МИНИСТЕРСТВО НАУКИ И ВЫСШЕГО ОБРАЗОВАНИЯ РОССИЙСКОЙ ФЕДЕРАЦИИ
НАЦИОНАЛЬНЫЙ ИССЛЕДОВАТЕЛЬСКИЙ
ТОМСКИЙ ГОСУДАСТВЕННЫЙ УНИВЕРСИТЕТ
ФАКУЛЬТЕТ ИНОСТРАННЫХ ЯЗЫКОВ

Academic Writing for Chemistry Students

Учебно-методическое пособие

Томск
2018

РАССМОТРЕНО И УТВЕРЖДЕНО учебно-методической комиссией кафедры английского языка естественнонаучных и физико-математических факультетов
Протокол № 1 от «20» февраля 2018 г.

Председатель методической комиссии
заведующая кафедрой, канд. пед. наук, доцент ……
Шульгина Е.М.

Academic Writing for Chemistry Students: учебно-методическое пособие / сост. Л.В. Артамонова, Т.Г. Евтушенко, Т.В. Шилова. – Томск: Издательский Дом Томского государственного университета, 2018. – 102 с.

Данное учебно-методическое пособие предназначено для магистрантов и аспирантов, обучающихся по направлению подготовки «Химия». Целью данного пособия является обучение будущих специалистов написанию научных статей по специальности на английском языке. Пособие основано на аутентичных профессиональных текстах из международных научных журналов.

Составителями разработан комплекс упражнений, а также представлены справочные материалы.

СОСТАВИТЕЛИ:

Л.В. Артамонова, Т.Г. Евтушенко, Т.В. Шилова

Рецензенты:

доктор педагогических наук, профессор О.А. Обдалова,
кандидат химических наук, старший научный сотрудник М.А. Салаев

CONTENTS

PREFACE

The textbook aims to develop postgraduate students' writing skills necessary for science communication helping them to better understand authentic texts in different domains of chemistry and report their research findings.

A research paper in Chemistry written for publication in one of International scientific journals, like any other paper in Natural Sciences, is supposed to consist of the following sections:

- Title;
- Abstract;
- Introduction;
- Main body;
- Conclusions;
- Acknowledgements;
- References.

However, the number of sections and their names can vary in different journals.

The paper written in English must be well presented at a conference when needed. Thus, some information and advice consistent with appropriate self-study activities are provided for students who are planning their scientific career.

The textbook is structured as follows.

- The Preface gives a review of issues that must be studied when building skills in academic writing in English.
- Part I (Sections 1.1-1.6) presents the structure of a research paper, the knowledge of which is essential for young researchers. Every section gives a full explanation of how to write each part of the scientific paper including both methodological recommendations and a sufficient number of exercises that can be chosen by a teacher depending on students' language skills, proficiency and syllabus.
- Part II (Sections 2.1-2.3) provides authentic materials from conference announcements. The analysis of a number of Calls for papers boosts students' vocabulary, which helps them to easily find the right conference, register and submit a paper in accordance with their scientific interests.

1.1. TITLE AND KEYWORDS

Focus on theory

Every paper starts with the Title, after which one can find the names of the authors, their affiliation, post and e-mail addresses and the institution where research was done. Then goes the Abstract, at the end of which there is a list of keywords.

Every word in the title should be meaningful. The title is supposed to be simple and accurately reflect the investigation in order to attract the right kind of readers. As a matter of fact, it should be short and indicate what is written in the paper itself.

Usually titles are incomplete sentences but they can be in a question form as well. If the title is an incomplete sentence, no period is placed at the end of the sentence. If the title is a question, which is rather rare, there must be a question mark at the end of it.

All the words in the title are often capitalized, apart from articles, prepositions and conjunctions. This is always specified in a template. If the title consists of two parts, they are divided by a colon. Remember that the first word after the colon is written with a capital letter no matter what part of speech it may be.

One important issue is the use of the articles in the title. The title is more often an incomplete sentence (containing nouns, infinitives, gerunds), that is why it should conform to the rules of English Grammar. Consequently you can use either definite or indefinite articles if you need.

The prepositions that are frequently used in the title are *by* (how something is done), *for* (for the purpose of), *from* (the origin of), *in/on* (where something is located; what something regards), and *of* (belonging to, regarding).

***Note*:** The title should consist of 6-10 words and include the words relevant for your research area and attract the reader's attention.

The keywords are more often nouns. Remember to choose nouns very carefully. Avoid using a string of nouns otherwise clarity might be lost. The adjectives that have been chosen should show the uniqueness of the work.

Exercise 1.1. Read the title and keywords below and answer the following questions.

- How many words does the title consist of?
- What parts of speech does it consist of?
- Are there any keywords in the title?
- What parts of speech are usually capitalized?
- Are there any prepositions? What do they mean?

A compact portable flow analysis system for the rapid determination of total phosphorus in estuarine and marine waters

Brady S. Gentle, Peter S. Ellis, Peter A. Faber, Michael R. Grace, Ian D. McKelvie*
Water Studies Centre, School of Chemistry, P.O. Box 23, Monash University, Clayton, Vic. 3800, Australia

Keywords: Flow analysis, phosphorus, nutrient monitoring, natural waters
* Corresponding author. Tel.: +61 3 990 54558; fax: +61 3 990 54196.
E-mail address: Ian.McKelvie@sci.monash.edu.au (I.D. McKelvie).

Exercise 1.2. Read the title and keywords below and answer the questions.

- Does the title attract the right kind of readers? Why?
- What parts of speech does it consist of?
- Does it have a definite and concise indication of what is written in the paper itself?
- What information about the authors is given? Is it complete or not?

Chemical synthesis of poly (lactic-co-glycolic acid) / hydroxyapatite composites for orthopaedic applications

Sarah E. Petricca [a], Kacey G. Marra [a,b], Prashant N. Kumta [a,b,c,*]
a Biomedical Engineering, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, USA
b Institute for Complex Engineered Systems, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, USA
c Materials Science and Engineering, Carnegie Mellon University, 4309 Wean Hall, 5000 Forbes Avenue, Pittsburgh, PA 15213, US

Keywords: Hydroxyapatite (HA); PLGA; Biodegradable; Bone tissue engineering; MG63
* Corresponding author. Address: Biomedical Engineering, Carnegie Mellon University, 5000 Forbes Avenue, Pittsburgh, PA 15213, USA.
E-mail address: kumta@cmu.edu (P.N. Kumta).

Exercise 1.3. Read the information below and answer the questions.

- What keywords for the paper with this title might be?
- What parts of speech are capitalized?
- Are there punctuation marks in the title?

Nanostructured TiO2.CeO2 mixed oxides by an aqueous sol.gel process: Effect of Ce:Ti molar ratio on physical and sensing properties

M.R. Mohammadi[a,b], D.J. Fray[b]
a Department of Materials Science & Engineering, Sharif University of Technology, Azadi Street, Tehran, Iran
b Department of Materials Science & Metallurgy, University of Cambridge, Pembroke Street, Cambridge CB2 3QZ, UK

* Corresponding author at: Department of Materials Science & Engineering, Sharif University of Technology Azadi Street, Tehran, Iran. Tel.: +98 21 6616 5211.
E-mail addresses: mrm41@cam.ac.uk, mohammadi@sharif.edu (M.R. Mohammadi).

1.2. ABSTRACT

Focus on theory

A.Wallwork distinguishes four main types of abstracts (Wallwork, 2013). Their function is to summarize the research. That is why they are sometimes called Summaries.

An *unstructured* abstract consists of one paragraph (100-250 words) and contains a very brief summary of the paper.

A *structured* abstract consists of two or even more paragraphs and also contains a brief summary of the paper.

An *extended* abstract is organized as a full paper (e.g. Introduction, Methods, Discussion...), but much shorter (two to four pages). According to the requirements the abstract is optional.

A *conference* abstract is usually an extended abstract (up to 500 words) written for the conference.

The type of abstract depends on the journal or conference where you are going to submit your paper. The instructions to the authors are always given in a template.

It is common practice to write the draft of the abstract. It can be used as a plan of the paper. When the paper has been completed, the abstract is written.

In the abstract, the author should describe:

- aim of research;
- methods of study;
- results of research;
- conclusions and/or recommendations.

The styles that are used for writing abstracts can be personal or impersonal.

Personal way:

We discovered that…

The authors discovered that…

Impersonal way:

It was discovered that …

The most commonly used tenses in abstracts are:

The p r e s e n t s i m p l e *(we show*)

The p a s t simple *(we showed).*

The present perfect *(we have shown)*

The link words are very important in the abstract. The most frequently used are *however, otherwise, instead, moreover, also, in this paper, consequently in addition.*

The use of keywords

The keywords are of great importance because the readers stick to the keywords in their search for information. That is why the authors must have the keywords not only in the title but in the abstract of the article as well. It is recommended that the keywords should not be repeated more than 3 times in the abstract.

PART A

Exercise 2.1.Read and analyze the Abstract below.

ABSTRACT. The effect of the **catalyst** load in slurry hydrocracking of heavy Maya crude oil … at mild conditions (390 _C and 1400 H2 psi). The catalyst load and operating time …in the intervals 0–1000 ppm Mo and 0–11 h respectively. The results …to establish the transformation routes of the different **fractions** under thermal or catalytic conditions. Under thermal conditions, the **contributors** to gas **formation** … to be: Asphaltenes_resins > vacuum gas–oil and the use of catalyst inhibited the contributions of resins and vacuum gas–oil. It … that catalytic slurry hydrocracking evolves in two general reaction stages: the first, dominated by the catalyst-induced **reactions**, from zero to 50% VR **conversion**, and the second, above 50% VR conversion, dominated by thermal reactions leading to high **production** of coke. During the first stage the naturally occurring asphaltenes of Maya crude were effectively transformed to liquid fractions and the formation of coke and new asphaltene-like **components** were catalytically inhibited. Moreover, the production of middle distillates was enhanced. The second reaction stage in catalytic hydrocracking approaches thermal behavior likely because part of the catalyst is lost when the crude **mixture** above 50% VR conversion departs from physical **equilibrium** and forms asphaltenic **aggregates** that precipitate entrapping some catalyst. During the second reaction stage, middle **distillates** are transformed to light ends, which are end products because no declination … in its production. The use of catalyst … API **gravity** and **viscosity** of the liquid product. In all cases the API gravity … with naphtha production. The hydrodesulfurization results … that most of the eliminated sulfur was of asphaltenic nature, presumably associated to the aliphatic lateral chains of asphaltenes. A qualitative **estimation** of the importance of the different reaction routes … on the basis of the results of this work.

Exercise 2.2. Make the abstract complete using the following words: *were varied, was investigate, increased, improves, were found, indicate, allowed (2), was found, is proposed.*

Exercise 2.3. Make the list of keywords for the Abstract given above.

Exercise 2.4. Make the heading of the paper using the words given below:

Hydrocracking, of, crude, oil, Maya, in, a, slurry-phase, batch, reactor., II., Effect, catalyst, load, of.

Exercise 2.5. Think of the definitions for the highlighted words in the Abstract.

Exercise 2.6. Fill in the prepositions to make word combinations complete.

at from to(2) in

1. Investigate … mild conditions
2. The contributors … gas formation
3. Evolve … two reaction stages
4. Transform … fractions
5. depart … physical equilibrium

Exercise 2.7. Make up sentences with the word combinations given in Ex. 2.6

Exercise 2.8. Rewrite the following sentences in the Passive voice.

1. We investigate the effect of the catalyst load in slurry hydrocracking of heavy Maya crude oil at mild conditions (390 ^{0}C and 1400 H2 psi).
2. We found that the contributors to gas formation are Asphaltenes_resins > vacuum gas–oil under thermal conditions.
3. We found that catalytic slurry hydrocracking evolved in two general reaction stages.
4. We propose a qualitative estimation of the importance of the different reaction routes on the basis of the results of this work.
5. We did not observe any declination in coke production.

Exercise 2.9. What does ***'that'*** mean in these sentences?

1. It was found **that** catalytic slurry hydrocracking evolves in two general reaction stages: the first, dominated by the catalyst-induced reactions, from zero to 50% VR conversion, and the second, above 50% VR conversion, dominated by thermal reactions leading to high production of coke.
2. The second reaction stage in catalytic hydrocracking approaches thermal behavior likely because part of the catalyst is lost when the crude mixture above 50% VR conversion departs from physical equilibrium and forms asphaltenic aggregates **that** precipitate entrapping some catalyst.
3. This finding is in line with previous results **that** indicate that around 67% of the metals in Maya crude are of asphaltenic nature whereas 33% is non-asphaltenic.
4. This implies **that** most of the removed sulfur was located in the asphaltenes and **that** its elimination, at least in the initial stages of the process, is associated to the elimination of the side chains of asphaltenes and was likely via gas products and not associated to the precipitation of solids **that** followed a different trend and **that** up to 40% VR conversion was not present for the catalytic process.
6. This indicates **that** the amount of gasoline in the liquid mixture influences significantly the API gravity of the mixture.
7. The observed accelerated production of gasoline at ~ 70% VR conversion is coincident with the decline of middle distillates, indicating **that** middle distillates contribute significantly to the production of gasoline and **that** they are responsible of the higher level of gasoline production in the 1000 ppm Mo catalytic hydrocracking.
8. Thus, it is possible to say **that** the catalyst favors the production of middle distillates which are in turn transformed to gasoline mainly by thermal reactions.
9. It is also observed **that** the thermal processing leads to greater proportions of light fraction in the liquid compared to catalytic reaction.

Exercise 2.10. Boost your vocabulary with the words from the Abstract.

Noun	Verb	Adjective	Adverb
conversion	evolve	General	naturally
effect	establish	Heavy	respectively
load	inhibit	Mild	effectively

Noun	Verb	Adjective	Adverb
condition	dominate	Different	catalytically
interval	induce	Thermal	likely
route	occur	Catalytic	presumably
contribution	approach	Lateral	
distillate	depart	Aliphatic	
behavior	lose	qualitative	
declination	precipitate		
gravity	entrap		
viscosity	eliminate		
chain	associate		
estimation	improve		

PART B

Exercise 2.11. Read and analyze the Abstract below.

A compact portable flow analysis system for the rapid determination of total phosphorus in estuarine and marine waters

Brady S. Gentle, Peter S. Ellis, Peter A. Faber, Michael R. Grace, Ian D. McKelvie*
Water Studies Centre, School of Chemistry, P.O. Box 23, Monash University, Clayton, Vic. 3800, Australia

ABSTRACT. The development and evaluation of a portable flow analysis system for the *in situ* determination of total phosphorus is described. The system has been designed with rapid underway monitoring in mind. The system employs an ultra-violet photo-reactor and thermal heating for peroxodisulfate digestion of total phosphorus to orthophosphate, followed by spectrophotometric detection with a multi-reflective flow cell and low-power light emitting diode using the molybdenum blue method. Reagents are stored under gas pressure and delivered using software controlled miniature solenoid valves. The fully automated system has a throughput of 115 measurements per hour, a detection limit of 1μgPL^{-1}, and gives a linear response over the calibration range of 0–200μgPL^{-1} (r2 = 0.9998), with a precision of 4.6% RSD at 100μgPL^{-1} (n = 10). Field validation of the instrument and method was performed in Port Philip and Western Port Bays in Victoria, SE Australia, where 2499 analyses were performed over a 25 h period, over a cruise path of 285 km. Good agreement was observed between determinations of samples taken manually and analyzed in the laboratory and those measured *in situ* with the flow analysis system.

Exercise 2.12. Make the list of keywords for the Abstract given above.

Exercise 2.13. Fill in the appropriate link words (you will not need all of them): *firstly, secondly, finally, in addition to, also, moreover, otherwise, while, but, consequently, in this paper, herein.*

Exercise 2.14. Match the verbs with the nouns.

a. describe	1. good agreement
b. design	2. validation
c. store	3. response
d. give	4. reagents
e. perform	5. system
f. observe	6. development

Exercise 2.15. Complete the definitions using the correct word from the text given above.

_____ systematic determination of merit, worth, and significance of something or someone using criteria against a set of standards.

_____ a poisonous non metallic chemical element existing as a yellowish waxy solid which ignites spontaneously in air and glows in the dark, and as a less reactive form used in making matches.

_____ the process of breaking a complex topic or substance into smaller parts to gain a better understanding of it.

_____ the act or process of digesting; reduction to order; classification; thoughtful consideration.

_____ finding out or being found out.

_____ a planned way of doing something, especially one that a lot of people use.

_____ a situation in which someone tries to make someone else do something by arguing, persuading, etc.

_____ the basic organizational unit of all living organisms.

_____ a small part or quantity intended to show what the whole is like.

Exercise 2.16. How do the highlighted words differ? Explain it to your partner.

1. The system employs an ultra-violet photo-reactor and thermal ***heating*** for peroxodisulfate digestion of total phosphorus to orthophosphate
2. The system has been designed with rapid underway ***monitoring*** in mind.
3. Reagents are stored under gas pressure and delivered ***using*** software controlled miniature solenoid valves.
4. It is followed by spectrophotometric detection with a multi-reflective flow cell and low-power light ***emitting*** diode ***using*** the molybdenum blue method.

Exercise 2.17. What do you think the highlighted words mean?

1. Good agreement was observed between determinations of samples taken manually and analyzed in the laboratory and ***those*** measured in situ with the flow analysis system.
2. Consequently the sacrifice in sensitivity to achieve complete mineralization of ***these*** species is not worth the gain in conversion.
3. Under ***these*** conditions a silicic acid solution produces 1.6% of the analytical response of an equivalent molarity orthophosphate solution.
4. ***This*** therefore precludes the use of an alkaline medium I marine or high salt estuary waters.
5. There is reasonable agreement between manually collected samples measured by a comparative method and ***those*** measured continuously.
6. ***This*** is most likely the loss of sensitivity.
7. ***This*** detection limit is adequate for coastal marine and highly pristine fresh waters.

Exercise 2.18. Boost your vocabulary with the words from the Abstract.

Noun	Verb	Adjective	Adverb
development	describe	portable	fully
evaluation	design	Rapid	manually
determination	employ	ultra-violet	
digestion	follow	thermal	

Noun	Verb	Adjective	Adverb
detection	emit	spectrophotometric	
pressure	store	Linear	
measurement	deliver	Total	
response	perform		
precision	observe		
validation			
valve			
sample			
range			
agreement			

PART C

Exercise 2.19. Read and analyze the Abstract below.

Comparison of inductively coupled plasma mass spectrometry and colorimetric determination of total and extractable phosphorus in soils

Krasimir Ivanov [a], Penka Zaprjanova [b], Milena Petkova [a], Violeta Stefanova [c], Veselin Kmetov [c], Deyana Georgieva [c], Violina Angelova [a]
a Department of Chemistry, University of Agriculture, Plovdiv, Bulgaria
b Tobacco and Tobacco Products Institute, Plovdiv, Bulgaria
c Department of Analytical Chemistry, Plovdiv University "Paisii Hilendarski," Plovdiv, Bulgaria

ABSTRACT. The most widely used method for determination of total phosphorus in soils ***is/will be*** perchloric acid digestion, followed by a colorimetric assay to measure the measure of P in solution. The first part of this study ***is comparing/compares*** an alternative digestion method, using aqua regia (ISO 11466 and EPA Method 3052), with perchloric acid digestion procedure, and also ***are comparing/compares*** inductively coupled plasma mass spectroscopy (ICP-MS) with colorimetry for the measurement of P on the basis of five internationally certified standard soils and 20 real-life soils with widely different extractability of phosphorus. The phosphorus concentration ***had been determined/was determined*** by means of the reduced phosphomolybdenum blue and ICP-MS. The relationship between methods ***has been examined/is examined*** statistically. Good agreement of the results from colorimetry and ICP-MS ***has been established/was established*** for all certified soils. The microwave-assisted

digestion with aqua regia ***is being comparable/was comparable***, both in precision and accuracy, with the hot plate aqua regia method. The phosphorus concentration found with the HF+HClO4 digestion method ***was/has been*** in good agreement with the certified mean values, while the superiority in extracting phosphorus, when compared to other methods, ***is being/was*** obvious.

Soil testing for plant-available phosphorus in Bulgaria and many European countries ***is/was*** most commonly ***conducted*** using acid Ca-lactate extraction (Egner–Riehm test) and alkaline sodium bicarbonate extraction (BDS ISO 11263:2002), based on Olsen test, followed by a colorimetric assay to measure the concentration of P in solution. The second part of this study ***reports/have been reported*** the differences between Egner–Riehm test and BDS ISO 11263:2002 measured colorimetrically and by ICP-MS. Fifty soils ***will be selected/were selected*** from South Bulgaria to represent a wide range of soil properties. ***It was established/had been established*** that ICP-MS consistently ***yielded/yield*** significantly higher P concentrations than the colorimetric method in both alkaline sodium bicarbonate extraction, and the relative differences ***were/was*** greatest in soils with lower P concentrations.

Exercise 2.20. Think of the keywords for the article.

Exercise 2.21. Choose the correct form of the verb in bold italics.

Exercise 2.22. Fill in the appropriate link words (you will not need all of them): *to start with, thereafter, in other words, later, next, as a result, hence, however, in conclusion*

Exercise 2.23. Complete the definitions using the word from the text.

_____ a test of a substance to find out what chemicals it contains. It is usually carried out to find out how pure a substance is.

_____ a homogeneous mixture of two or more substances in which the molecules or atoms of the substances are completely dispersed. The constituents can be solids, liquids, or gases.

_____ a way of doing something, especially the usual or correct way.

_____ a level of quality or achievement, especially a level that is thought to be acceptable.

_____ a particular number or quantity that can replace a symbol such as `x' or `y' in a mathematical expression.

_____ the action of extracting something, especially using effort or force.

_____ a quality, attribute, or distinctive feature of anything, esp. a characteristic attribute such as the density or strength of a material.

_____agreement harmony or accordance in opinion or feeling.

_____ the state of being connected or related.

Exercise 2.24. Fill in the prepositions.

with for between on by to,

1. Method … determination
2. Followed … the assay
3. The relationship … methods
4. Good agreement … results
5. Compared … other methods
6. Based … the test

Exercise 2.25. Make up sentences with the word combinations given in *Ex. 2.19*

Exercise 2.26. Rewrite the word combinations using prepositional phrases.

1. Perchloric acid digestion procedure
2. An alternative digestion method
3. Coupled plasma mass spectroscopy
4. The phosphorus concentration
5. The hot plate aqua regia method
6. alkaline sodium bicarbonate extraction

Exercise 2.27. Join the sentences together using the appropriate conjunctions where necessary.

1A. The most widely used method for determination of total phosphorus in soils is perchloric acid digestion.

1B. It is followed by a colorimetric assay to measure the measure of P in solution.

2A. The phosphorus concentration found with the HF+HClO4 digestion method was in good agreement with the certified mean values.
2B. Still, the superiority in extracting phosphorus was obvious.
2C. It is compared to other methods.

Exercise 2.28. The sentences contain an extra word. Cross out the extra words where necessary.

1. The most widely used method for determination of total phosphorus in soils it is perchloric acid digestion.

2. Soil testing for plant-available phosphorus in Bulgaria and many European countries it is most commonly conducted using acid Ca-lactate extraction (Egner–Riehm test) and alkaline sodium bicarbonate extraction (BDS ISO 11263:2002).

3. Fifty soils were selected from South Bulgaria to their represent a wide range of soil properties.

Exercise 2.29. Boost your vocabulary with the words from the Abstract.

Noun	Verb	Adjective	Adverb
determination	follow	Total	widely
phosphorus	measure	alternative	inductively
digestion	extract	Mean	internationally
assay	compare	obvious	statistically
measure	represent	available	commonly
solution	use	relative	consistently
procedure	establish		significantly
colorimetry	select		
extractability	report		
relationship	yield		
precision	conduct		
accuracy	compare		
agreement	determine		
value			
concentration			

Part D

Exercise 2.30. Read and analyze the Abstract below.

Investigation of sol–gel prepared CeO2–TiO2 thin films for oxygen gas sensing

A. Trinchi [a],∗, Y.X. Li [a,b], W. Wlodarski [a] , S. Kaciulis [c], L.Pandolfi [c], S. Viticoli [c], E. Comini [d], G. Sberveglieri [d]

a *School of Electrical and Computer Engineering, RMIT University, Australia*
b *The State Key Lab of High Performance Ceramics and Superfine Microstructure, Shanghai Institute of Ceramics, Shanghai 200050, China*
c *Institute for the Study of Nanostructured Materials, ISMN-CNR, Monterotondo (RM), Italy*
d *Department of Materials Chemistry and Physics, University of Brescia, Brescia, Italy*

ABSTRACT. The oxygen gas sensing performance of semiconducting CeO2–TiO2 thin films ***(be investigated)***. These thin films ***(be prepared)*** by the sol–gel process utilizing a non-alkoxide as the main precursors. For gas sensing measurements, the films ***(be deposited)*** by the spin coating technique onto alumina substrates with interdigital transducers located on the top and a micro-heater on the bottom. For the microstructural characterization, the thin films ***(be deposited)*** onto single crystal silicon substrates. X-ray photoelectron spectroscopy (XPS), Auger electron spectrometry (AES) and scanning electron microscopy (SEM) ***(be employed)*** to analyze the films. These films ***(be exposed)*** to various concentrations of O2 gas and their electrical responses ***(be measured).***

Exercise 2.31. What might be the keywords?

Exercise 2.32. Put the verbs in brackets into the correct form.

Exercise 2.33. Match the verb with the nouns.

1 measure	A effect, possibility, matter, cause, relationship, condition, nature , problem, question, influence, role,case, subject, situation, impact, way, property, issue, use, relation, structure
2. prepare	B student ,report , plan , statement , list , work , draft , information
3. utilize	C method , term , power ,word , order, purpose, worker ,technique, agent, resource, device
4. investigate	D success, test, value, damage, unit, degree, thing, way, time, ability, amount, standard, power, strength, effect, distance
5 .employ	E ability, service , opportunity, way , resource , power, plant, approach, need, method, information, person, effort, oxygen, energy

Tell your partner / group what kind of things you could …

- investigate;
- prepare;
- employ;
- measure;
- utilize.

Exercise 2.34. Rewrite the word combinations using prepositional phrases.

1. CeO2–TiO2 thin films
2. the oxygen gas sensing performance
3. gas sensing measurements
4. the spin coating technique
5. crystal silicon substrates
6. X-ray photoelectron spectroscopy
7. Auger electron spectrometry

Exercise 2.35. What do the highlighted phrases mean?

1. ***For the microstructural characterization***, the thin films were deposited onto single crystal silicon substrates.

2. X-ray photoelectron spectroscopy (XPS), Auger electron spectrometry (AES) and scanning electron microscopy (SEM) were employed ***to analyze the films***.

Exercise 2.36. What is the weakness of this Abstract?

Exercise 2.37. Reproduce the Abstract using the appropriate link words.

Exercise 2.38. Boost your vocabulary with the words from the Abstract.

Noun	Verb	Adjective	Adverb
performance	investigate	Thin	
film	utilize	Main	
process	locate	interdigital	

Noun	Verb	Adjective	Adverb
precursor	prepare	microstructural	
measurement	deposit	single	
technique	expose	various	
substrate	measure	electrical	
characterization	analyze		
transducer			
micro-heater			
bottom			
response			

PART E

Exercise 2.39. Read and analyze the Abstract below.

Structural characterization of humic acids, extracted from sewage sludge during composting, by thermochemolysis–gas chromatography–mass spectrometry

S. Amir [a], M. Hafidi [a],*, L. Lemee [b], G. Merlina [c], M. Guiresse [c], E. Pinelli [c], J.-C. Revel [c], J.-R. Bailly [c], A. Ambles [b]

a Equipe Ecologie Ve´ge´tale et Environnement, Faculte´ des Sciences Semlalia, De´partement de Biologie, BP/2390 Marrakech, Maroc

b Laboratoire de Chimie XII, Universite´ de Poitiers, 40 Avenue du Recteur Pineau, Poitiers 86022, France

c Equipe Agronomie, Environnement et Ecotoxicologie (A2E), Ecole Nationale Supe´rieure Agronomique, Auzeville-Tolosane, BP/107 Toulouse, France

ABSTRACT. Thermochemolysis coupled with gas chromatography and mass spectrometry *(be applied)* to determine the structure of humic acids (HA) extracted from a sewage sludge and straw mixture at different steps of composting. The HA extracted from sludge mixture *(release)* various compounds, such as mono-, di-, tri-methoxy (alkyl) benzene and (alkyl) benzoic acids, ***which/who*** originated from lignin like derivatives of phydroxyphenyl, guiaicyl and syringyl units. ***However/In addition***, other aromatic non-lignin derived structures *(be found)* along with series of branched C15, linear C16, C18 fatty acid methyl esters. The follow-up of various lignin-derived units during composting *(show)* a decrease in *p*-hydroxyphenyl type-compounds (C) after the stabilisation phase. In parallel the more oxidized units, derived from guaiacyl (G) and syringyl (S) units, corresponding mainly to methylated derivatives of cafeic acids, protocatechuic acids, gallic acids and aldehydes, significantly *(increase)* in comparison with the other aromatic structures. Various ratios commonly used as parameters to determine the degree of lignin decomposition during humification *(be follow)* to monitor the chemical structure changes of the HA extracted from sludge mixture during

composting. In the present case, the S/G ratio *(not present)* significant changes during composting. The acid/aldehyde ratio *(be supervised)* using the ratio of gallic acids to gallic aldehyde methylated derivatives ***or/and*** *(show)* an increase from 0.73 to 2.13 after the stabilization phase ***but/moreover*** a decrease to 0.93 at the end of composting. This evolution may be explained by the increase of acid-containing derivatives following the intense oxidation of lignin side-chains during the stabilisation phase. ***But/Also***, the decrease of the acid/aldehyde ratio during the maturation phase could be attributed to a decrease in acid units by polymerization of benzoic acid type-compounds through ester/ether linkages. The follow up of six families of compounds of similar chemical structures during composting *(show)* a decrease of lignin-type compounds C6–C3 and ***that/because*** C6–C1 units *(predominate)* in the humic acid isolated from end compost sludge. The fatty acid methyl esters *(show)* an increase in the intermediate phase of composting probably originating from the activities and tissues of microorganisms, ***which/that*** are numerous during the process. The final decrease in the amount of fatty acids may be explained by the death of most of the microbial population at the end of composting typified by a low respiratory rate. The index of Shannon-Weaver (Ish) *(remain)* constant at about 3 in course of composting indicating the neoformation of HA from subunits of similar chemical nature. A similitude index (Sij, S0 i j) *(show)* a split between 30 and 90 days of composting indicating a change in the rate of geoformation of HA after a stabilization phase. ***Afterwards/Finally***, the rate of HA neoformation *(vary)* linearly with the duration of composting.

Exercise 2.40. Choose the appropriate link words.

Exercise 2.41. Put the verbs in brackets in the correct tense form.

Exercise 2.42. Reproduce the Abstract.

Exercise 2.43. Find the derivatives of the words given below in the text and translate them into Russian.

Mix, vary, derive, stable, aroma, line, compare, fat, act, organ, form, sew.

Exercise 2.44. Complete the definitions using the correct word from the text.

_____ the arrangement of particles or parts in a substance or body.

_____ a portion of matter consisting of two or more components in varying proportions that retain their own properties.

_____ a substance that can be made from another substance.

_____ any of a set of physical properties whose values determine the characteristics or behavior of something.

_____ the relationship in quantity, amount, or size between two or more things.

_____ a process of continuous change from a lower, simpler, or worse to a higher, more complex, or better state.

_____ a distinguishable part in a course, development, or cycle.

_____ the process of becoming mature.

_____ a chemical reaction in which two or more molecules combine to form larger molecules that contain repeating structural units.

_____ the total of individuals occupying an area or making up a whole.

_____ a number (as a ratio) derived from a series of observations and used as an indicator or measure.

Exercise 2.45. Are **'such as'** and **'like'** the same in this sentence?

The HA extracted from sludge mixture released various compounds, such as mono-di-, tri-methoxy (alkyl) benzene and (alkyl) benzoic acids, which originated from lignin like derivatives of phydroxyphenyl, guiaicyl and syringyl units.

Exercise 2.46. What is the difference between the phrases?

a) the decrease of the acid/aldehyde ratio

b) the final decrease in the amount of fatty acids

Exercise 2.47. Join two sentences together using the appropriate connectives where necessary.

1A. In parallel the more oxidized units significantly increased in comparison with the other aromatic structures.

1B. The more oxidized units were derived from guaiacyl (G) and syringyl (S) units, corresponding mainly to methylated derivatives of cafeic acids, protocatechuic acids, gallic acids and aldehydes.

2A. The acid/aldehyde ratio was supervised using the ratio of gallic acids to gallic aldehyde methylated derivatives.
2B. It showed an increase from 0.73 to 2.13 after the stabilization phase but a decrease to 0.93 at the end of composting.

3A. The index of Shannon-Weaver (Ish) remained constant at about 3 in course of composting.
3B. This indicates the neoformation of HA from subunits of similar chemical nature.

4A. The fatty acid methyl esters *(show)* an increase in the intermediate phase of composting probably originating from the activities and tissues of microorganisms.
4B. Microorganisms are numerous during the process.

Exercise 2.48. The two sentences below contain errors. Can you spot them yourself?

1.Thermochemolysis coupled with gas chromatography and mass spectrometry were applied for to determine the structure of humic acids (HA) extracted from a sewage sludge and straw mixture at different steps of composting.

2.The final decrease in the amount of fatty acids may be explained by the death of the most of the microbial population at the end of composting typified by a low respiratory rate.

Exercise 2.49. Boost your vocabulary with the words from the Abstract.

Noun	Verb	Adjective	Adverb
Thermochemolysis	determine	humic	mainly
chromatography	extract	various	significantly
spectrometry	originate	benzoic	probably
acid	explain	aromatic	linearly
sludge	attribute	fatty	
mixture	indicate	cafeic	
compound	typify	intermediate	
derivative	predominate	respiratory	
ester	increase	microbial	
evolution	release	similar	
linkage		constant	
polymerization			
humification			
duration			
neoformation			

Noun	Verb	Adjective	Adverb
geoformation			
tissue			
maturation			

Exercise 2.50. Translate the following phrases from Russian into English.

1. В этой статье описывается метод …
2. В работе приводятся данные …
3. В литературе имеются данные о …
4. Данные, полученные экспериментальным путем, не противоречат …
5. Нами установлено…
6. Предлагается метод …
7. В статье описывается система …
8. Разработаны методы …
9. Материал успешно используется …
10. В статье приводятся данные…

PART F

Exercise 2.51. Read the Abstract and correct 10 mistakes (grammar, spelling, punctuation).

Synthesis of CeO2 and CeZrO2 mixed oxide nanostructured catalysts for the iso-syntheses reaction

Raimundo Crisostomo Rabelo Netob,1, Martin Schmala,∗

The different CeO2 oxides and mixed oxide CeZrO2 showing nanosized structures and morphologies in particular distinct structural and surface propertis. These catalysts were effectively in the iso-synthesis reaction. The flowerlike CeO2 (F) and the mixed oxide (CeZrO2) showed the most high selectivity toward isobutene and isobutene and low methane formation. The turnover frequency (TOF) related to the total basicity and total acid sites is equal for all catalysts within a factor less than 2 and did not change with the oxigen lattice capacity (OSC), that confirms that the reaction is structure insensitive. The selectivity of total hydrocarbon and of CO2 are independent on the basic sites. However, the selectivity of total iso- C4 exhibits a linear relationship with the basic sites. The mixed oxide (CeZrO2) presented the strongest basic sites and thus the highest selectivity to iso-C4. Significant is the influence of Lewis acid sites on the selectivity of isobutene increasing and isobutane decreasing both linear with Lewis acid sites. The ratio isobutene/isobutane presented a linear relationship with

the Lewis acid sites which are direct related to OSC capacity of reducible oxides.

Exercise 2.52. Boost your vocabulary with the words from the Abstract.

Noun	Verb	Adjective	Adverb
oxide	change	particular	directly
relationship	increase	equal	
factor	present	linear	
morphology	exhibit	distinct	
property	confirm	effective	
selectivity	relate	insensitive	
isobutene	decrease	significant	
frequency		total	
basicity		reducible	
insensitive		basic	
influence			
ratio			
capacity			

Revision

What do you need to know when writing an Abstract?

Self-study activity

Write the Abstract for the research paper of your own.

1.3. THE STRUCTURE OF THE INTRODUCTION

Focus on theory

In the Introduction, the background knowledge is presented. The reader finds the tools for understanding the meaning and motivation of the research carried out by the authors.

In the Introduction, the author introduces:

- The description of the problem or establishing a context;
- The literature review;
- Research gaps in a certain scientific field;
- The gap the author is going to fill;
- The definition of the purpose;
- The results the author has arrived at;
- The structure of the rest of the paper.

The use of tenses

The present simple is generally used at the beginning of the Introduction in order to describe well-known facts. Then it is reasonable to use the Present Perfect to show how long the problem has been studied. To introduce the completed investigations the Past Simple is used. At the end of the Introduction the Present Simple is usually used to outline the structure of the paper.

PART A

Exercise 3.1. Read and analyze the Introduction using the information given above. Put the verbs in brackets into the correct form.

Rate of phosphoantimonylmolybdenum blue complex formation in acidic persulfate digested sample matrix for total dissolved phosphorusdetermination: Importance of post-digestion pH adjustment

Xiao-Lan Huang[a,b],., Jia-Zhong Zhang[a]

a Ocean Chemistry Division, Atlantic Oceanographic and Meteorological Laboratory, National Oceanic and Atmospheric Administration, Miami, FL 33149, USA
b CIMAS, Rosenstiel School of Marine and Atmospheric Science, University of Miami, Miami, FL 33149, USA

INTRODUCTION

Phosphorus ***(be)*** one of essential nutrients for life on earth, and ***(occur)*** in soils, sediments, waters, and organisms. Among various forms of phosphorus, orthophosphate, the most frequently measured form of phosphorus, ***(be considered)*** to be the only form directly

available and rapidly assimilated by bacteria, algae [1] and plants [2,3]. On the other hand, the role of organic phosphorus in different ecosystems ***(be)*** still a subject of intensive study [4–6]. This ***(be)*** in part due to the lack of reliable organic phosphorus data in many ecosystems because of complex procedures involved in determination of dissolved organic phosphorus [4,7]. To determine total dissolved organic phosphorus in the samples, breakdown of organic phosphorus, by digestion, to dissolved phosphate ***(be often required).*** Several methods, including fusion, dry ashing, and boiling samples in perchloric, sulfuric or nitric acid on a hot plate, ***(be employed)*** to digest samples for total dissolved phosphorus determination. More recently, autoclaving, UV photo-oxidation and microwave heating ***(be widely used)*** [8]. However, there ***(be)*** many uncertainties involved in the total dissolved phosphorus measurements [7–9]. The QUASIMEME laboratory performance studies (nutrient section) ***(indicate)*** that more than a half of laboratories participated in the inter-comparison study on total dissolved phosphorus cannot produce consistent results and ***(conclude)*** that the total phosphorus ***(be)*** the most problematic parameter in routine water quality monitoring program [10]. Among various problems, incomplete recovery of organic phosphate compounds ***(be considered)*** to cause the underestimate of the total dissolved phosphorus in the natural waters [4,11–13].

One of the most popular methods of total phosphorus digestion ***(be based)*** on the oxidation of organic phosphorus by persulfate in acidic solution. The oxidation processes ***(be usually accelerated)*** by autoclaving samples at a pressure of 137 kPa to 120 ◦C for a period of time (ranged from 30 min to 5 h) [12,14–17]. This procedure ***(be adapted)*** for total dissolved phosphorus analysis in the standard method for the examination of water and wastewater [18] and USEPA Method 365.1 [19]. Because the digestion product of organic phosphorus ***(be)*** orthophosphate, same color reagents and procedures ***(be widely used)*** for the determination of phosphate and total dissolved phosphorus in the same samples. Slow formation of the phosphoantimonylmolybdenum blue complex in persulfate might cause an underestimate in determination of total phosphorus, particularly in automated analysis where the colored complex ***(be usually detected***) less than 10 min after mixing the sample with reagents [22].

Previous studies ***(attribute)*** the slow formation of the phosphoantimonylmolybdenum blue complex in the acidic persulfate digested samples to the decrease in sample pH resulting from decomposition of persulfate to sulfuric acid [12,20,21]. For the total dissolved phosphorus in the fresh water and wastewater, neutralization of digested solution with sodium hydroxide ***(be recommended)*** before the total phosphate determination [18,19,23]. For measuring total dissolved phosphorus in seawater samples, a modified mixed reagent with high molybdate and low acidity ([H+]/Mo = 46.5) ***(be recommended)*** [12,15,17] to compensate newly formed sulfuric acid from decomposition of persulfate during the digestion process. The same strategy for sea water ***(be recently suggested)*** for determination of total dissolved phosphorus in fresh water and waste water samples [24]. Little attention ***(be paid)*** to the difference in sample matrix, particularly the modification of sample matrix after addition of oxidizing reagents and subsequent digestion process. The influence of oxidation products on the subsequent phosphoantimonylmolybdenum blue formation ***(be largely ignored).*** So far, there ***(be)*** no study on the kinetics of formation of the phosphoantimonylmolybdenum blue complex in the persulfate digested sample matrix. To develop an optimal procedure for total dissolved phosphorus determination, it ***(be)*** necessary to understand the factors that ***(control)*** the rate of the color formation in these digested sample matrix. In this report, we ***(explore)*** the kinetics of formation of the phosphoantimonylmolybdenum blue complex in total dissolved phosphorus samples that ***(undergo)*** the acidic persulfate digestion by a modified Murphy and Riley method [25,26]. The influences of persulfate and solution pH on the formation of the phosphoantimonylmolybdenum blue complex ***(be separately examined)*** and their combined effect ***(be evaluated).***

Exercise 3.2. What do the highlighted phrases express?

1. To determine total dissolved organic phosphorus in the samples, breakdown of organic phosphorus, by digestion, to dissolved phosphate is often required.
2. This procedure has been adapted for total dissolved phosphorus analysis in the standard method for the examination of water and wastewater and USEPA Method 365.1.
3. Because the digestion product of organic phosphorus is orthophosphate, same color reagents and procedures have been widely used for the determination of phosphate and total dissolved phosphorus in the same samples.
4. For the total dissolved phosphorus in the fresh water and wastewater, neutralization of digested solution with sodium hydroxide was recommended before the total phosphate determination .
5. The same strategy for sea water has recently been suggested for determination of total dissolved phosphorus in fresh water and waste water samples.
6. To develop an optimal procedure for total dissolved phosphorus determination, it is necessary to understand the factors that control the rate of the color formation in these digested sample matrix.
7. For measuring total dissolved phosphorus in seawater samples, a modified mixed reagent with high molybdate and low acidity ([H+]/Mo = 46.5) was recommende to compensate newly formed sulfuric acid from decomposition of persulfate during the digestion process.
8. To separate the effects of pH and persulfate concentration on the color formation kinetics, the first set of experiments was designed to study the kinetic of formations of the phosphoantimonylmolybdenum blue complex as a function of pH in the absence of persulfate and without autoclaving.
9. The chloride competing reaction for persulfate has been considered to cause incomplete persulfate digestion of dissolved organic carbon in seawater.
10. In order to verify the role of the intermediate products of persulfate oxidation in the color formation, kinetic measurements were made in the different mixtures of persulfate digested sample and undigested sample.

Exercise 3.3. Underline the link words that are used in the paper.

Exercise 3.4. Put the link words in the correct space below.

Contrast

_____

_____

Reason

_____

_____

Example

_____

Exercise 3.5. Put the verbs in brackets in the appropriate tense form.

Exercise 3.6. Find the words with the opposite meaning.

1. unnecessary, trivial - …

2. same, similar - …

3. rarely, occasionally - …

4. gradually, slowly - …

5. uncertain, unsafe …

6. conflicting, incompatible - …

7. strange, unusual - …

8. great, big - …

9. earlier, old - …

Exercise 3.7. Fill in the prepositions.

of by in on

a) forms … phosphorus

b) assimilated … bacteria, algae and plants

c) the role … organic phosphorus

d) a subject … intensive study

e) the lack … reliable data

f) involved … determination

g) participated … the inter-comparison study

h) methods … total phosphorus digestion

i) the difference .. sample matrix

j) the influences … the formation

k) no study … the kinetics of formation

Exercise 3.8. Make up your own sentences using the word combinations given in Ex. 3.7

Exercise 3.9 Rewrite the sentences using personal and impersonal constructions.

1. Among various forms of phosphorus, orthophosphate, the most frequently measured form of phosphorus, is considered to be the only form directly available and rapidly assimilated by bacteria, algae and plants.

   It is considered _____

   We consider _____

2. The chloride competing reaction for persulfate has been considered to cause incomplete persulfate digestion of dissolved organic carbon in seawater.

   It has been considered _____

   We have considered_____

3. Among various problems, incomplete recovery of organic phosphate compounds has been considered to cause the underestimate of the total dissolved phosphorus in the natural waters.

   It has been considered _____

   We have considered_____

4. Since hydrogen peroxide is usually assumed to be one of the main intermediate products of potassium persulfate oxidation after high temperature digestion, the effects of hydrogen peroxide (0–600mg l−1) on the color formation was studied by adding different amount of hydrogen peroxide to the digested samples.

   It is assumed _____

   We assume_____

Exercise 3.10. These three sentences contain errors. Can you spot them yourself?

1. One of the most popular methods of total phosphorus digestion it was based on the oxidation of organic phosphorus by persulfate in acidic solution.
2. To develop an optimal procedure for total dissolved phosphorus determination, is necessary to understand the factors that control the rate of the color formation in these digested sample matrix.
3. Persulfate thermal decomposition it is complex process involving many factors and complicate mechanisms.

Exercise 3.11. Summarize the Introduction.

Exercise 3.12. Boost your vocabulary with the words from the Introduction.

Noun	Verb	Adjective	Adverb
sample	consider	essential	separately
digestion	assimilate	available	particularly
breakdown	dissolve	reliable	frequently
fusion	underestimate	subsequent	directly
influence	combine		
matrix	require		
nutrient			

PART B

Exercise 3.13. Read and analyze the Introduction given below.

Nanostructured TiO2–CeO2 mixed oxides by an aqueous sol–gel process: Effect of Ce:Ti molar ratio on physical and sensing properties

M.R. Mohammadi [a,b],∗, D.J. Fray [b]
a Department of Materials Science & Engineering, Sharif University of Technology, Azadi Street, Tehran, Iran
b Department of Materials Science & Metallurgy, University of Cambridge, Pembroke Street, Cambridge CB2 3QZ, UK

INTRODUCTION

Titanium dioxide has a widespread range of traditional and new applications, as a white pigment for paints or cosmetics [1], support for catalysts [2], coatings for self-cleaning

surfaces [3], an energy resource for solar cells [4], an electrode material for lithium batteries [5], an antireflection coating for dye sensitized photovoltaic cells [6] and a sensing film gas sensors [7]. In developing gas sensors it is critical to use a titanium dioxide film with the highest possible specific surface area. There is ***also/either*** evidence in favor of anatase as the most promising phase for gas detection ***in spite of/due to*** its higher surface reactivity to gases [8,9]. ***Recently/not long ago***, many efforts have been aimed to improve the gas sensing performance by improvements in selectivity, sensitivity and durability. In order to improve these properties, microstructure control by preparing porous, high specific surface area films and doping with hetero components (such as Sn, V, Cr, W, Co, Cu, Fe, Nb, Ta, Ga and Mo) are known to be effective, ***because/whereas*** active sites for particular gas species can be produced [10–14].

Another method to improve gas sensing performance of metal oxide semiconductors is to employ binary metal oxide semiconductors. This novel alternative has the potential to form tailored film morphologies, ***which/that*** facilitates gas–film interaction by altering atomic ratio of each element. ***Furthermore/in contrast***, it is possible to increase the current single metal oxide surface-to-volume ratio and to pigment stable nanosized grain morphologies for high performance gas sensing thin films [15]. Sensing properties of binary oxides based on TiO2 such as TiO2–MoO3 [15], TiO2–WO3 [16], TiO2–Cr2O3 [17], TiO2–V2O5 [13] and TiO2–ZrO2 [18] reported previously. Trinchi et al. [19] studied oxygen gas sensing performance of TiO2–CeO2 thin films. This sensor showed good response to 100–10,000ppm O2 in the temperature range 300–470 ◦C. ***Moreover/nevertheless***, the sensor had similar response and recovery times to the different concentrations of oxygen gas, < 90 s. ***Therefore/instead***, in the present work a new straightforward particulate sol–gel route for improvement of TiO2 sensing 0925-4005/$ – see front matter doi:10.1016/j.snb.2010.08.029 performance by adding CeO2 with various Ti:Ce molar ratios, in the form of TiO2–CeO2 binary oxide films is reported.

A wide variety of techniques have been used to prepare TiO2–CeO2 mixed oxide, ***such as/like*** radio frequency (rf) sputtering and electrochemical deposition [20, 21]. Amongst chemical routes, sol–gel techniques offer important advantages ***due to/since*** a low cost simple synthetic route, excellent compositional control, feasibility of producing thin films on large and complex shapes and, the most significant one, low crystallization temperature. TiO2–CeO2 mixed oxides prepared by polymeric sol–gel route from different precursors, ***such as/for example*** titanium n-butoxide, and titanium tetraisopropoxide as titanium source, cerium butoxide, ammonium hexanitratocerate, cerium nitrate, cerium chloride as cerium source and various alcohols ***such as/in particular*** isopropanol, ethanol and buthanol were reported previously in the literature [22–33]. ***So far/recently***, no significant work has been reported on preparation of TiO2–CeO2 mixed oxides by particulate sol–gel route for gas sensing application.

Therefore/as a matter of fact, the aim of the present work is preparation of nanostructured TiO2–CeO2 gas sensor, by an aqueous particulate sol–gel route rather than the polymeric sol–gel methods reported previously. ***Furthermore/consequently***, a strategy for lowering the annealing temperature for crystallization of nanostructured TiO2–CeO2 material by employing a suitable aqueous particulate sol–gel route is developed. This process can be defined as an environmentally friendly processing as it uses an aqueous solution. One of the advantages of the present method is using an alternative to alkoxide (i.e., cerium chloride) as a cerium source to produce a low cost product. ***Besides/Due*** to controlling the phase structure, composition homogeneity, crystallite size, monodispersity and microstructure, the cost of the product is also an important concern. ***Therefore/as a result***, starting with a low cost precursor such as cerium chloride rather than other sources may reduce the total cost of the production.

Since the pores in particulate sol–gel processes are much larger than that found in polymeric sol–gel route, the capillary stress and therefore the shrinkage decrease during heat treatment. ***Therefore/on the contrary***, it is possible to produce crack-free thin films with high surface area. The effect of Ce:Ti molar ratio and annealing temperature on physical, chemical and electrical characteristics of the prepared thin films and powders is also discussed.

Exercise 3.13. Make up the list of keywords.

Exercise 3.14. Choose the appropriate link words in the text given above. Remember that sometimes both of them are possible.

Exercise 3.15. Put the link words in the correct space below.

Contrast

_____

Reason

_____

Time

_____

Adding more points

_____

_____

_____

Example

_____

Exercise 3.16. Complete the definition using the correct word from the text.

_____ widely extended or spread out

_____an act of putting to use

_____ used or done in order to improve a person's appearance

_____ the act or process of discovering, finding, or noticing something

_____one of the parts of something (such as a system or mixture) : an important piece of something

_____able to exist for a long time without significant deterioration

_____the act of doing a job, an activity

_____capable of becoming real

_____something that is done as a reaction to something else

_____a process in which a substance is put on something, for example in order to preserve or clean it

_____a series of actions used to make a product, or to treat it with chemicals

Exercise 3.17. What does **'as'** mean in these sentences?

1. Titanium dioxide has a widespread range of traditional and new applications, **as** a white pigment for paints or cosmetics , support for catalysts , coatings for self-cleaning surfaces, an energy resource for solar cells, an electrode material for lithium batteries, an antireflection coating for dye sensitized photovoltaic cells and a sensing film gas sensors.
2. There is also evidence in favor of anatase **as** the most promising phase for gas detection due to its higher surface reactivity to gases.
3. A wide variety of techniques have been used to prepare TiO2–CeO2 mixed oxide, such **as** radio frequency (rf) sputtering and electrochemical deposition .
4. TiO2–CeO2 mixed oxides prepared by polymeric sol–gel route from different precursors, such **as** titanium n-butoxide, and titanium tetraisopropoxide **as** titanium source, cerium butoxide, ammonium hexanitratocerate, cerium nitrate, cerium chloride **as** cerium source and various alcohols such **as** isopropanol, ethanol and buthanol were reported previously in the literature.
5. This process can be defined **as** an environmentally friendly processing **as** it uses an aqueous solution.
6. One of the advantages of the present method is using an alternative to alkoxide (i.e., cerium chloride) **as** a cerium source to produce a low cost product.

Exercise 3.18. Rephrase the sentences.

It is critical to use a titanium dioxide film with the highest possible specific surface area.

Using _____

It is possible to produce crack-free thin films with high surface area.

Producing _____

It is possible to increase the current single metal oxide -to-volume ratio and to fabricate stable nanosized grain morphologies for high performance gas sensing thin films.

Increasing _____

In order to improve these properties, microstructure control by preparing porous, high specific surface area films and doping with hetero components (such as Sn, V, Cr, W, Co, Cu, Fe, Nb, Ta, Ga and Mo) are known to be effective.

It is known _____

Exercise 3.19. Write the Abstract based on the Introduction given above.

Exercise 3.20. Summarize the Introduction.

Exercise 3.21. Boost your vocabulary with the words from the Introduction.

Noun	Verb	Adjective	Adverb
surface	tailor	current	previously
volume	employ	porous	environmentally
pigment	alter	effective	
powder	prepare	stable	
shrinkage	offer	aqueous	
monodispersity		significant	
homogeneity		straightforward	

PART C

Exercise 3.22. Read and analyze the Introduction given below.

Synthesis of CeO2 and CeZrO2 mixed oxide nanostructured catalysts for the iso-syntheses reaction

Raimundo Crisostomo Rabelo Netob,1, Martin Schmala,∗
a Federal University of Rio de Janeiro, Programa de Engenharia Quнmica-COPPE/NUCAT, Centro de Tecnologia, Bl. G 128, P.O. Box 68502, 21941-972, Rio de Janeiro, RJ, Brazil
b Instituto Nacional de Tecnologia (INT), Brazil

INTRODUCTION

1 The CeO2 and CeO2-based materials have been investigated for this reaction. The higher performance of cerium oxide is assigned to the redox property *(Ce4+↔ Ce3+)* promoting oxygen vacancies in the lattice, which are responsible for the high oxygen atom mobility. This is one of the important characteristics of ceria, allowing fluctuation between oxidant and reductant conditions due to the oxygen storage capability in the lattice structure [9]. However, Zhu and He [15] observed that pure CeO2 is poorly thermostable and loses easily oxygen at high temperatures. Therefore, many authors added other metal ions or dopants to increase the stability and oxygen capability storage. The substitution of Ce4+ by dopants favored the reduction of the oxidation state of the Ce4+ to Ce3+ that maintains neutrality in the lattice and reduces the link stress bonding depending on the dopant cation, which indeed favors the formation of new oxygen vacancies [6,16].

2 In fact, Khaodee et al. [7,8] and Reddy and Khan [9] studied the isosynthesis reaction on zirconia and ceria catalysts showing higher activity and selectivity of isobutene than the commercial catalysts. Khaodee et al. [7,8] studied the effects of preparation method and catalyst composition on the catalytic performance for the isosynthesis on ZrO2–CeO2 oxides mixtures and the influence of acid–base properties, as well as, the surface area on the selectivity of isobutene.

3 Su et al. [10], Postula et al. [11] and Feng et al. [12] observed higher catalytic performance of isobutene with zirconia oxide and concluded that the activity and selectivity depended on the acid sites and base/acid ratio, respectively, which was confirmed by Lu et al. [13]. Maruya et al. [14] claim that branched carbon chains compounds of CO hydrogenation are formed on oxide catalyst which are less or non reducible oxides.

4 The main objective is to correlate the structural oxygen mobility and surface acid/base parameters with the activity and selectivity of iso-C4 of the isosynthesis reaction from syngas, after preparing different cerium oxides and a mixed Ce–Zr oxide samples provoking strong structural defects, affecting surface and acid–base properties. The structural and surface properties were examined by using specific characterization methods. The objective is to demonstrate that the nanostructured Ce based reducible oxides exhibit high selectivity to iso-C4 related to the acid/base properties of reducible oxides.

5 Syntheses gas derived from natural gas and nowadays from renewable biomass sources is promising for producing valuable aggregated products as well as hydrogen for energy or fuels specially designated to improve the quality. In particular, isobutene is an important feedstock for producing oxygenated compounds. It is produced from petroleum products which becomes limited or inadequate in near future. One potential source is based on renewable resources. From biomass or biogas the main products are methane and CO2, which can be transformed through dry reforming to synthesis gas (CO and H2) and subsequently converted to branched

chain hydrocarbons, especially isobutene and isobutane through hydrogenation of carbon monoxide, named by Pichler and Ziesecke, as isosynthesis reaction [1]. The selective conversion of synthesis gas on metal oxides to produce alcohol, isobutane, isobutene and other derivatives has been studied by many authors under severe reaction conditions [1–4].

6 Shi et al. [5] studied the isosynthesis using oxides, like Samaria (SmO2) under mild conditions, at temperatures around 450 ◦C and 50 atm. This catalyst presented good selectivity to iso-C4 (above 50%). Besides ceria (CeO2) also provided good selectivity to isobutene in C4 hydrocarbons [6]. Some reducible oxides such as ceria promote the catalytic activity and selectivity of isobutene. Therefore, it is a suitable catalyst for isosynthesis. Mostly, zirconia and ceria have been tested for isosynthesis.

7 There is no consensus in the literature about the influence of oxygen vacancies and the nature of acid or basic sites on activity or selectivity of iso-C4. The nature of acid or base sites is not well related to the selectivity or activity of this reaction. However, it is well known that chain growth occurs on acid sites, depending on Lewis or Bronsted sites. The insertion of CO depends also on the surface properties, in particular on nano sized crystallites.

Exercise 3.23. Look through the Introduction. Put the paragraphs in the logical order.

Exercise 3.24. Find the words with the same meaning.

a) substance

b) arrangement

c) replacement

d) blend

e) weakness

f) agreement

g) feature

h) subdivision

i) response

j) exterior

Exercise 3.25. Fill in the prepositions *under, to (3), on (2).*

1. assigned …the redox property
2. depended … the acid sites
3. formed … oxide catalyst
4. studied … severe reaction conditions
5. converted … branched chain hydrocarbons

6. related … the selectivity

Exercise 3.26. Divide the extended sentences into smaller units.

1. This is one of the important characteristics of ceria, allowing fluctuation between oxidant and reductant conditions due to the oxygen storage capability in the lattice structure.
2. In fact, Khaodee et al. [7,8] and Reddy and Khan [9] studied the isosynthesis reaction on zirconia and ceria catalysts showing higher activity and selectivity of isobutene than the commercial catalysts.
3. However, it is well known that chain growth occurs on acid sites, depending on Lewis or Bronsted sites.
4. Su et al. [10], Postula et al. [11] and Feng et al. [12] observed higher catalytic performance of isobutene with zirconia oxide and concluded that the activity and selectivity depended on the acid sites and base/acid ratio, respectively, which was confirmed by Lu et al. [13].
5. The substitution of Ce4+ by dopants favored the reduction of the oxidation state of the Ce4+ to Ce3+ that maintains neutrality in the lattice and reduces the link stress bonding depending on the dopant cation, which indeed favors the formation of new oxygen vacancies [6,16].

Exercise 3.27. Make up sentences using the word combinations.

a) to investigate materials
b) to study effect
c) to observe performance
d) to correlate parameters
e) to examine properties

Exercise 3.28. Complete the definition with the correct word from the text.

_____ an increase in the number, size, or importance of something

_____ to happen, especially unexpectedly

_____ a substance that causes a chemical reaction to happenmore quickly but is not affected itself.

_____ to be connected with or related to something

_____ a series of things of the same type that form a connected line

_____ to say that something is true, even though there is no definite proof

_____ produced in order to be sold

_____ to make a situation easier or better for someone or something

Exercise 3.29. These two sentences contain errors. Can you spot them yourself?

1. The objective it is to demonstrate that the nanostructured Ce based reducible oxides exhibit high selectivity to iso-C4 related to the acid/base properties of reducible oxides.
2. Therefore, many authors added other metal ions or dopants for to increase the stability and oxygen capability storage.

Exercise 3.30. Put the words in the correct order in each sentence.

1. selectivity, presented, iso-C4 (above 50%), This, catalyst, to
2. is, petroleum, from, It, products, produced
3. properties, depends, on, insertion of CO, also, on the surface, The
4. for, suitable,Therefore, it, a catalyst, isosynthesis, is
5. reaction, have been investigated, for, The CeO2 and CeO2-based, materials, this

Exercise 3.31. Make up the list of keywords.

Exercise 3.32. Write the Abstract based on the Introduction given above.

Exercise 3.33. Summarize the Introduction.

Exercise 3.34. Boost your vocabulary with the words from the Introduction.

Noun	Verb	Adjective	Adverb
consensus	assign	reducible	specially
insertion	promote	renewable	especially

Noun	Verb	Adjective	Adverb
crystallite	derive	reductant	respectively
derivative	designate	dopant	
feedstock	correlate		
hydrogenation	conclude		
fluctuation			

PART D

Exercise 3.35. Read and analyze the Introduction given below.

Investigation of sol–gel prepared CeO2–TiO2 thin films for oxygen gas sensing

A. Trinchi [a,∗], Y.X. Li [a,b], W. Wlodarski [a], S. Kaciulis [c],
L. Pandolfi [c], S. Viticoli [c], E. Comini [d], G. Sberveglieri [d]

a *School of Electrical and Computer Engineering, RMIT University, Australia*
b *The State Key Lab of High Performance Ceramics and Superfine Microstructure, Shanghai Institute of Ceramics, Shanghai 200050, China*
c *Institute for the Study of Nanostructured Materials, ISMN-CNR, Monterotondo (RM), Italy*
d *Department of Materials Chemistry and Physics, University of Brescia, Brescia, Italy*

INTRODUCTION

The focus ***of/on*** new sensor **development/develop/developing** concerns research into novel materials providing increased **sensitivity/sense/sensitive**, **selectivity/select/selection** and stability. Metal oxide semiconductors are used ***for/to*** gas sensing due to the **dependence/depend/dependent** of their electrical **conductivity/ conduct/conductor** on the ambient gas **composition/compose/composite**. They offer the **possibility/possible/possibly** ***of/for*** "tailoring" the **sensitivity/sense/sensitive** and **selectivity/select/selection** towards specific gas species. Thin films of the metal oxides can be obtained ***by/with*** the sol–gel technique, which represents a **reliable/rely/reliability**, low-cost chemical route, widely used ***for/to*** the deposition ***of/for*** these materials.

Gaining increased **attention/attend/attentive** are mixed metal oxide compounds whereby varying the **composition/compose/composite** ***of/in*** the constituents, the sensor **performance/perform/performer** can be modified, i.e**. improvement/improve/improved** ***of/in*** **sensitivity/sense/sensitive** and **selectivity/sense/sensitive**, **fabrication/fabric/fabricate** ***of/in*** n- and/or p-type semiconductors and modification ***of/in*** the sensor resistance ***for/because of*** ease of electronic interface [1, 2]. CeO2 is a promising material ***for/in*** fast oxygen gas sensing ***at/in*** high temperatures ***because of/due to*** its chemical stability and high diffusion coefficient ***of/in*** oxygen vacancies [3]. Pure CeO2 deposited ***by/with*** sputtering shows strong oxygen gas sensing properties ***at/in*** high temperatures (800–1100 ◦C) [4]. Furthermore, CeO2 has been shown to enhance the dissociation of carbon monoxide ***on/to*** ceramics [5].

TiO2 has been used ***in/for*** diverse **applications/apply/applicable** ***from/with*** ultraviolet filters ***for/in*** optics and packaging materials ***to/at*** antireflection coatings ***for/in*** solar and photovoltaic cells. It has been widely reported ***for/with*** its gas sensing properties ***towards/to*** oxygen, carbon monoxide, methanol and ethanol vapors and humidity [6–9].

Fang et al. [10] have demonstrated the use of the binary compound CeO2–SnO2 for

H2S gas sensing ***at/in*** room temperature. The binary compound of CeO2 and TiO2 has been studied primarily ***for/in*** electrochromic devices [11,12]. ***With/by*** increased **attention/attend/attentive** being given ***to/on*** new semiconducting metal oxide materials for oxygen gas sensing ***at/in*** low temperatures (300–500 ◦C), we present the CeO2–TiO2 thin films prepared ***by/with*** the sol–gel process ***in/at*** this paper. The microstructural **characterization/character/characteristic** of these films will be related ***to/on*** their oxygen gas sensing **performance/perform/performer** ***at/in*** low operating temperatures (<500 ◦C).

Exercise 3.36. Read the Introduction and state:

- the problem under study,
- the existing solutions (literature),
- the best solution,
- the research gap,
- the goal of research,
- the evaluation of research.

Exercise 3.37. Choose the appropriate form of a highlighted word.

Exercise 3.38. Choose the right preposition in the Introduction given above.

Exercise 3.39. Complete the definition using the correct word from the text.

1. _____ to direct one's attention or efforts

2. _____ a solid substance such as silicon that allows some electricity to pass through it, used for making electronic equipment such as computers

3. _____ moisture in the air, clouds and cloudy weather

4. _____ consisting of two parts

5. _____ a machine or piece of equipment that does a particular thing

6. _____ a piece of equipment that reacts to physical changes such as the amount of heat or light that exists somewhere

7. _____ existing or present around you

8. _____ a chemical that consists of oxygen combined with another substance

Exercise 3.40. Find the words with the same meaning.

Various, pottery, structure, substance, improve, worry, change

Exercise 3.41. Join two sentences together using the appropriate connectives.

1A Thin films of the metal oxides can be obtained by the sol–gel technique.

1B It represents a reliable, low-cost chemical route, widely used for the deposition of these materials.

2A CeO_2 is a promising material for fast oxygen gas sensing at high temperatures.
2B It has chemical stability and high diffusion coefficient of oxygen vacancies.

3A Metal oxide semiconductors are used for gas sensing .

3B They are dependent on their electrical conductivity on the ambient gas composition.

Exercise 3.42. Rewrite the sentence using the cause clause.

With increased attention being given to new semiconducting metal oxide materials for oxygen gas sensing at low temperatures (300–500 ◦C), we present the CeO_2–TiO_2 thin films prepared by the sol–gel process in this paper.

Exercise 3.43. Rewrite the sentences in the Active voice.

1. Metal oxide semiconductors are used for gas sensing due to the dependence of their electrical conductivity on the ambient gas composition.
2. Thin films of the metal oxides can be obtained by the sol–gel technique, which represents a reliable, low-cost chemical route, widely used for the deposition of these materials.
3. Furthermore, CeO_2 has been shown to enhance the dissociation of carbon monoxide on ceramics.
4. It has been widely reported for its gas sensing properties towards oxygen, carbon monoxide, methanol and ethanol vapors and humidity.
5. TiO_2 has been used in diverse applications from ultraviolet filters in optics and packaging materials to antireflection coatings in solar and photovoltaic cells.
6. The binary compound of CeO_2 and TiO_2 has been studied primarily for electrochromic devices

Exercise 3.44. Summarize the Introduction.

Exercise 3.45. Boost your vocabulary with the words from the Introduction.

Noun	Verb	Adjective	Adverb
focus	concern	novel	primarily
sensor	tailor	ambient	
semiconductor	gain	specific	
species	sputter	Pure	
diffusion	vary	Binary	
property	enhance		
constituent			

PART E

Exercise 3.46. Read and analyze the Introduction given below.

New procedures for arsenic speciation: A review

Ming-Li Chen,Lin-YuMa,Xu-WeiChen n

Research Center for Analytical Sciences, College of Sciences, Northeastern University, Box332, Shenyang 110819, China

INTRODUCTION

1. ***Exposure/positioning*** to arsenic (As) is a global public health concern due to the wide distribution in environment of As and its close association with numerous adverse ***effects/affects*** [1]. It has been estimated that about hundred million people in India are at risk of drinking arsenic- contaminated water [2,3]. Total arsenic level of 22 in 23 total water samples from Hungary are confirmed to be higher than the health limit ***value/number*** of European Union (10 μg L^{-1}) [4],_____ . Serious arsenic pollutions in groundwater are also found in China [5], and arsenic concentration in some water ***samples/examples*** are even higher than 500 μg L^{-1}. With the deterioration of environment pollutions, humans are at an increasing risk of As exposure. ***The survey/questioning*** on the water and diet contributions to As exposure in northwest of China reveals that As ***content/contents*** in high percentages of water (77% of n¼ 131total samples), vegetables (92%, n¼ 120), and cereals (32%, n¼ 25) are higher than the acceptable ***levels/layers*** [5].

2. It is well known that the simple knowledge of total arsenic content in real world samples is far from enough, as the toxicity of As element is predestined by its chemical species

presented [6]. For example, inorganic As is the number one toxin in the United States Environmental Protection Agency (USEPA) list of prioritized pollutants [2] and classified as Group I carcinogens based on human epidemiological ***data/facts***, while the methylated As species such as monomethylarsonic acid (MMA) and dimethyarsinic acid (DMA) are less toxic,_____.

3. In the past 5 years, various ***methodologies/techniques*** have been developed to figure out arsenic species in environmental and biological samples including water, plant, seafood, rice, blood, saliva [8], nail, hair and Euglena gracilis cells [9]. The construction of new analytical ***procedures/techniques*** for As speciation not only improve our knowledge on As biogeochemistry, toxicity and metabolism,_____ . At the same time, the ***acknowledgment/recognition*** of exact arsenic species in biological and environmental samples facilitates the more accurate assessments of environmental impact and health risks induced by As ***exposure/positioning***.

4. During As speciation, suitable sample pretreatment **techniques/methodologies** are usually adopted to eliminate the **effect/affect** on matrices,_____ . With suitable detection **mode/fashion**, excellent selectivity and sensitivity have been achieved for the newly developed As speciation protocols in last 5 years, which also gain practical **demonstration/show** in various environmental and biological assays. In this mini-review, **the extraction/separation procedures/techniques** including solid phase extraction, liquid–liquid extraction, hydride generation, liquid chromatography and capillary electrophoresis, are thus discussed and summarized. Also, the commonly used strategies for arsenic speciation and determination techniques in different samples are also reviewed.

Exercise 3.47. What is the weakness of the Introduction?

Exercise 3.48. Translate Paragraph 4 into Russian.

Exercise 3.49. Choose the correct highlighted word.

Exercise 3.50. Match the pairs of synonyms. Retell the Introduction using the link words given below.

However	*Moreover*
As a matter of fact	*In particular*
Indeed	*Actually*
Furthermore	*Nevertheless*
Especially	*In reality*

Exercise 3.51. Fill in the prepositions.

To (2) for at in out

a) exposure… arsenic

b) distribution … environment

c) are … risk of

d) contributions … As exposure

e) figure … arsenic species

f) strategies … arsenic speciation

Exercise 3.52. Add the correct suffixes to form derivatives.

1. distribute -	10. generate -
2. associate -	11. determinate –
3. pollute -	12. number -
4. concentrate -	13. epidemic -
5. deteriorate -	14. biology -
6. construct -	15. environment -
7. species -	16. analysis -
8. detect -	17. practice -
9. demonstrate -	18. suit -

Exercise 3.53. Some parts of the sentences were extracted from the text. Make each sentence complete. Remember that one part is not necessary.

A.… but also provide abundant information relating to the biomarkers of exposure and As cycling in natural environment.(A-3)

B.… the highest total arsenic content is up to 210.3 μg L^{-1} (B-1)

C.… to enrich the aimed species and/or to separate the As species for accurate identification. (C-4)

D.… arsenobetaine (AsB), arsenocholine (AsC) and other arsenosugars are even considered to be of non- toxicity [7] (D-2)

E.… exhibit high selectivity to iso-C4 related to the acid/base properties of reducible oxides

Exercise 3.54. What does **'as'** mean in the sentences?

1. It is well known that the simple knowledge of total arsenic content in real world samples is far from enough, **as** the toxicity of As element is predestined by its chemical species presented.

2. Due to the abundant functional groups on its unique structure and high surface area, ESM has been used **as** an adsorbent for the sorption of organic molecules and metal ions.

3. Though efforts have been taken to use ESM **as** sorbent for As removal, while the carboxylic groups on ESM surface are not favorable for arsenic adsorption, leading to a notso-satisfied removal efficiency.

4. **As** far **as** As(III) is concerned, APDC and DDTC are typically employed **as** the chalexation regent for their specific reaction with arsenite, then the formed complex are separated by suitable adsorbent or liquid phase.

5. Among above detection techniques, AFS and gas phase chemiluminescence are both based on the hydride generation chemical derivatization process to produce volatile hydrides, which limits their applications in the speciation of organoarsenic compounds **as** they do not form volatile hydrides after borohydride treating[6,46], while ICP-MS offers advantages of the extremely high sensitivity and the universality to all arsenic species.

6. High sensitivity is always indispensable in As speciation **as** some As species are of very low concentration in real-world samples.

Exercise 3.55. Put in *a/an*, *the* or zero (-) article in this paragraph.

Capillary electrophoresis has been proved … useful tool in multi-arsenic species separation. As (III), DMA, p-As, MMA and As (V) in shrimp are successfully separated with capillary zone electrophoresis [52]. With … ultraviolet detection method, … detection limits locate in … range of 0.004–0.30 mg L^{-1}. After microwave-assisted extraction, arsenic species As (III), DMA, MMA and As(V) in … Mya arenaria Linnaeus and shrimp samples are base line separated within11min using capillary electrophoresis [53]. With … help of … improved sheath flow interface, … separated As species are transported to … ICP-MS detection smoothly, along with … recovery of 96–105%. By using … novel and high efficient interface as … nebulizer, … capillary electrophoresis coupled with inductively coupled plasma

mass spectrometer (ICP-MS) system is developed for … simultaneous determination of … ten arsenic compounds including As (III), As(V), DMA, MMA, AsB, AsC, 3-NHPAA, 4-NPAA, o-ASA (o-arsanilic acid) and p-UPAA. … separation is achieved on …100 cm length ×50 μm ID fused- silica capillary [7].

Exercise 3.55. Boost your vocabulary with the words from the Introduction.

Noun	Verb	Adjective	Adverb
facility	contaminate	adverse	usually
assay	induce	accurate	enough
treatment	adopt	epidemiological	
speciation	predestine		
electrophoresis	prioritize		
deterioration	figure out		
toxicity	eliminate		

Exercise 3.56. Read the text and correct ten mistakes (grammar, spelling, punctuation).

The growing demand for middle distillates and the increasing production of heavy crude oils has place hydrocracking as one of the most important secondary petroleum refinery proceses. Hydrocracking is commonly practised in the petroleum refining industry to treat oil residua. During hydrocracking, large compounds are broken to forming low molecular weight compounds. When the reaction takes place over a catalyst in a hydrogen-rich atmosphere other reactions, such as hydrodesulfurization, hydrodemetallization, etc., occur simultaneous. The different rates and selectivity of each reaction depends on the properties of the catalyst used and on the reaction severity. Most of industrial processes employs catalysts with both hydrogenation and acid functions [1]; isomerization and cracking occur on acid sites via ion carbenium chemestry, whereas hydrogenation and dehydrogenation reactions take place on the metallic sites.

Exercise 3.57. Translate the phrases from Russian into English.

1. Насколько автору известно, на данный момент не проводятся исследования…
2. На сегодняшний день в литературе описано только 2 метода…
3. Уже разработано много аналитических методов…
4. Всестороннее рассмотрение всех существующих подходов выходит за рамки этой статьи.
5. Многие ученые уже занимались исследованием этой проблемы …
6. На самом деле многие авторы исследовали … и наблюдали …
7. В литературе нет единого мнения о…
8. Основная цель – установить зависимость…
9. Цель заключается в том, чтобы показать …
10. Несмотря на недостатки, эти два метода считаются стандартными …

Revision

What do you need to know when writing an Introduction?

Self-study activity

Write the Introduction for the research paper of your own.

1.4. THE STRUCTURE OF THE MAIN BODY OF THE PAPER

Focus on theory

The main body of the paper presents procedures and theoretical basis of the research. It usually consists of several sections and contains the detailed description of the research process. The main body can be structured in the following way:

- Detailed description of the problem under study and its analysis;
- Related work (optional);
- Solution to the problem;
- Results (the findings: positive and negative if there are some).

Taking into account a large amount of information given in this part of the paper, independent work of students is implied. The Master students already know the field of their research and the subject matter of their Master thesis has been chosen. Consequently, they have got a lot of literature sources to read on their major.

Exercise 4.1 Take any paper on your major and give a detailed description of its main body. You should describe:

- The problem under study;
- Solution to the problem;
- Results.

Exercise 4.2 Summsarize the main body of the paper using the appropriate link words.

Self-study activity

Write the Main body for the research paper of your own.

1.5. THE STRUCTURE OF THE CONCLUSIONS

Focus on theory

This section includes the short description of the major findings. After that, future perspectives and/or application of the work are presented. One should keep in mind that the Conclusion section is not the material given in the Abstract or some other part of the paper. This section is usually short (1-2 paragraphs). The items one might find are as follows:

- A brief description of the most essential finding;
- Improvements that can be done;
- Suggestions for further work;
- Tips for policy modification.

PART A

Exercise 5.1. Read and analyze the Conclusions. Focus on the most essential findings described in the section.

Poly(L,L-lacide-co-glycode)/tricalcium phosphate composite scaffold and its various changes changes during degradation in vitro

Fei Yang, Wenjin Cui, Zhuo Xiong, Li Liu, Jianzhong Bei, Shenguo Wang

CONCLUSIONS

A _____, the following conclusions could be obtained. A 3-dimensionally porous structured PLGA(70/30)/TCP composite scaffold has been fabricated by low-temperature deposition (LDM). After degradation in vitro, it was found that the acidity of the degradation system of the PLGA(70/30)/TCP composite scaffold was much lower than that B _____. This demonstrated that the TCP component can ***effectively/effective*** reduce acidity of degradation products of the polylactide-type polymer. So the PLGA(70/30)/TCP composite scaffold would be ***beneficial/beneficially*** to reduce bacteria-free inflammation of the polylactide- type scaffold. With degradation, volume and porosity of the PLGA(70/30)/TCP composite scaffold reduced, and the surface morphology of the scaffold has changed from ***smooth/smoothly*** to ***rough/roughly***. The weight loss of the scaffold increased but TCP component proportion increased. ***On the other hand***, with degradation the lactyl unit of the remained PLGA component increased, but the molecular weight and molecular weight distribution of the PLGA component reduced and increased, ***respectively/respective***. The compressive strength and modulus of the scaffold also reduced C_____, but the effect of degradation on compressive strength was much less than that on modulus. **Since** the PLGA(70/30)/TCP composite scaffold shows ***excellent/excellently*** cell affinity and ***good/well*** results D _____, it would be a ***potentially/potential useful/usefully*** bone tissue engineering scaffold.

Exercise 5.2. Choose the correct highlighted word (either adjective or adverb).

Exercise 5.3. What do the words ***'****on the other hand', 'since'* mean in this text?

Exercise 5.4. Define the function of the underlined words.

Exercise 5.5. Rewrite the sentences in the Active voice.

1. CeO2–TiO2 thin films have been prepared by the sol–gel process.
2. The morphology and chemical composition were analyzed by scanning electron microscopy (SEM) and XPS.
3. The gas sensitivity of the films at different temperatures was studied by measuring the electrical response to oxygen gas.
4. The film resistance variation was measured from 0 to 10,000 ppm O2 at an operating temperature of 420 ◦C.
5. An electron gun (LEG 200) with sub-micro spot was employed for the Auger electron spectrometry (AES) measurements.
6. CeO2–TiO2 thin films can be synthesized from numerous starting materials.
7. The morphology of the obtained films was studied by the secondary electron images using a Philips XL-30 electron microscope with a beam energy of 10 keV.

Exercise 5.6. Some parts of the sentences were extracted from the text. Make each sentence complete. Remember that one part is not necessary.

1. According to the results presented above
2. of the TCP-free PLGA scaffold system
3. with degradation time
4. on posterolateral spinal fusion of rabbit
5. the development and evaluation of a portable flow analysis

Exercise 5.7. Reproduce the Conclusion.

Exercise 5.8. Read the Title, Abstract and Conclusions.

PART B

Exercise 5.9. Read and analyze the Abstract and Conclusions given below.

A compact portable flow analysis system for the rapid determination of total phosphorus in estuarine and marine waters

Brady S. Gentle, Peter S. Ellis, Peter A. Faber, Michael R. Grace, Ian D. McKelvie*

ABSTRACT. The development and evaluation of a portable flow analysis system for the in situ determination of total phosphorus is described. The system has been designed with rapid underway monitoring in mind. The system employs an ultra-violet photo-reactor and thermal heating for peroxodisulfate digestion of total phosphorus to orthophosphate, followed by spectrophotometric detection with a multi-reflective flow cell and low-power light emitting diode using the molybdenum blue method. Reagents are stored under gas pressure and delivered using software controlled miniature solenoid valves. The fully automated system has a throughput of 115 measurements per hour, a detection limit of 1_gPL−1, and gives a linear response over the calibration range of 0–200_gPL−1 (r2 = 0.9998), with a precision of 4.6% RSD at 100_gPL−1 (n = 10). Field validation of the instrument and method was performed in Port Philip and Western Port Bays in Victoria, SE Australia, where 2499 analyses were performed over a 25 h period, over a cruise path of 285 km. Good agreement was observed between determinations of samples taken manually and analyzed in the laboratory and those measured in situ with the flow analysis system.

CONCLUSIONS

The concept, development and evaluation of a portable flow analysis system for the determination of total phosphorus in situ **(describe).** This work **(indicate)** that flow analysis using a photo-reactor and thermal decomposition unit in-line, coupled with a reagent injection flow injection analyzer **(be)** successful at rapidly and reliably determining total phosphorus in surface marine, estuarine and fresh waters. The instrument **(meet)** many of the criteria for unattended field-use such ***as/for example*** total automation, reagent stability, compact design, low power consumption, durability; instrumental features desirable for mapping ***such as/in particular*** fast throughput, reduced reagent consumption and tidy sample/waste handling; and excellent analytical figures of sensitivity, precision and accuracy. ***While/when*** unattended operation of the system **(limit)** to around 96 h using a combined peroxodisulfate and acid reagent, this may be extended by storing these reagents separately and mixing in-line prior to digestion.

The developed instrument **(apply)** successfully in the field for the mapping of total phosphorus in Port Philip and Western Port Bays, Victoria, SE Australia. Samples taken concurrently for validation suggest a high degree of accuracy in the measurements. ***However/on the contrary***, bubbles evolving from the reaction mixture as it **(pass)** through the detector due to/because of the high concentration of acid **(remain)** a cause of some data loss.

Exercise 5.10. Analyze the content of the Conclusions section and compare the information given in the Abstract with that of the Conclusions.

Exercise 5.11. Choose the correct link word, sometimes both of them are possible.

Exercise 5.12. Put the verbs in brackets into the correct form.

Exercise 5.13. Rewrite the sentences in the Passive Voice.

1. We describe the development and evaluation of a portable flow analysis system for the in situ determination of total phosphorus.
2. We have been successfully applied the developed instrument in the field for the mapping of total phosphorus in Port Philip and Western Port Bays, Victoria, SE Australia.
3. We have designed the system with rapid underway monitoring in mind.
4. We store and deliver reagents under gas pressure using software controlled miniature solenoid valves.
5. We performed 2499 analyses over a 25 h period, over a cruise path of 285 km.
6. We observed good agreement between determinations of samples taken manually and analyzed in the laboratory and those measured in situ with the flow analysis system.

Exercise 5.14. Summarize the Conclusions section.

Part C

Exercise 5.15. Read and analyze the Abstract and Conclusions given below.

New procedures for arsenic speciation: A review

Ming-Li Chen, Lin-Yu Ma, Xu-Wei Chen

ABSTRACT. Considerable analytical methods have been developed for arsenic speciation in the last 5 years, the details of these new arsenic speciation procedures are thus summarized in present mini review. The performances of various sample pretreatment techniques including solid phase extraction, liquid–liquid extraction, hydride generation, liquid chromatography and capillary electrophoresis, which offer effective preconcentration/separation and eventually contribute greatly to excellent sensitivity and selectivity in arsenic speciation when coupling with suitable detection mode, are discussed and compared thoroughly. High-performance liquid chromatography coupling with inductively coupled plasma mass spectrometry and hydride generation atomic spectrometry are proved **to be/have been** the most powerful hyphenated methodologies for arsenic speciation in environmental and biological matrices.

CONCLUSION AND PERSPECTIVE

In the last 5 years, different procedures are explored for arsenic speciation. With the assistance of suitable sample pretreatments, favorable selectivity and sensitivity have been achieved in acknowledging information on As species in environmental and biological samples. SPE/LLE coupling with element-specific spectrometry detection techniques is proven **to be/ have been** very effective for specific arsenic speciation. For multi As species analysis, the combination of chromatography with ICP-MS/hydride generation atomic spectrometry should **be/been** more

powerful **to achieve/have been achieving** efficient separation of all As species and subsequent simultaneous detection.
While it should **be mentioned/mention** that most speciation protocols recently developed are specially designed for the assay of As content in aqueous phases, suitable sample treatments such as acid digestion are necessary for non-aqueous samples, i.e., biological tissue, minerals and sullage, etc. The external introduced reagents in the treating processes might induce the transform of As speciation/valence state, leading to inaccurate evaluations of As species for original sample sources. Therefore, it is an urgent task **to develop/be developing** direct analytical methodologies **to obtain/to have obtained** original species information of non-aqueous samples.

Exercise 5.16. Analyze the content of the Conclusions section and compare the information given in the Abstract with that of the Conclusions.

Exercise 5.17. Choose the appropriate form of the infinitive.

Exercise 5.18. Underline the link words and explain their meaning.

Exercise 5.19. Join two sentences together using the appropriate conjunctions where necessary.

1A. Considerable analytical methods have been developed for arsenic speciation in the last 5 years.

1B. The details of these new arsenic speciation procedures are thus summarized in present mini review.

2A. The performances of various sample pretreatment techniques including solid phase extraction, liquid–liquid extraction, hydride generation, liquid chromatography and capillary electrophoresis,are discussed and compared thoroughly.

2B. The techniques offer effective preconcentration/separation and eventually contribute greatly to excellent sensitivity and selectivity in arsenic speciation when coupling with suitable detection mode.

3A. It should be mentioned that most speciation protocols recently developed are specially designed for the assay of As content in aqueous phases.

3B. Suitable sample treatments such as acid digestion are necessary for non-aqueous samples, i.e., biological tissue, minerals and sullage, etc.

4A. The external introduced reagents in the treating processes might induce the transform of As speciation/valence state.

4B. This leads to inaccurate evaluations of As species for original sample sources.

PART D

Exercise 5.20. Read and analyze the Abstract and Conclusions given below.

Rate of phosphoantimonylmolybdenum blue complex formation in acidic persulfate digested sample matrix for total dissolved phosphorus determination: Importance of post-digestion pH adjustment

Xiao-Lan Huanga,[b],∗, Jia-Zhong Zhang[a]

ABSTRACT. Acidic persulfate oxidation *(be)* one of the most common procedures used to digest dissolved organic phosphorus compounds in water samples for total dissolved phosphorus ***determination/determine/determinable***. It *(report)* that the rates of phosphoantimonylmolybdenum blue complex ***formation/form/formative*** were significantly reduced in the digested sample matrix. This study *(reveal)* that the intermediate ***products/produce/production*** of persulfate ***oxidation/oxidize/oxidate***, not the slight change in pH, cause the slowdown of color ***formation/form/formative***. This effect can be remedied by adjusting digested samples pH to a near neural to decompose the intermediate ***products/produce/production***. No disturbing effects of chlorine on the phosphoantimonylmolybdenum blue ***formation/form/formative*** in seawater *(observe)*. It *(note)* that the ***modification/modify/modifier*** of mixed reagent recipe cannot provide near neutral pH for the ***decomposition/decompose/composite*** of the intermediate ***products/produce/production*** of persulfate oxidation. This study *(provide)* experimental evidence not only to support the recommendation made in APHA standard ***methods/methodic/methodize*** that the pH of the digested sample must be adjusted to within a narrow range of sample, but also to improve the ***understanding/understand/understandable*** of role of residue from persulfate ***decomposition/decompose/composite*** on the subsequent phosphoantimonylmolybdenum blue ***formation/form/formative***.

CONCLUSION

The mechanism of slow ***formation/form/formative*** of the phosphoantimonylmolybdenum blue complex in the acidic persulfate digested samples *(investigate)*. The rate of color formation *(relate)* to the types of organic phosphorus compounds, the sample matrix, and the pH of the digested samples and, most important, the amount of persulfate used in the digestion.

• The intermediate ***products/produce/production*** of persulfate oxidation (*cause*) the rate of the phosphoantimonylmolybdenum blue complex ***formation/form/formative*** to decline in acidic persulfate digested samples.

• By adjusting digested solution's pH to be neutral, the intermediate ***products/produce/production*** of persulfate ***oxidation/oxidize/oxidate*** can be readily decomposed, and the color of phosphoantimonylmolybdenum blue complex can be fully developed within 3min. No disturbing effects from chlorine on the phosphoantimonylmolybdenum blue ***formation/form/formative*** in seawater (*observe*) and it is not necessary to add extra ascorbic acid prior to the mixed reagent for the seawater total dissolved phosphorus ***determination/determine/determinable***.

• It is critical to adjusting pH before mixed reagent ***addition/add/additive*** to be near neutral for both the digested ***calibration/calibrate/calibre*** standards and organic phosphorus samples ***solution/solubility/solute*** due to the different kinetics behavior. Modification of mixed reagent recipe cannot provide near neutral pH for the ***decomposition/decompose/composite*** of the intermediate ***products/produce/production*** of persulfate oxidation.

In summary, this study *(provide)* experimental evidence to support the recommendation made in APHA standard methods that the pH of the digested sample must be adjusted to within a narrow range of sample, in order to avoid the effects of persulfate

digestion/digest/digestive on the kinetics of phosphoantimonylmolybdenum blue ***development/develop/developer***.

Exercise 5.21. Read the Abstract and the Conclusions putting the verb in brackets in the appropriate form.

Exercise 5.22. Make up the list of keywords.

Exercise 5.23. Choose the correct highlighted word.

Exercise 5.24. Explain the use of the phrase *'in summary'*. Give its synonyms.

PART E

Exercise 5.25. Read and analyze the Abstract and Conclusions given below.

Kinetic modeling of hydrocracking of heavy oil fractions: A review

Jorge Ancheyta [a,c,*], Sergio Sa´nchez [a], Miguel A. Rodrı´guez [b]

ABSTRACT. An exhaustive review of the scientific literature on kinetic modeling of heavy petroleum fraction hydrocracking is reported in this paper. Kinetic models for hydrocracking of model compounds were not analyzed. The review includes models based on the lumping technique, continuous mixtures, structure oriented lumping, and single event models. Experimental data, reaction networks, main characteristics of kinetic approaches, and kinetic parameter values are ***also*** reported. In some cases when detailed experimental data were available, kinetic parameters were re-estimated and some differences were found in comparison with original reported values. One representative model of each kinetic approach was selected, and parameter estimation was done with reported experimental values in order to establish the capability and accuracy in the prediction of conversion and product yields. Advantages and disadvantages of the models are discussed in terms of their capability to predict detailed product composition, difficulty for parameter estimation, dependency of rate coefficient with feed properties, and required experimental data.

CONCLUSIONS

Lump models have been used for several years for kinetic modeling of complex reactions. ***In fact***, some commercial catalytic process design is still being performed with this type of approach. Catalyst screening, process control, basic process studies, and dynamic modeling, among others, are areas in which lump kinetic models are extensively applied. The main disadvantages of lump models are their simplicity in predicting product yields, the dependency of kinetic parameters on feed properties, and the use of an invariant distillation range of products, which, if changed, necessitates further experiments and parameter estimation.

Models based on continuous mixtures (continuous theory of lumping) overcome some of these deficiencies by considering properties of the reaction mixture, the underlying pathways, and the associated selectivity of the reactions. The common parameter of characterization is the true boiling point temperature, ***since*** during reaction it changes continuously inside the reactor as the residence time increases. ***However***, dependency of model parameters on feed properties is still present. Distillation curves, either chromatographic or physical, ***also*** present some difficulties when analyzing heavy oils since

initial and final boiling points are not accurate during experimentation. ***In fact***, for many purposes, 10% and 90% boiling point are commonly utilized instead of IBP and FBP, respectively.

Structure oriented lumping models are more detailed approaches that express the chemical transformations in terms of typical molecule structures. These models describe reaction kinetics in terms of a relatively large number of pseudocomponents, and ***hence*** they do not completely eliminate lumps. ***In addition***, dependency of rate parameters on feed properties is present.

The single event concept uses elementary steps of cation chemistry, which consists of a limited number of types of steps involving series of homologous species. The number of rate coefficients to be determined from experimental information can be reduced and are modeled based upon transition state theory and statistical thermodynamics. With this approach, parameter values are not dependent on feed properties. ***However***, even though the number of parameters can be diminished, detailed and sufficient experimental data are necessary.

The complexity of real feedstocks suggests that models based on lumping theory will continue to be used for the study of hydrocracking reaction kinetics. ***However***, more sophisticated and accurate approaches need to be studied with more detail for a better understanding and representation of heavy oil hydrocracking kinetics.

Exercise 5.26. Read the Abstract and Conclusion below.

Exercise 5.27. Change the highlighted words to their synonyms.

Exercise 5.28. Make up 5 questions to the text.

Exercise 5.29. Summarize the information given in the Conclusions.

Exercise 5.30. Translate the sentences from Russian into English using the Gerund.

1. В течение последних лет применялись различные методы…
2. Следует отметить, что разработанные в последнее время методики предназначены…
3. Следовательно, наиважнейшей задачей в настоящее время является разработка методов анализа…
4. Был разработан надежный метод, в основе которого …
5. В этой статье представлены результаты, которые соответствуют результатам полученным ранее.
6. Самыми важными критериями являются точность, простота и скорость определения …
7. Принимая во внимание эти критерии, наш метод можно рекомендовать…
8. Однако в этом случае нужно учитывать …

9. Это может повлиять на точность измерений…

10. Преимуществом над другими методами является простота в реализации и низкая стоимость…

11. В соответствии с результатами, представленными выше, можно сделать следующие выводы.

Revision

What do you need to know when writing Conclusions?

Self-study activity

Write the Conclusions for the research paper of your own.

1.6. ACKNOWLEDGEMENTS

Focus on theory

It is common practice to conclude the paper by giving thanks to the people who were helpful and supportive in doing the research. There are some clichés that are usually used in writing Acknowledgements:

- This work was carried out within the framework of a project ...
- This work was partly sponsored by...
- The work was possible from a grant from ...
- Support was given by ...
- We would like to thank ...
- We are indebted grateful to …
- The authors wish to thank Prof. X who gave us much valuable advice ...

Here are some *examples* of Acknowledgements.

1 This research was financially supported by an Australia Research Council Linkage Grant (LPO669359) and EPA Victoria. The assistance of Garry McKechnie, Natalie Davey and the crew of SV Pelican 1 during the Two Bays cruise is gratefully acknowledged.

2 This work is supported by Bulgarian Ministry of Education Project DO-02-87/08 and NSFB project GAMA DO 02–70 11/12/2008.

3 Financial support for this study was provided by NOAA's Coastal Ocean Program and Climate and Global Change Program. This research was carried out, in part, under the auspices of the Cooperative Institute of Marine and Atmospheric Studies (CIMAS), a joint institute of the University of Miami and the National Oceanic and Atmospheric Administration, cooperative agreement #NA67RJ0149. The statements, findings, conclusions, and recommendations are those of the authors and do not necessarily reflect the views of the NOAA or the U.S. Department of Commerce.

4 The authors wish to acknowledge Mr. David Nicol for his help with TEM analysis.

5 All the authors would like to thank Universiti Teknologi Malaysia (UTM) for the Research University Grant (GUP 2011) Vote Number 01H94 and GUP 2013 Vote Number 04H22, respectively for the fundings and for facilitations. Ms. M.M.A. Omar acknowledges funding from the Organization for Women in Science for the Developing World (OWSDW) and Swedish International Development Cooperation Agency (SIDA) under Fund Reservation No.3240253940 to spend time in UTM.

6 This work was supported by the JER 6013 associated to the AUPELF UREF and Scholarship Program of Formation in Search of French-speaker university agency AUF. The authors thank P. Winterton (UPS Toulouse-Fr), a Native English Speaker, for his helpful criticisms of the English version of the manuscript.

7 CAPES for scholarship and CNPq, FAPERJ and FINEP for research projects.

8 This work is financially supported by the Natural Science Foundation of China (21075013, 21235001, 21275027, 21375013), the Program of New Century Excellent Talents in University (NCET-11-0071) and the Fundamental Research Funds for the Central Universities (N110605001, N110705002, N110805001 and N120405004).

9 Hugo Ortiz-Moreno acknowledges PhD Grant from CONACyT, Mexico. We thank Ivan Puente-Lee for the TEM and microanalysis work and Ciro Eliseo Marquez Herrera for Plasma spectroscopy work.

10 The authors thank the Instituto Mexicano del Petro´leo for financial support. M.A. Rodrı´guez also thanks the CONACyT for financial support.

Exercise 6.1 Express your acknowledgments to your scientific adviser for his or her help in doing the research project.

Exercise 6.2 Thank your colleagues for feedback during writing the paper.

Exercise 6.3 Give the information about the financial support of your research (funds,grants,etc.)

Part II. SUBMITTING A PAPER TO A CONFERENCE

2.1. CONFERENCE TITLES

Focus on theory

Before submitting a paper to the conference it is important to read the following sections.

- Conference announcements and call for papers
- Important dates and paper submission
- Additional information: Venue, Accommodation, Tourist information

Scientific papers where you present the results of your research can be published either in the proceedings of the conferences or in peer-reviewed journals. The requirements for these publications (the format, the number of words, font, etc.) are given in the template that can be found on the website of the conference or journal. These requirements and rules must be strictly obeyed otherwise your paper might not be published.

Before publishing a paper in a good peer-reviewed journal it is recommended, though not obligatory, to present new findings at the conference.

All international conferences have a website where the organizers make an announcement and provide the authors with the information they might need. First of all, it is important to choose an appropriate conference scanning the titles that can be found on the Internet.

Chemistry Conferences Topics are taken from the Website: http://www.chemistry-conferences.com.

Here is a list of several general domains in Chemistry.

Exercise 1.1. Scan the domains in Chemistry given below and select three of them which might be interesting to you. Give your reasons.

Agricultural Chemistry
Analytical Chemistry
Biochemistry
Biotechnology
Chemical Education

Chemical Engineering
Chemoinformatics
Combinatorial Chemistry
Drug Delivery
Environmental Chemistry
Food Chemistry
General Chemistry
Green Chemistry
Inorganic Chemistry
Materials Science
Medicinal Chemistry
Molecular Modeling
Nanotechnology
Organic Chemistry
Physical Chemistry
Polymer Chemistry
Process Chemistry
Supramolecular Chemistry
Surface Chemistry
Toxicology

Here is a list of the real conferences from the Internet.

1. *Winter Conference on Plasma Spectrochemistry*
2. *2nd Advances in Crystal Engineering - ACE2016*
3. *Inorganic Polymers Conference 2016*
4. *6th International Conference on Metals in Genetics, Chemical Biology and Therapeutics (ICMG 2016)*
5. *Anatolian Conference on Synthetic Organic Chemistry (ACSOC II)*
6. *International Conference on Metallurgical Coatings and Thin Films*

Exercise 1.2. Look at the titles of the conferences given above and answer the following questions.

- What are the conferences about?
- What kind of specialists might be interested in them?
- Would you be able to present the results of your scientific work at these conferences? Which one?

2.2. CALL FOR PAPERS

When choosing a conference it is important to read Call for papers, where one can find the information about the place where the conference will be held, the dates of the conference, submission deadline and requirements, etc. Here are the fragments of the Calls for paper from different websites where the topics of the sections are covered.

Exercise 2.1. Scan the Calls for papers given below in parts A-D and answer the following questions.

- Which section would you like to choose to present the results of your current research? Explain your choice.
- Which of the sections would you like to attend? Why?
- Which of the topics do you think are the most popular nowadays?

PART A

The ICCME 2016 : 18th International Conference on Chemical and Molecular Engineering is the premier interdisciplinary forum for the presentation of new advances and research results in the fields of Chemical and Molecular Engineering. The conference will bring together leading academic scientists, researchers and scholars in the domain of interest from around the world. Topics of interest for submission include, but are not limited to:

- Analytical Chemistry
- Advanced materials processing
- Biotechnology and Biochemical Engineering
- Biochemical and biomolecular engineering
- Bioengineering and biomedical engineering
- Biological and Medicinal Chemistry
- Biotechnology
- CO2 Capture and Sequestration
- Catalysis
- Chemical reaction engineering
- Chemical engineering equipment design and process design
- Clean Coal
- Inorganic Chemistry
- Heavy Oil and Oil Sands
- Macromolecular Science and Engineering

- Materials Chemistry
- Organic Chemistry
- Physical, Theoretical and Computational Chemistry
- Process Safety Management
- Rubber
- Surface Science
- Systems and Control
- Green Chemistry
- Energy and Environment

PART B

It is my great pleasure to announce the 11th Asian Conference on Chemical Sensors (*ACCS2015*) organized by Universiti Malaysia Perlis, to be held in the enchanting and vibrant island of Penang, Malaysia on *November 16-18 2015*. On behalf of the organizing committee, I would like to invite you to this Asia's premier biennial scientific and technical event on chemical sensors.

You can be assured that *ACCS2015* will be technically, socially and culturally rewarding to all participants. The highlights of *ACCS2015* will include keynote speakers by Asia's top guru in chemical sensors as well as invited talks, poster presentations, exhibitions and cultural/social programs.

ACCS2015 invites submission of high quality unpublished papers in the following areas. Papers in other related areas may also be considered:

A – Sensor Fundamentals
A1 – Fundamentals: Principle & Methodology
A2 – Sensing Mechanism: Semiconductor & Nanotechnology
A3 – New Sensing & Functionalized Materials
B – System & Devices
B1 – Chemical Sensors
B2 – Electrochemical Sensor
B3 – Optical Sensor
B4 – Biochemical Sensors
B5 – Graphene Sensor
B6 – Bio Inspired Sensing
C- Application & Technology
C1 – E-Nose: Devices and Application
C2 – Sensing for Health, Safety and Security
C3 – Chemical Sensing for Environmental

C4 – Wireless Sensor Network & IoT
C5 – Wearable Sensor
C6 – Mobile Olfaction
D – Chemometrics, Modelling & Evaluation
D1 – Sensor Arrays
D2 – Data Analysis & Chemometrics
D3 – Sensor Fusion
D4 – Modelling and Evaluation

PART C

The ICCE 2015 : 17th International Conference on Chemical Ecology is the premier interdisciplinary forum for the presentation of new advances and research results in the fields of Chemical Ecology. The conference will bring together leading academic scientists, researchers and scholars in the domain of interest from around the world. Topics of interest for submission include, but are not limited to:

- Applied Chemical Ecology
- Aquatic Chemical Ecology
- Chemical ecology and global decline of pollinators
- chemical ecology for sustainable food production
- Chemical Ecology for Human Health
- Chemical ecology of insect herbivore genomes
- Chemical Ecology of Invading Species
- Chemical Ecology of Pollination
- Effects of pollution on plant defenses, insect behavior and evolution
- Evolution of Chemical Communication in the Era of Genomics and Transcriptomics
- Evolutionary ecology of chemically mediated interactions
- Fungal superhighways: common mycorrhizal networks mediating plant communication
- Insect (Drosophila) Neuroethology
- Insect communication through cuticular chemicals
- Insect Semiochemical and Pheromone Registration
- Interactions Between Plants and Animals
- Microbial-Chemical Ecological Interactions among Micro-organisms and their Environments
- Molecular Mechanisms in Perception of Semiochemicals
- Multimodal Communication (integration of olfaction, taste, vision, acoustics, mechanoreception)

- Plasticity of Constitutive Plant Defences: Microbes to Climate
- Quorum sensing and biofilms
- Rhizosphere Ecology
- The Chemical Stimulus – it's Analysis and Synthesis
- The geography of chemical ecology and implications for effects of global change

PART D

The 6th International Chemical and Environmental Engineering Conference is the leading forum of World Science and Engineering Conferences 2015 for the presentation of new advances and research results in the fields of Chemical and Environmental Engineering. The conference will bring together leading researchers, engineers and scientists in the domain of interest from around the world. Topics of interest for submission include, but are not limited to:

Chemical, Environmental, and Process Engineering

- Environmental engineering and sustainable development
- Process design and optimization
- Product innovation, development and economics
- Process intensification
- Nanotechnology
- New materials & structured products
- Intelligent polymers
- Green organic synthesis routes
- Process integration
- Environmental engineering & management
- Sustainable & clean technologies
- SCF as solvent substitutes

Environmental Engineering and Technology

- Pollution and monitoring
- Water supply and wastewater treatment
- Air pollution
- Solid waste management
- Modeling, simulation and optimization
- Impact, risk and life cycle assessment
- Environmental integrated management and policy making
- Environmental friendly materials
- Sustainable tourism
- Urban and Rural Ecology

- Waste Management (industrial, domestic, natural)
- Environmental Technology and Management
- Environmental Political Economy
- Biodiversity Conservation & Protected Areas Management
- Ecological and Environmental Quality Studies
- Environmental Education
- Computer Modeling & Applications, Remote Sensing, GIS
- Environmental Manufacturing & Engineering
- Cleaner Technologies, Control, Treatment & Remediation Techniques
- Life Cycle Assessment, Risk Assessment, Health and Safety Impact Assessment

In the Call for Papers you may also find the Important dates:

- Conference Dates
- Abstract Submission
- Notification of acceptance
- Authors' Registration
- Final Paper Submission

These dates can sometimes be extended.

Exercise 2.2. Answer the following questions.

- Can you name 8 Chemistry-related areas?
- Can you specify the phrases that are typically used in the titles of the conferences?

Self-study activity

- Find 5 conferences in chemistry on the Internet that would be interesting to you and say a few words about one of them.
- Explain why these conferences are a good fit for your specific interests and area of research.

2.3. ABSTRACT AND PAPER SUBMISSION

Exercise 3.1. Scan the submission guidelines given below in Parts A and B and answer the following questions.

- What types of papers are mentioned in the guidelines?
- What submission instructions are given in each case?

PART A

Prospective authors are invited to submit original papers (not being considered for publication elsewhere) in standard format (double column, single-spaced, 10-pt font) describing new theoretical and/or experimental research. Submissions are recommended to have no more than 10 pages (extra pages are subject to surcharge), including figures, tables, and references. Submissions will be judged on originality, significance, interest, clarity, relevance, correctness, and presentation.

Note For Authors

All submitted papers will be sent to reviewers for a blind review. The reviewers use the following in evaluating research papers:

1 Novel Contribution
2 Originality in Thought
3 Inferences
4 Key Strengths
5 Key Weaknesses
6 Areas of Improvement
7 Presentation/Organization of Research

Guidelines For Panel Proposal Submission

Panels entail presentation of prepared papers (distributed in advance to a discussant) on a specific topic or theme, followed by structured discussion of those papers at CCECP 2016.

Panels should be comprised by no more than three-four paper presentations, and at least one, but no more than two, Discussants and each paper should have a full abstract and author information.

Panels are guaranteed a 60-80 minute slot (individual paper presentations are expected to run 12-15 minutes).

Each panel requires a chair, which can be self-nominated (during the submission process). They need to prepare a 400-word rationale for the panel proposal and a 75-word panel description for the conference program.

Full Panel Proposal (in word or PDF format) should contain the following:

- Panel Title
- Panel Abstract (200 words)
- Chair
- Discussant
- Presentation Titles
- Papers included in the panel

You may submit your full panel proposal in word/PDF format through EasyChair. Kindly choose panel as category for your proposal submission.

Registration

Your registration includes:

- Concurrent/Sessions of Technical Program
- Conference Proceedings (for Authors only)
- Welcome Breakfast, Morning and Afternoon Refreshment Breaks, and Lunch
- Paper Presentation
- Attendance to all sessions
- Portfolio Folder
- GSTF T-Shirt
- Certificate of Presentation
- Complimentary City Tour

PART B

Poster & Proceeding Guidelines
Poster size is **A0** size (**Portrait**) . Please refer below for the size dimension.

Poster Presentation
The following guidelines may prove helpful in the preparation of your poster.

- Use a large font size, and bullet your major points.
- Keep the text to a minimum – most posters contain far too much text.

- Attractive charts, tables and graphics will greatly increase the effectiveness of any poster. Illustrations and tables should be kept relatively simple to maximize legibility. Avoid “artsy” style and keep captions brief.
- Lines in graphs should be heavy. Choose colors that are easily distinguishable from one another. Symbols, letters and numbers should be large enough to be seen from a distance of six feet.
- It’s easier to read a poster if the information is arranged in vertical columns rather than horizontal strips.
- If you wish to show movies as part of your poster presentation, there are now a variety of commercially-available hangers for iPads and similar devices which can be mounted to your poster. Some hangers are like fancy plate holders, others are clear “sleeves”. Bring your own hanger and be sure that it is mounted securely.
- Push pins or Velcro will be provided.

Poster Evaluation

Students and presenters are required to be at their poster booth 10-15 minutes prior to lunch break and tea breaks. Judges will have a walkabout at random order for evaluation. You are also encouraged to be at your poster booth during the tea breaks to promote and present your work to audiences.

The evaluation on the poster will be on the poster organization, simplicity and concise, straight story line in a logical order and easy to read from appropriate distance. Poster content, figures and results and as well as poster design and layout will be evaluated as well.

Registration and Payment

Early Bird
Normal
Delegate / Corporate
Oral & Poster Presenter
Accompanying Person/Non-presenting Student
Dinner Ticket
Excursion Visits

Abstract review criteria

- Relevance to the conference topics
- Significance of the scientific question(s) and results
- Style
- Organization (e.g., the abstract has a clear beginning, middle and end)
- Clear question or hypothesis
- Sufficient background
- The experimental approach and rationale for the approach are clear
- The results are clearly presented
- The interpretation and conclusions are reasonable and logical

On the website of the conferences one can also find additional information about the venue, accommodation, sightseeing of the place, etc.

Exercise 3.2. Find the information about other conference presentations on the Internet and make up a list of instructions for each type of presentations.

Self-study activity

Study the conference announcements given above and make a glossary you might need when preparing a Call for papers.

2.4. HOW TO GIVE PRESENTATIONS: USEFUL EXPRESSIONS

Tips: The presentation is a science talk with a visual aid that helps listeners to better understand the scope of the research presented. The common error is to use the constructions of the written scientific prose. They are hard to understand and sound a bit artificial. Thus, the talk should be well prepared and rehearsed, the presentation slides read and checked by your supervisor.

The slides you use must help you to stick to the idea of your presentation and control the time it takes. The number of your slides should be specified by the time given for your presentation. Questions and answer (Q&A) session is usually about 15 or 20 minutes. Keynote speakers and invited lecturers are often given more time ranging from 30 minutes to an hour.

Do not forget to thank listeners after your presentation. You should also express your acknowledgements to the people who helped you with precious comments if they are not listed as co-authors in your research.

Exercise 4.1. Focus on the clichés given below and think of those you might also need when giving a presentation at a scientific conference in Chemistry.

Introduction

Dear colleagues, …

I am a Master/PhD student at . . .

I came from … (*a few words if the time permits*)

In this presentation, I am going to discuss / consider…

Today I would like to…

In our work we propose a model / consider a method…

Outline

I will begin with an introduction to . . .

Then I will move on to ...

I will say some words about …

And I will draw conclusions. . .

Motivation

This topic is of interest / importance …

Objectives and challenges

We aim to…

The objectives of our study are …

Moving form slide to slide

Next…

We should also note that…

First I'd like to give you a bit of background.

Introducing examples, plots, formulas

This slide shows …

I've got an example here . . .

There are several examples of this, such as . . .

Diagrams and tables

Here you can see ...

The solid / dashed curve in the plot indicates…

This diagram illustrates . . .

This table illustrates …

Self-study activity

Make up a presentation of your own following the instructions given below.

- Prepare a talk for 10 minutes.
- It should contain 8-10 slides.
- Say not more than three sentences for each slide (simple sentences are more preferable).
- Use as much imagery as possible.
- Check the pronunciation of the words when you hesitate how to read them right.

APPENDIX 1: Video tutorials on the Internet

Video tutorials from YouTube and other sources provide an alternative means of presenting and explaining concepts that can usefully supplement the printed word.

***Empirical formulas** (Sandra Etheridge, 9 min)*

***Elements to ions: formulas for binary ionic compounds** (papapodcasts, 9½ min)*

***How to distinguish ionic and molecular compounds** (Tyler DeWitt, 9 min)*

***Molar mass (not the same as molecular mass!)** (IsaacsTeach, 6½ min)*

***Calculating the molar mass of a compound** (MrB, 7½ min)*

***Using a "mole map" in calculations** (MrB, 17½ min)*

***Percent composition from formula** (IsaacsTeach, 4½ min)*

***Calculating percent composition from mass data** (Brian Swarthout, 2½ min)*

***Finding the formula from percent composition** (Khan, 13 min)*

APPENDIX 2: Table of chemical elements

No.	Сим-вол	Латинское название	Русское название	Английское название	Транскрипция
1	**H**	Hydrogenium	Водород	**Hydrogen**	[ˈhaɪdrədʒən]
2	**He**	Helium	Гелий	**Helium**	[ˈhiːlɪəm]
3	**Li**	Lithium	Литий	**Lithium**	[ˈlɪθiəm]
4	**Be**	Beryllium	Бериллий	**Beryllium**	[bəˈrɪliəm]
5	**B**	Borum	Бор	**Boron**	[ˈbɔːrɒn]
6	**C**	Carboneum	Углерод	**Carbon**	[ˈkɑːbən]
7	**N**	Nitrogenium	Азот	**Nitrogen**	[ˈnaɪtrədʒən]
8	**O**	Oxygenium	Кислород	**Oxygen**	[ˈɒksɪdʒən]
9	**F**	Fluorum	Фтор	**Fluorine**	[ˈflʊəriːn]
10	**Ne**	Neon	Неон	**Neon**	[ˈniːɒn]
11	**Na**	Natrium	Натрий	**Sodium**	[ˈsəʊdɪəm]
12	**Mg**	Magnesium	Магний	**Magnesium**	[mægˈniːzɪəm]
13	**Al**	Aluminium	Алюминий	**Aluminum**	[əˈluːmɪnəm]
14	**Si**	Silicium	Кремний	**Silicon**	[ˈsɪlɪkən]
15	**P**	Phosphorus	Фосфор	**Phosphorus**	[ˈfɒsfərəs]
16	**S**	Sulfur	Сера	**Sulfur**	[ˈsəlfə]
17	**Cl**	Chlorum	Хлор	**Chlorine**	[ˈklɔːriːn]
18	**Ar**	Argon	Аргон	**Argon**	[ˈɑːgɒn]
19	**K**	Kalium	Калий	**Potassium**	[pəˈtæsɪəm]
20	**Ca**	Calcium	Кальций	**Calcium**	[ˈkælsɪəm]
21	**Sc**	Scandium	Скандий	**Scandium**	[ˈskændɪəm]
22	**Ti**	Titanium	Титан	**Titanium**	[t(a)ɪˈteɪnɪəm]
23	**V**	Vanadium	Ванадий	**Vanadium**	[vəˈneɪdiəm]
24	**Cr**	Chromium	Хром	**Chromium**	[ˈkrəʊmɪəm]
25	**Mn**	Manganum	Марганец	**Manganese**	[ˈmæŋgəniːz]

26	**Fe**	Ferrum	Железо	**Iron**	[ˈaɪən]
27	**Co**	Cobaltum	Кобальт	**Cobalt**	[ˈkəʊbɔːlt]
28	**Ni**	Niccolum	Никель	**Nickel**	[ˈnɪkəl]
29	**Cu**	Cuprum	Медь	**Copper**	[ˈkɒpə]
30	**Zn**	Zincum	Цинк	**Zinc**	[zɪŋk]
31	**Ga**	Gallium	Галлий	**Gallium**	[ˈgæliəm]
32	**Ge**	Germanium	Германий	**Germanium**	[dʒɜːˈmeɪniəm]
33	**As**	Arsenicum	Мышьяк	**Arsenic**	[ˈɑːsnɪk]
34	**Se**	Selenium	Селен	**Selenium**	[sɪˈliːnɪəm]
35	**Br**	Bromum	Бром	**Bromine**	[ˈbrəʊmiːn]
36	**Kr**	Krypton	Криптон	**Krypton**	[ˈkrɪptɒn]
37	**Rb**	Rubidium	Рубидий	**Rubidium**	[rʊˈbɪdiəm]
38	**Sr**	Strontium	Стронций	**Strontium**	[ˈstrɒntɪəm]
39	**Y**	Yttrium	Иттрий	**Yttrium**	[ˈɪtriəm]
40	**Zr**	Zirconium	Цирконий	**Zirconium**	[zɜːˈkəʊniəm]
41	**Nb**	Niobium	Ниобий	**Niobium**	[naɪˈəubɪəm]
42	**Mo**	Molybdaenum	Молибден	**Molybdenum**	[məˈlɪbdənəm]
43	**Tc**	Technetium	Технеций	**Technetium**	[tek'niːʃɪəm]
44	**Ru**	Ruthenium	Рутений	**Ruthenium**	[ruːˈθiːnjəm]
45	**Rh**	Rhodium	Родий	**Rhodium**	[ˈrəʊdiəm]
46	**Pd**	Palladium	Палладий	**Palladium**	[pəˈleɪdiəm]
47	**Ag**	Argentum	Серебро	**Silver**	[ˈsɪlvə]
48	**Cd**	Cadmium	Кадмий	**Cadmium**	[ˈkædmɪəm]
49	**In**	Indium	Индий	**Indium**	[ˈɪndiəm]
50	**Sn**	Stannum	Олово	**Tin**	[ˈtɪn]
51	**Sb**	Stibium	Сурьма	**Antimony**	[ˈæntɪməni]
52	**Te**	Tellurium	Теллур	**Tellurium**	[teˈlʊriəm]
53	**I**	Jodum	Иод	**Iodine**	[ˈaɪədiːn]
54	**Xe**	Xenon	Ксенон	**Xenon**	[ˈzenɒn] [ˈziːnɒn]

55	**Cs**	Caesium	Цезий	**Cesium**	[ˈsiːziəm]
56	**Ba**	Barium	Барий	**Barium**	[ˈbeəriəm]
57	**La**	Lanthanum	Лантан	**Lanthanum**	[ˈlænθənəm]
58	**Ce**	Cerium	Церий	**Cerium**	[ˈsɪərɪəm]
59	**Pr**	Praseodymium	Празеодим	**Praseodymium**	[ˌpreɪziːəʊˈdɪmɪəm]
60	**Nd**	Neodymium	Неодим	**Neodymium**	[ˌniːəu'dɪmɪəm]
61	**Pm**	Promethium	Прометий	**Promethium**	[prəˈmiːθiəm]
62	**Sm**	Samarium	Самарий	**Samarium**	[səˈmeɪrɪəm]
63	**Eu**	Europium	Европий	**Europium**	[jʊˈropiəm]
64	**Gd**	Gadolinium	Гадолиний	**Gadolinium**	[ˌgædɒˈlɪnɪəm]
65	**Tb**	Terbium	Тербий	**Terbium**	[ˈtɜːbɪəm]
66	**Dy**	Dysprosium	Диспрозий	**Dysprosium**	[dɪsˈprəʊʃɪəm]
67	**Ho**	Holmium	Гольмий	**Holmium**	[ˈholmiəm]
68	**Er**	Erbium	Эрбий	**Erbium**	[ˈɜːbiəm]
69	**Tm**	Thulium	Тулий	**Thulium**	[ˈθjuːlɪəm]
70	**Yb**	Ytterbium	Иттербий	**Ytterbium**	[ɪˈtɜːbjəm]
71	**Lu**	Lutetium	Лютеций	**Lutetium**	[luːˊtiːʃjəm]
72	**Hf**	Hafnium	Гафний	**Hafnium**	[ˈhæfniəm]
73	**Ta**	Tantalum	Тантал	**Tantalum**	[ˈtæntələm]
74	**W**	Wolfram	Вольфрам	**Tungsten**	[ˈtʌŋstən]
75	**Re**	Rhenium	Рений	**Rhenium**	[ˈriːniəm]
76	**Os**	Osmium	Осмий	**Osmium**	[ˈɒzmiəm]
77	**Ir**	Iridium	Иридий	**Iridium**	[ɪˈrɪdɪəm]
78	**Pt**	Platinum	Платина	**Platinum**	[ˈplætɪnəm]
79	**Au**	Aurum	Золото	**Gold**	[gəʊld]
80	**Hg**	Hydrargyrum	Ртуть	**Mercury**	[ˈmɜːkjʊri]
81	**Tl**	Thallium	Таллий	**Thallium**	[ˈθæliəm]
82	**Pb**	Plumbum	Свинец	**Lead**	[led]
83	**Bi**	Bismuthum	Висмут	**Bismuth**	[ˈbɪzməθ]

84	**Po**	Polonium	Полоний	**Polonium**	[pəˈləʊniəm]
85	**At**	Astatium	Астат	**Astatine**	['æstəti:n]
86	**Rn**	Radon	Радон	**Radon**	[ˈreɪdɒn]
87	**Fr**	Francium	Франций	**Francium**	['frænsɪəm]
88	**Ra**	Radium	Радий	**Radium**	[ˈreɪdɪəm]
89	**Ac**	Actinium	Актиний	**Actinium**	[ækˈtɪnɪəm]
90	**Th**	Thorium	Торий	**Thorium**	[ˈθɔ:riəm]
91	**Pa**	Protactinium	Протактиний	**Protactinium**	[ˌprəʊtækˈtɪniəm]
92	**U**	Uranium	Уран	**Uranium**	[jʊˈreɪnɪəm]
93	**Np**	Neptunium	Нептуний	**Neptunium**	[nepˈtju:niəm]
94	**Pu**	Plutonium	Плутоний	**Plutonium**	[plu:ˈtəʊnɪəm]
95	**Am**	Americium	Америций	**Americium**	[ˌæməˈrɪsiəm]
96	**Cm**	Curium	Кюрий	**Curium**	[ˈkjʊərɪəm]
97	**Bk**	Berkelium	Берклий	**Berkelium**	[bɜ:'ki:lɪəm]
98	**Cf**	Californium	Калифорний	**Californium**	[ˌkælɪˈfɔ:njəm]
99	**Es**	Einsteinium	Эйнштейний	**Einsteinium**	[ˌaɪn'staɪnɪəm]
100	**Fm**	Fermium	Фермий	**Fermium**	[ˈfermiəm]
101	**Md**	Mendelevium	Менделевий	**Mendelevium**	[ˌmendəˈli:viəm]
102	**No**	Nobelium	Нобелий	**Nobelium**	[noˈbeliəm]
103	**Lr**	Lawrencium	Лоуренсий	**Lawrencium**	[lɒˈrensiəm]
104	**Rf**	Rutherfordium	Резерфордий	**Rutherfordium**	[ˌrʌðə'fɔ:dɪəm]
105	**Db**	Dubnium	Дубний	**Dubnium**	['dʌbnɪəm]
106	**Sg**	Seaborgium	Сиборгий	**Seaborgium**	['si:bɔ:gɪəm]
107	**Bh**	Bohrium	Борий	**Bohrium**	['bɔrɪəm]
108	**Hs**	Hassium	Хассий	**Hassium**	['hæsɪəm]
109	**Mt**	Meitnerium	Мейтнерий	**Meitnerium**	[ˌmaɪt'nɪərɪəm]

APPENDIX 3: Rules of reading compounds

Ionic compounds

If the compound is *ionic*, then the name of the cation (usually metal) comes first, followed by the 'compound' name of the anion. To find the compound name of an anion, replace the end of the element's name with 'ide'.

name of cation + name of anion, suffix 'ide'

E.g. **NaCl:** sodium, the cation, first, followed by chlorine changed with the suffix 'ide' = **sodium chloride**

If the anion is polyatomic and contains oxygen, then the suffix is 'ate'.

name of cation + name of polyatomic oxygen anion, suffix 'ate'

E.g. **Na_2CO_3:** sodium, the cation, first, followed by a polyatomic group containing carbon and oxygen to form carbonate = **sodium carbonate**

Hydrogen compounds

If the compound contains hydrogen and a metal, the metal comes first, followed by the word 'hydride', to denote the hydrogen component.

metal + hydride

E.g. **NaH:** sodium, the metal, first, followed by hydrogen changed with the suffix 'ide' = **sodium hydride**

If the compound contains hydrogen and a non-metal and *does not* contain water (H2O), then the hydrogen comes first, followed by the element's name replaced with the 'ide' suffix.

hydrogen + non-metal, suffix 'ide'

E.g. **HF:** hydrogen first, followed by fluorine changed with the suffix 'ide' = **hydrogen fluoride**

If the hydrogen non-metal compound dissolves in water, it starts with the 'hydro' prefix, followed by the element's name replaced with an 'ic' suffix, followed by 'acid'.

hydro(name of element, suffix 'ic') acid

E.g. **HCl:** hydro, then chlorine with an 'ic' suffix, then 'acid' = **hydrochloric acid**

Oxygen compounds

If the compound contains hydrogen and an oxygen anion (**oxyanion**) and *does not* contain water, then hydrogen comes first, followed by the element name with the suffix 'ate'.

hydrogen + element, suffix 'ate'

E.g. **HCO_3:** hydrogen followed by carbon with the suffix 'ate' = **hydrogen carbonate**

The 'ate' rule is used for the most common or the only compound made with an oxyanion. Some compounds, however, form more than one type of compound with oxygen and the amount of oxygen will affect the prefixes and suffixes used. This occurs for all oxyanions, with or without hydrogen involved, e.g.

ClO = **hypochlorite**

ClO_2 = **chlorite**

ClO_3 = **chlorate**

ClO_4 = **perchlorate**

Covalent compounds

If a compound contains two non-metals in a covalent bond, then:

- the least electronegative element is named first

- if the compound contains hydrogen, hydrogen is named first
- the number of atoms of each element is indicated by a prefix
- if the first element only has one atom the prefix is not used
- the name of the element has the suffix 'ide'

least electronegative + number prefix, most electronegative element, suffix 'ide'

The prefixes used to number the atoms come from Greek and are as follows:

1 = mono- or mon-	6 = hexa-
2 = di-	7 = hepta-
3 = tri-	8 = octa-
4 = tetra-	9 = nona-
5 = penta-	10 = deca-

E.g. **CO:** carbon, the least electronegative atom, first, followed by the prefix 'mon' to indicate one atom of oxygen, the most electronegative atom, with the suffix 'ide' =**carbon monoxide**

The information is taken from the Website: http://www.skwirk.com/p-c_s-4_u-107_t-285_c-953/nsw/science/introducing-chemistry/compounds-and-reactions/naming-compounds

APPENDIX 4: The Table of Irregular Verbs

Simple Present	Simple Past	Past Participle
arise	arose	arisen
be	was, were	been
bear	bore	borne
become	became	become
begin	began	begun
bend	bent	bent
break	broke	broken
bring	brought	brought
build	built	built
burn	burned or burnt	burned or burnt
burst	burst	burst
buy	bought	bought
catch	caught	caught
choose	chose	chosen
come	came	come
cost	cost	cost
cut	cut	cut
deal	dealt	dealt
do	did	done
draw	drew	drawn
drink	drank	drunk
drive	drove	driven
eat	ate	eaten
fall	fell	fallen
feed	fed	fed
feel	felt	felt
find	found	found
fit	fit, fitted	fit, fitted
forget	forgot	forgotten
freeze	froze	frozen
get	got	gotten or got
give	gave	given
go	went	gone
grind	ground	ground
grow	grew	grown
hang	hung or hanged	hung or hanged
have	had	had
hear	heard	heard
hide	hid	hidden
hit	hit	hit
hold	held	held
hurt	hurt	hurt

Simple Present	Simple Past	Past Participle
keep	kept	kept
know	knew	known
lay	laid	laid
lead	led	led
leap	leapt or leaped	leapt or leaped
leave	left	left
lend	lent	lent
let	let	let
lie (down)	lay	lain
light	lit or lighted	lit or lighted
lose	lost	lost
make	made	made
mean	meant	meant
meet	met	met
pay	paid	paid
prove	proved	proved or proven
put	put	put
quit	quit	quit
read	read	read
rise	rose	risen
run	ran	run
say	said	said
see	saw	seen
seek	sought	sought
sell	sold	sold
send	sent	sent
set	set	set
shake	shook	shaken
shear	sheared	sheared or shorn
show	showed	shown or showed
shrink	shrank or shrunk	shrunk or shrunken
shut	shut	shut
speak	spoke	spoken
spend	spent	spent
spread	spread	spread
take	took	taken
tell	told	told
think	thought	thought
undergo	underwent	undergone
understand	understood	understood
win	won	won
wind	wound	wound
withdraw	withdrew	withdrawn
write	wrote	written

APPENDIX 5: Passive voice

To be + Past Participle (V_3)

	Simple	Continuous	Perfect
Present	The test is done.	The test is being done.	The test has been done.
Past	The test was done.	The test was being done.	The test had been done.
Future	The test will be done.		The test will have been done.

Have something done

Have + Object + Past Participle (V_3)

Present Simple	They have it tested.
Present Continuous	They are having it tested.
Past Simple	They had it tested.
Past Continuous	They were having it tested.
Future Simple	They will have it tested.
Future Continuous	They will be having it tested.
Present Perfect	They have had it tested.
Present Perfect Continuous	They have been having it tested.
Past Perfect	They had had it tested.
Past Perfect Continuous	They had been having it tested.

APPENDIX 6: Non-finite forms of the verb

The Infinitive

Forms of the Infinitive

	Active	Passive
Present	(to) do	(to) be done
Present Continuous	(to) be doing	–
Perfect	(to) have done	(to) have been done
Perfect Continuous	(to) have been doing	–

The Gerund

Forms of the Gerund

	Active	Passive
Simple	doing	being done
Perfect	having done	having been done

The Participle

Forms of the Participle

	Active	Passive
Present Participle Simple	using writing	being used being written
Present Participle Perfect	having used having written	having been used having been written
Past Participle	–	used, written

APPENDIX 7: Word Formation. Affixation

Prefixes

Prefixes	Meaning	Examples
a-	not, without	*amoral*
anti-	against	*antisocial*
bi-	two	*bidirectional*
co-	with	*co-author*
counter-	counter, in opposition to,	*counterpart*
de-	down; away	*decompose*
dis-	negation	*disagreement*
ex-	previous, former	*ex-chairman*
il- (before l)	not, without	*illogical*
im- (before b, m, p)	not, without	*impractical, imbalance*
in-	not, without	*insignificant*
ir- (before r)	not, without	*irrational*
inter-	between	*international*
mal-	wrongly, badly	*malformed*
mis-	wrongly, badly	*misunderstand, misunderstanding*
mono-	one	*monograph*
multi-	many	*multidisciplinary*
non-	not	*non-ability*
out-	more, better	*outbalance, outgo*
over-	excessively	*overestimated*
post-	after	*postdate*
pseudo-	false	*pseudo-scientific*
pre-	before	*preanalysis, precalculate*

Prefixes	Meaning	Examples
re-	again	*recalculate*
semi-	half	*semi-automatic, semi-natural*
sub-	under, less	*subdivision*
super-	more, big	*supercompact, superfast*
trans-	into another state or place	*transform*
un-	opposite	*unexpected, unacceptable*
under-	not enough	*underdeveloped*

Suffixes

Forming Nouns

Suffixes	Meaning	Examples
-age	denoting an action; denoting an aggregate or number of	*usage, linkage; percentage*
-al	denoting verbal action	*refusal*
-ance	denoting a quality or state or an instance of one; denoting an action	*importance; dissonance; appearance*
-ation	denoting an action or an instance of it	*exploration*
-cy	denoting state or condition	*vacancy*
-ee	recipient of the action	*conferee*
-ence	denoting a quality or an instance of it; denoting an action or its result	*competence; difference; reference*

Suffixes	Meaning	Examples
-er,-or	agent performing the action	*publisher, inventor*
-ion	denoting verbal action	*revision*
-ist	denoting a member of a profession or business activity; denoting a person who does something expressed by a verb ending in -ize	*plagiarist*
-ity	denoting quality or condition	*formality*
-ment	state, action, the result of	*development*
-ness	status, condition, quality	*effectiveness*
-ship	condition, status	*membership*
-sion	forming nouns of action, condition, etc.	*comprehension*
-sis	denoting an action or its result	*analysis*
-tion	forming nouns of action, condition	*completion*
-ty	denoting quality or condition	*loyalty*

Forming Adjectives

Suffixes	Meaning	Examples
-able	able to	*acceptable*
-al	relating to	*logical*
-ible	able to be, suitable for being	–
-ic	having the nature of, like	*realistic*
-ive	tending to; having the nature of	*active, conclusive*
-ful	full of, characterised by	*useful, meaningful*
-less	without	*useless, meaningless*

Forming Verbs

Suffixes	Meaning	Meaning
-en	denoting the development, creation, or intensification of a state	widen, deepen
-ise	make or become; follow a specified practice	legalise, theorise

APPENDIX 8: Linking Words and Phrases

Listing/Sequencing	***To begin:*** *initially, first, firstly, first of all, in the first place, to start/begin with.* ***To continue:*** *secondly, second, thirdly, third, next, then, thereafter.* ***To conclude:*** *finally, lastly, eventually, in the end.*
Indicating addition	*and, both … and, as well (as), what is more, in addition (to this), additionally, moreover, also, further, furthermore, besides (this), too* ***Negative addition:*** *neither … nor, nor, neither, either.*
Highlighting contrast	*alternatively, although, but, conversely, despite, even so, even though, for all that, however, in contrast, in spite of, instead,* *on the contrary, contrary to, nevertheless, nonetheless, notwithstanding, rather, still, on the other hand, otherwise, though, whereas, while*
Explaining results/effects	*accordingly, as a result/consequence of, consequently, for this reason, hence, so, therefore, thus, inevitably*
Giving reasons/causes	*a/the consequence of, because, because of,* *due to, for this reason, as, as a result (of), the effect of …, the result of …, since*
Making a general statement	*generally, in general, as a rule, for the most part, in most cases, normally, on the whole, usually*
Stating purposes	*so as (not) to, in order (not) to, in case, to, so that, in order that*
Referring to other sources:	*with reference to, according to, in accordance with*
Giving examples	*for example, for instance, in particular,* *such as, thus, a further instance of this is..., an example of this is…, as follows, especially*
Rephrasing statements	*in other words, more simply, namely, simply, put, to put it differently / another way, such as, that is*

Emphasising a point:	*in fact, indeed, particularly, especially, interestingly, (un)fortunately, naturally, obviously, unquestionably, clearly, undoubtedly, generally, admittedly, again, to repeat, it should be noted/mentioned (that), more important(ly), most importantly*
Making comparisons	*similarly, in a similar manner, similar to, likewise, in the same way, too, the same as, equally, correspondingly, in comparison*
Providing condition	*if, in that case, in case of, in case, unless, provided that, providing that, on condition that*
Summarizing	*in conclusion, in summary, to sum up, in brief, in short, taking everything into account/consideration, on the whole, all things considered, for the above mentioned reasons.*

REFERENCES

Adrian Wallwork English for Writing Research Papers. Springer Science+Business Media, LLC 2011

Internet resources

http://www.skwirk.com/p-c_s-4_u-107_t-285_c-953/nsw/science/introducing-chemistry/compounds-and-reactions/naming-compounds
http://www.chemistry-conf.org/CallForPapers.html
https://www.waset.org/conference/2016/03/london/ICCME/call-for-papers
http://sciconference.net/viewjc.php?id=c5&page_id=16
http://www.accs2015.org/call-for-paper/

MATERIALS USED FOR ANALYSIS

Gentle, Brady S.; Ellis, Peter S.; Grace, Michael R.; McKelvie, Ian D. Analytica. A compact portable flow analysis system for the rapid determination of total phosphorus in estuarine and marine waters. *Analytica Chimica Acta*, 2010, Vol.674(2), pp.117-122

Sarah E. Petricca, Kacey G. Marra, Prashant N. Kumta Chemical synthesis of poly (lactic-co-glycolic acid) / hydroxyapatitecomposites for orthopaedic applications. *Acta Biomaterialia 2* (2006) 277–286

M.R. Mohammadia, D.J. Fray. Nanostructured TiO2.CeO2 mixed oxides by an aqueous sol. gel process: Effect of Ce: Ti molar ratio on physical and sensing properties. *Acta Biomaterialia 2* (2006) 277–286

Krasimir Ivanov, Penka Zaprjanova, Milena Petkova, Violeta Stefanova, Veselin Kmetov, Deyana Georgieva, Violina Angelova. Comparison of inductively coupled plasma mass spectrometry and colorimetric determination of total and extractable phosphorus in soils. *Spectrochimica Acta Part B* 71-72 (2012) 117–122

Fei Yang, Wenjin Cui, Zhuo Xiong, Li Liu, Jianzhong Bei, Shenguo Wang, Poly (L, L-lactide-co-glycolide) / tricalcium phosphate composite scaffold and its various changes during degradation in vitro. *Polymer Degradation and Stability 91* (2006) 3065e3073

Jorge Ancheyta, Sergio Sa´nchez, Miguel A. Rodrı´guez. Kinetic modeling of hydrocracking of heavy oil fractions: A review. *Catalysis Today* 109 (2005) 76–92

Ming-Li Chen, Lin-YuMa, Xu-WeiChen. New procedures for arsenic speciation: A review. *Talanta125* (2014)78–86

A. Trinchi, Y.X. Li, W. Wlodarski, S. Kaciulis, L. Pandolfi, S. Viticoli, E. Comini, G. Sberveglieri. Investigation of sol-gel prepared CeO2-TiO2 thin films for oxygen gas sensing. *Sensors and Actuators B* 95 (2003) 145–150

Raimundo Crisostomo Rabelo Neto, Martin Schmal. Synthesis of CeO2 and CeZrO2 mixed oxide nanostructured catalysts for the iso-syntheses reaction. *Applied Catalysis A*: *General* 450 (2013) 131– 142

Xiao-Lan Huang, Jia-Zhong Zhang. Rate of phosphoantimonylmolybdenum blue complex formation in acidic persulfate digested sample matrix for total dissolved phosphorus determination: Importance of post-digestion pH adjustment. *Talanta* 77 (2008) 340–345

Hugo Ortiz-Moreno, Jorge Ramнrez, Felipe Sanchez-Minero, Rogelio Cuevas, Jorge Ancheyta. Hydrocracking of Maya crude oil in a slurry-phase batch reactor II. Effect of catalyst load. *Fuel* 130 (2014) 263–2

KEYS

Abstract

Part A

Ex.2.2.

1. was investigated
2. were varied
3. allowed
4. were found
5. was found
6. was observed
7. improves
8. increased
9. indicate
10. is proposed

Ex.2.6.

1.at 2. to 3. in 4. to 5. from

Part B

Ex.2.14.

a 6 b5 c4 d3 e2 f1

Ex. 2.15.

1. evaluation
2. phosphorus
3. analysis
4. digestion
5. detection
6. method
7. pressure
8. cell
9. sample

Part C

Ex. 2.21.

compares, compare, was determined, was established, was comparable, was, was, is conducted, reports, were selected, was established, yielded, were.

Ex. 2.23.

1. assay
2. solution
3. procedure
4. standard

5. value
6. property
7. agreement
8. relationship

1. for 2 by 3 between 4. of 5. to. 6.on

Part D

Ex. 2.32.

have been investigated, have been prepared, were deposited, were deposited, were employed, were exposed, were measured.

Ex. 2.33.

1D 2B 3E 4A 5C

Part E

Ex. 2.41.

were applied, released, were found, shows, increased, were followed, did not present, was supervised, showed, showed, predominated, showed, remained, showed, varied.

Ex. 2.44.

1. structure
2. mixture
3. derivative
4. parameter
5. ratio
6. evolution
7. phase
8. maturation
9. polymerization
10. population
11. index

Part F

Ex. 2.51.

The different CeO2 oxides and mixed oxide CeZrO2 showed nanosized structures and morphologies in particular distinct structural and surface properties. These catalysts were effective in the iso-synthesis reaction. The flowerlike CeO2 (F) and the mixed oxide (CeZrO2) showed the highest selectivity toward isobutene and low methane formation. The turnover frequency (TOF) related to the total basicity and total acid sites are equal for all catalysts within a factor less than 2 and did not change with the oxygen lattice capacity (OSC), which confirms that the reaction is structure insensitive. The selectivity of total hydrocarbon and of CO2 are independent of the basic sites. However, the selectivity of total iso- C4 exhibits a linear relationship with the basic sites. The mixed oxide (CeZrO2) presented the strongest basic sites and thus

the highest selectivity to iso-C4. Significant is the influence of Lewis acid sites on the selectivity of isobutene increasing and isobutane decreasing both linearly with Lewis acid sites. The ratio isobutene/isobutane presented a linear relationship with the Lewis acid sites which are directly related to OSC capacity of reducible oxides.

Introduction

Part A

Ex. 3.1.

Is, occurs, is considered, is, is, is required, have been employed, are used, are, indicated, concluded, was, has been considered, was based, were accelerated, has been adapted, is, have been used, has been reported, is detected, attributed, was recommended, were recommended, has been suggested, has been paid, has been ignored, is, is, control, explore, has undergone, was examined, was evaluated.

Ex. 3.6.

1. essential
2. different
3. frequently
4. rapidly
5. reliable
6. consistent
7. standard
8. little
9. previous

Ex. 3.7.

a. of b. by c. of d. of e. of f. in g. in h. of i.in j. on k.on

Part B

Ex. 3.14.

Also, due to, recently, because, which, furthermore, moreover, therefore, such as, due to, such as, such as, so far, therefore, furthermore, besides, therefore, therefore.

Ex. 3.16.

1. widespread
2. application
3. cosmetics
4. detection
5. component
6. durability
7. performance
8. potential
9. response
10. treatment
11. process

Part C

Ex. 3.23.

1(5), 2(6), 3(2), 4(3), 5(1), 6(7), 7(4)

Ex. 3.24.

a. Material
b. Lattice
c. Substitution,
d. Mixture
e. Defect
f. Consensus
g. Characteristic
h. Paragraph
i. Reaction
j. Surface

Ex. 3.25.

1.to 2. on 3. on 4. under 5.to 6. To

Ex. 3.28.

1. growth
2. occur
3. catalyst
4. correlate
5. chain
6. claim
7. commercial
8. favour

Ex. 3.30.

1. This catalyst presented selectivity to iso-C4 (above 50%).
2. It is produced from petroleum products
3. The insertion of CO depends also on the surface properties,
4. Therefore, it is a suitable catalyst for isosynthesis.
5. The CeO2 and CeO2-based materials have been investigated for this reaction.

Part D

Ex. 3.37.

Development, sensitivity, selectivity, dependence, conductivity, composition, possibility, sensitivity, selectivity, reliable, attention, composition, performance, improvement, sensitivity, selectivity, fabrication, application, attention, characterization, performance.

Ex. 3.38.
Of, for, of, for, of, of, of, of, of, for, for, at, because, of, by, at, on, in, from, for to for, for, at, for, with, to, at, by, into, at

Ex. 3.39.
1. focus
2. semiconductor
3. vapor
4. binary
5. device
6. sensor
7. ambient
8. oxide

Ex. 3.40.
1. Diverse
2. Ceramics
3. Composition
4. Material
5. Modify
6. Concern
7. Vary

Part E
Ex. 3.49.
Exposure, effect, values, sample, survey, content, levels, data, methodologies, procedure, acknowledge, exposure, techniques, effect, mode, demonstration, procedure

Ex. 3.51.
to b. in c. at d. to e. out f. for

Ex. 3.53.
B. 3, C. 1, D. 4, E. 2

Ex. 3.55.
Capillary electrophoresis has been proved a useful tool in multi-arsenic species separation. As (III), DMA, p-As, MMA and As (V) in shrimp are successfully separated with capillary zone electrophoresis [52]. With the ultraviolet detection method,the detection limits locate in the range of 0.004–0.30 mg L^{-1}. After microwave-assisted extraction, arsenic species As (III), DMA, MMA and As(V) in Mya arenaria Linnaeus and shrimp samples are base line separated within11min using capillary electrophoresis [53]. With the help of an improved sheath flow interface, the separated As species are transported to ICP-MS detection smoothly, along with a recovery of 96–105%. By using a novel and high efficient interface as

thenebulizer, a capillary electrophoresis coupled with inductively coupled plasma mass spectrometer (ICP-MS) system is developed for the simultaneous determination of ten arsenic compounds including As (III), As(V), DMA, MMA, AsB, AsC, 3-NHPAA, 4-NPAA, o-ASA (o-arsanilic acid) and p-UPAA. The separation is achieved on a100 cm length ~50 μm ID fused- silica capillary [7].

Ex. 3.56.
The growing demand for middle distillates and the increasing production of heavy crude oils have place hydrocracking as one of the most important secondary petroleum refinery processes. Hydrocracking is commonly practiced in the petroleum refining industry to treat oil residua. During hydrocracking, large compounds are broken to form low molecular weight compounds. When the reaction takes place over a catalyst in a hydrogen-rich atmosphere, other reactions, such as hydrodesulfurization, hydrodemetallization, etc., occur simultaneously. The different rates and selectivity of each reaction depend on the properties of the catalyst used and on the reaction severity. Most of industrial processes employ catalysts with both hydrogenation and acid functions [1]; isomerization and cracking occur on acid sites via ion carbenium chemistry, whereas hydrogenation and dehydrogenation reactions take place on the metallic sites.

Conclusion

Part A
Ex. 5.2.
Effectively, beneficial, smooth, rough, respectively, excellent, good, useful

Ex. 5.6.
A2, B4, C3, D5

Part B
Ex. 5.11.
Such as, such as, while, however

Ex. 5.12.
Have been describing,, indicates, was, meets, is limited, has been applied, passes, remains

Part C
Ex. 5.17.
To be, to be, to achieve, be mentioned, to develop, to obtain

Part D

Ex. 5.21.

Abstract. Has been reported, revealed, were observed, is noted, provides

Conclusion. Was investigated, was related, caused, were observed, provides

Ex. 5.23.

Abstract. Determination, formation, products, oxidation, formation, products, formation, modification, decomposition, product, methods, understanding, decomposition, formation

Conclusion. Formation, products, formation, products, oxidation, formation, determination, addition, calibration, solution, decomposition, products, digestion, development

Издание подготовлено в авторской редакции

Подписано в печать 20.12.2018 г.
Отпечатано на оборудовании Издательского Дома Томского государственного университета,
634050, г. Томск, пр. Ленина, 36, тел. (3822) 529-849. E-mail: rio.tsu@mail.ru
Заказ 3527 Тираж 50 экз.