高等院校应用型本科规划教材

表面精饰专业英语教程

Selected English Readings on Surface Finishing

万传云◎主编

華東理工大學出版社
EAST CHINA UNIVERSITY OF SCIENCE AND TECHNOLOGY PRESS

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前　言

Foreword

《表面精饰专业英语教程》是应用化学表面处理专业的一门重要专业课程教材，旨在提高学生专业英语水平，扩大学生专业知识面，提高查阅阅读专业英文资料、获取国外最新科研信息、了解先进技术的能力。本教程在讲述金属腐蚀和防腐基本知识的基础上，对金属表面处理技术（有机涂料涂装及电镀处理）的理论及实际技术做了较为全面的归纳，同时也对涂镀层的质量控制技术进行了总结。书中的内容涵盖了金属腐蚀、表面有机涂装和表面电镀等相关知识的基础专业英语，也给出了表面有机涂装和表面电镀的基本工艺过程以及生产中常见的涂装技术（喷涂、刷涂、电泳涂装等）和电镀工艺过程（镀铜、镀镍、镀铬、化学镀、电子电镀等）的英语素材。同时，也对涂镀层质量控制技术方面的英语进行了材料的收集和整理。在每一个知识点的后面，编者都对专业词汇做了适当的汇总，并给出了思考练习题，供学生在学习过程中使用。书中还以附录的方式给出了电镀、涂料工艺过程中相关的术语解析等信息。

本教程编写的初衷是为表面精饰专业的本科生提供优质的专业英语教材，为保证学生学习的系统性、完整性和准确性，本教材内容皆选自国外英语原版的表面处理专著及工具书，编者所选用的这些英语资料以满足本专业学生培养目标为原则，同时也提供相当数量的英语原素材供有时间和感兴趣的读者作为课外阅读材料使用，读者也可以根据自己的需求对内容进行有针对性的选读。根据教学需要，编者对部分所选内容做过调整和删减。本教程的内容也适合电镀、金属腐蚀与保护等专业的大专院校学生学习或工厂的技术人员作为英语参考书使用。

在本书的编写和修改过程中，上海电子电镀专业委员会主任郁祖湛教授曾对教材的内容提出过宝贵的修改意见，兄弟院校的同行也提出过中肯的建议，与我一起工作的同事们也给予过许多帮助，在此一并表达谢意。

由于编者英语水平有限，本教材难免存在不足和错误之处，请读者谅解，并提出宝贵意见。

编　者

2016 年 2 月

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Unit 1 Basic Chemistry

Lesson 1 Writing a Scientific Paper

What is a scientific paper? A scientific paper is an organized description of hypotheses, data and conclusions, intended to instruct the reader. Papers are a central part of research. If your research does not generate papers, it might just as well not have been done. "Interesting and unpublished" is equivalent to "non-existent".

1 Paper Format

Scientific papers usually include the following major sections: introduction, procedure (or materials and methods), results, discussion, conclusion, acknowledgments and literature cited. This is not an absolute structure as some papers will be variations of this model.

2 An Outline of a Scientific Paper

A good outline for a scientific paper is also a good plan for the research program. You should write and rewrite these plans/outlines throughout the course of the research. At the beginning, you will have mostly plans; at the end, mostly outlines. The continuous effort to understand, analyze, summarize, and reformulate hypotheses on paper will be immensely more efficient for you than a process in which you collect data and only start to organize them when their collection is "complete". An outline is a written plan of the organization of a paper, including the data on which it rests. You should, in fact, think of an outline as a carefully organized and presented set of data, with attendant objectives, hypotheses and conclusions, rather than an outline of text. A brief outline for a paper is given below.

1) Title

The primary aim of writing a paper is to have it read. The title is the first, and possibly the last, a reader will see of your paper. Its importance cannot be overemphasized. You must try to

produce something which is not only factual but stands out from the mass of other titles in the "contents" section of a journal. The title serves two main purposes: (1) to attract the potential audience and (2) to aid retrieval and indexing. Therefore, be sure to include several keywords. The title should provide the maximum information for a computerized search. Normally, the length of a title is limited for a journal. So please be sure to use the fewest possible words to adequately describe the contents of the paper.

2) Abstract

Most publications require an informative abstract for every paper, even if they do not publish abstracts. An abstract is a short description, or an accurate condensation of the contents of a piece of writing.

3) Introduction

In general, the introduction should have these elements: the objectives of the work, the justification for these objectives: why is the work important? background: who else has done what? how? what have we done previously? What should the reader watch for in the paper? What are the interesting high points? What strategy did we use? In general, the introduction should address the following questions: why did you undertake this study? what is the state of existing knowledge? what specifically are you going to do (clearly state your hypotheses and/or objectives)?

4) Procedure (Materials and Methods)

In a research report, this section can also be called "experimental methods" or "experimental section". For experimental work, you should give sufficient details of your materials and methods so that other experienced researchers can repeat your work and obtain comparable results. Answer all basic questions as to how the study was done, namely answer the three questions where, when, and how. Be as specific and as concise as possible.

In a theoretical report, this section is called, for example, "theoretical basis" or "theoretical calculations" instead of "experimental methods" and includes sufficient mathematical details to enable other researchers to reproduce derivations and verify numerical results. Include all background data, equations, and formulas necessary to the arguments, but lengthy derivations are best presented as Supporting Information.

5) Results

Results should clearly describe what was found, and readers are not required to interpret data from figures and tables. Generally, results include only summarized data and

observations obtained in the study. Do not present raw data. If you want to include actual data sheets, these are appendices to the paper. In addition, all figures and tables included in your paper must be cited in the results description. Most importantly, the results section should be free of interpretation of the data.

6) Discussion

The purpose of the discussion is the interpretation of the data in relation to the original objectives or hypotheses. Relate your findings to the present state of knowledge and future needs for research. Make sure this is genuinely interpretive, not just a restatement of the introduction or results sections.

In your discussion, address the followings:

Reach conclusions about the initial hypotheses and/or objectives;

Compare how your conclusions agree or contrast with previously published works;

Identify sources of errors and inadequacies of your research;

Speculate upon broader meaning of the conclusions;

Identify needed next steps in research on the problem.

7) Conclusions

The purpose of the conclusions section is to put the interpretation into the context of the original problem. Do not repeat discussion points or include irrelevant materials. Your conclusions should be based on the evidence presented. Your conclusion should address the following questions:

What does it all mean?

What hypotheses were proved or disproved?

What did I learn?

Why does it make a difference?

8) Acknowledgments

This section is optional and depending on the study. Acknowledgements give credit to those who helped in your research through advice, work, permission, technical advice, monetary support, etc.

9) Literature Cited

Literature cited (references) contains, in alphabetical order, only those items specifically referred to within the text. Items you read but did not specifically cite in the text of your paper should not be included.

3 Writing an Abstract to a Research Paper

1) Position and Designation

The abstract (usually presented in distinctive type and without heading) of a paper has to be printed at the beginning of a paper, just below the title, where it is most convenient for the reader to cover. The modern trend in scientific and technical journals is towards the adoption of this method. Abstracts of important articles are usually to be collected and published particularly in special forms annually for special branches of sciences.

The abstract as a form of abridgement should be the same in content as the whole paper.

2) Purpose

In preparing a title and an abstract for a paper, it is important to realize that the reader has to glance over many more papers than what he has time to read. An abstract is there to help him by telling him more precisely what the paper covers. Also, if he is interested only in the main results and conclusions, the abstract gives him this information in brief and spares him the difficulty for reading the whole paper. Evidently, if the abstract is well prepared by the author, it will be suitable for reprinting in an abstract journal.

3) Nature and Kinds of Abstracts

To serve its purpose, an abstract should indicate clearly all the subjects dealt with in the paper, so that no reader interested in only one of these subjects will fail to have his attention directed to it. The abstract should also summarize briefly but clearly the principal new results and conclusions, especially all new information likely to be of interest to readers who are not specialists in the field. The abstract should be well arranged and expressed, so as to be easily read and understood, and also be self-explanatory, complete and clear in itself.

Abstracts fall into different kinds or types and the abstractors decide which one to best suit their purposes. Abstracts placed before academic articles can usually be divided into two widely-used subtypes, that is, descriptive abstracts and informative abstracts. Basically, descriptive abstracts state usually the general subject matter of the paper abstracted or, in some experts' words, serve as a table of contents for the whole paper that follows.

Informative abstracts, on the other hand, focus on a certain aspect of the contents of the paper. The aspect in focus can be the findings or the methods, which are supposed to be outstanding and contributive in a special circle. Sometimes vital details are offered to make the focal point more informative and the whole abstracted paper more attractive or

more valuable as a result of a well-written abstract.

Keeping in mind the dual purposes of the abstract, the abstractor should read his manuscript carefully, making notes (a) as to the subjects dealt with, particularly subjects concerning which new information is given, evidently, and (b) as to the new results and conclusions reported. Material relating to each subject should then be gathered together; sentences summarizing the material should be put together so as to make a well-written abstract brief, condensed, complete, yet readable.

In order to write a proper abstract, especially, an informative one, it is necessary for a writer to perform the mental acts in four approximate stages:

(1) Focusing on the basic features of the original paper

The first step in writing an abstract is to determine the general characteristics of the materials to be abstracted, the form, type, size and structure of the information. The form of the material to be abstracted may be a monograph, article, dissertation, project status report, to name a few. Different forms usually require slightly different abstracting procedures.

First of all, the abstractor must classify the materials to be abstracted clearly. Is the material based on experimental research or testing; sociological, scientific, or psychological surveys; descriptions of methods of equipment; theoretical research of computer-modeling; or literal reviews, book reviews, or personal views on scientific, technical, or scholarly themes?

Then analysis should be done within the structure of the text. Particular attention should be paid to such guide words as "introduction" "methods" "results" "conclusions", and "recommendations", which expedite the locating of the representative information for the abstract. How to give a balanced, informative treatment in the abstract to the information on purpose, methods, results, conclusions, and recommendations?

Before beginning the first stage, the abstractor has to be aware of these information characteristics.

(2) Identifying relevant information

The second stage in the abstracting process involves a rapid-review reading of the text to identify those portions that may contain the relevant information for the abstract. In doing so, the abstractor has to seek relevant information through identification of cue words or phrases in sentences in the text. He has to concentrate on the information presented under conventional functional headings such as "introduction" and "methods". The location of sentences in a paragraph within paragraphs is also a good indicator of potentially representative information for the abstract. The first and the last sentences in a paragraph often are topical or summary ones.

(3) Extracting, organizing, and condensing relevant in formation

Having done the above two stages, the abstractor may now begin the "extracting into

abstracting" stage. The extractable information is sorted mentally into a pre-established format. As mentioned above, the ordinary standard format follows the sequence: purpose, methods, results, conclusions, and recommendations. Other formats generally involve rearrangement of these elements. Before writing or typing the information into abstract in the appropriate sequence, the abstractor has to review it for relevance and validity, and condense and consolidate it by using his cognitive techniques.

(4) Information refinement

The last stage in writing an abstract involves the editing or defining of the raw abstract into a good informative abstract. The refinement process ranges from minor to major self-editing or revision by authors or access abstractors, editors, or reviewers.

4) Sample Abstracts

(1) A descriptive abstract

The physical and chemical properties of layered inorganic compounds are summarized. The recent progress of layered zirconium phosphate in the fields of optics, electrics, catalysis and molecular recognition is reviewed.

(2) An informative abstract

Example 1:

The influence of H_3BO_3 on the zinc electroplating was studied using electrochemical noise technique, cyclic voltammetry and steady-state polarization method. The results showed that, under the experimental conditions, the deposition of zinc followed the mechanism of two-dimensional nucleation and subsequent grain growth. The addition of H_3BO_3 into the electroplating solution prominently changes the nucleation and growth kinetics of zinc deposits, which is directly related to the features of electrocrystallization noise and the corresponding structure of the electrodeposits. The results also show that the electrochemical noise (EN) technique can give more information about the electrodeposits structure and electroplating mechanism than other normal electrochemical measurements can give, such as steady-state polarization method and cyclic voltammetry technique.

Example 2:

Amorphous MnO_2 was synthesized using the sol-gel method by reduction of $NaMnO_4$ with solid fumaric acid. The synthesized product was characterized using X-ray diffraction, scanning electron microscopy, thermogravimetric analysis, BET and chemical analysis. Electrochemical characterization was performed using cyclic voltammetry by a three electrode method, and aqueous NaCl, KCl and Na_2SO_4 solutions were used as electrolytes. Prepared material remained amorphous until 400℃ and transformed to crystalline Mn_2O_3 at 500℃. The composition of prepared material was determined to be $Na_{0.25}MnO_2 \cdot 0.5H_2O$. A maximum capacitance of 110 $F \cdot g^{-1}$ was obtained at a scan rate

of 5 mV • s^{-1} in 2 mol • L^{-1} NaCl solution. MnO_2 yielded almost the same capacitance in 2 mol • L^{-1} and 1 mol • L^{-1} NaCl electrolytes. The specific capacitance of MnO_2 remained constant up to 800 cycles in 1 mol • L^{-1} NaCl electrolyte at 5 mV • s^{-1} scan rate.

4 Writing an Introduction to a Research Paper

The function of the introduction is to make clear the subject of the paper. The introduction should state the problem, describe its condition at the beginning of the study, and indicate the reasons for investigating it. It should give the purpose, scope, and general method of the investigation. Finally, the introduction should state clearly and definitely the most significant result of the investigation. With the main conclusion before him at the start, the reader is able, as he goes through the paper, to judge the development of evidence and inference brought forward in its support. If, on the other hand, the statement of the main point is deferred until later in the paper, the reader is unable to distinguish essential from non-essential evidence and may overlook or forget important features.

Make reference in the introduction to only those literature citations that bear directly upon the induction itself. The other references to the literature should be included in the parts of the paper to which they are most pertinent, chiefly the discussion of results.

The foregoing procedure is now favored by most science writers. To be sure, a long historical review often arranged merely chronologically was at one time considered to be an essential part of the introduction. But the reader generally finds such a review dull, since he is not prepared so early in the paper to correlate past investigations with the specific problem in hand. The place for most of the references to the literature is in the discussion of the results, where the new results and interpretations are compared with those of previous investigators.

5 Writing a Conclusion or Discussion of Results of a Research Paper

1) Interpretation

The primary purpose of the discussion of results is to show the relation between the related facts, their underlying causes, their effects, and their theoretical implications, aim, when possible, to explain the facts in the symbols or language of mathematics, and according to the laws of physics and chemistry.

2) Emphasis of Conclusions

Ways in which the results of your study should be stated to be related to the science as

a whole. Emphasize the additions that your study makes, and stress conclusions that modify in a significant way any hypothesis theory, or principle that has secured general acceptance. Develop with special clearness observations or inferences that seem to be of sufficient importance to deserve mention in a textbook on the subject.

3) Qualification of Conclusions

To prevent misunderstanding, it is necessary to define as clearly as possible as the precise conditions to which your conclusions apply. A conclusion should always be stated in such a way as to indicate its range of validity.

Confusion often results from failure to define adequately all influential experimental details. In any experiment or series of experiments the influential conditions may be analyzed conveniently into two groups ① those representing the variables specially studied, and ② those representing the rest of the experimental complex the influential background or prevailing conditions. The conditions of the first group are assumed to be adequately known and controlled; they are the conditions that are purposely made to differ in certain known ways. For an ideal experiment or experiment series, the conditions of the second group should be as thoroughly known and definitely described as are the primary variables; they should be maintained constant or at least not permitted to vary sufficiently to interfere with the influence of the primary variables.

4) Application of Your Results and the Feasibility of Your Conclusions

Indicate the practical applications of your study to agriculture, industry, engineering, medicine, etc.

5) Attention to be Paid to with Conclusion-making

Be careful not to draw conclusions from data involving errors of observation, errors in arithmetic, compensating errors, systematic and personal errors.

Do not use mathematical formulas without clearly understanding their derivation and all the assumptions involved.

Be cautious in comparing conclusions based upon experiments in which the influential conditions have been improperly controlled, and therefore not duplicated.

Avoid confusing facts with opinions or influences, not only in the investigation itself but also in preparing results for publication.

Do not draw a conclusion from too few data, nor too broad a conclusion from a limited series of data.

Be careful in drawing conclusions that are based on extrapolated curves.

Guard against failing to qualify a conclusion, so as to show the limits within which it applies, or the variation which is to be expected.

When you indulge in a speculation, be sure that your readers know that it is a speculation.

Comprehension Questions

1. Please describe an outline of a scientific paper.
2. How to write an abstract, a body and a conclusion of a scientific paper.

Lesson 2　Naming Inorganic Compounds

Since 1958, the International Union of Pure and Applied Chemistry (IUPAC) has recommended a set of rules for naming compounds. According to them, ideally, every inorganic compound should have a name from which an unambiguous formula can be determined. However, even professional chemists will use the non-systematic name (the common name) almost all of the time. The last revision of the IUPAC's nomenclature (IUPAC Recommendations 2005) changed this situation. In this version, there is no absolute right name for one compound any more. As long as the name describes the compound sufficiently and unambiguously, the name is correct. Old names such as water, carbonyl or cyano are still tolerated. Here, on basis of naming element, we will discuss the nomenclature of inorganic compound.

1　Naming Element

The term element refers to a pure substance with atoms all of a single kind. At present 107 chemical elements are known. For most elements the symbol is simply the abbreviated form of the English name consisting of one or two letters, for example:

oxygen = O; nitrogen = N; magnesium = Mg

Some elements, which have been known for a long time, have symbols based on their Latin names, for example:

iron = Fe (ferrum); copper = Cu (cuprum); lead = Pb (plumbum)

A few elements have symbols based on the Latin name of one of their compounds, the elements themselves having been discovered only in relatively recent times, for example:

sodium = Na (natrium = sodium carbonate);
potassium = K (kalium = potassium carbonate);

A listing of some common elements may be found in Table 2－1.

Table 2－1　Names of Some Common Elements

Symbol	Name	Symbol	Name	Symbol	Name
H	Hydrogen	N	Nitrogen	Na	Sodium
B	Boron	O	Oxygen	Mg	Magnesium
C	Carbon	F	Fluorine	Al	Aluminum

(continued)

Symbol	Name	Symbol	Name	Symbol	Name
Si	Silicon	Cu	Copper	Pt	Platinum
P	Phosphorus	Cr	Chromium	S	Sulfur
Ag	Silver	Cl	Chlorine	Hg	Mercury
K	Potassium	Zn	Zinc	Br	Bromine
Ca	Calcium	Ti	Titanium	Au	Gold
Fe	Iron	Sn	Tin	Ba	Barium
Co	Cobalt	Cd	Cadmium	Pd	Palladium
Ni	Nickel	As	Arsenic	I	Iiodine
Mn	Manganese	Pb	Lead	Ce	Cerium

2 Naming Ionic Compounds

Ionic compound is a combination of positive and negative ions in the proper ratio to give a balanced charge. To name ionic compounds you have to recognize that the compound is ionic. An ionic compound consists of the combination of metal and nonmetal elements. Metals give up electrons to form positively charged cations. Non-metals gain electrons to form negatively charged anions. You also need to know which metal ions form only one possible ion. The elements in groups ⅠA, ⅡA, and ⅢA (except Ti), can only form one ion. The charge of the ion is the same as the group number. Negative ions, anions, may be monoatomic or polyatomic. For monoatomic nonmetal ions, take the group number and subtract eight, i.e., oxide ion is −2 since oxygen is in group ⅥA, so 6 − 8 gives −2 for the ion charge and have names ending with -ide. Two polyatomic anions which also have names ending with-ide are the hydroxide ion, OH^-, and the cyanide ion, CN^-. Many polyatomic anions contain oxygen in addition to another element. The number of oxygen atoms in such oxyanions is denoted by the use of the suffixes -ite and-ate, meaning fewer and more oxygen atoms, respectively. In cases where it is necessary to denote more than two oxyanions of the same element, the prefixes hypo- and per-, meaning still fewer and still more oxygen atoms, respectively, may be used, for example, ClO^- is hypochlorite; ClO_2^- is chlorite ; ClO_3^- is chlorate and ClO_4^- is perchlorate. The polyatomic ions must be memorized. The more monoatomic and polyatomic common negative ions can be obtained from Table 2 − 2.

Table 2 − 2 Some Negative Ions

Name	Symbol	Name	Symbol	Name	Symbol
carbonate	CO_3^{2-}	oxalate	$C_2O_4^{2-}$	hydrogen sulphate	HSO_4^-
hydrogen carbonate	HCO_3^-	sulphate	SO_4^{2-}	sulphite	SO_3^{2-}