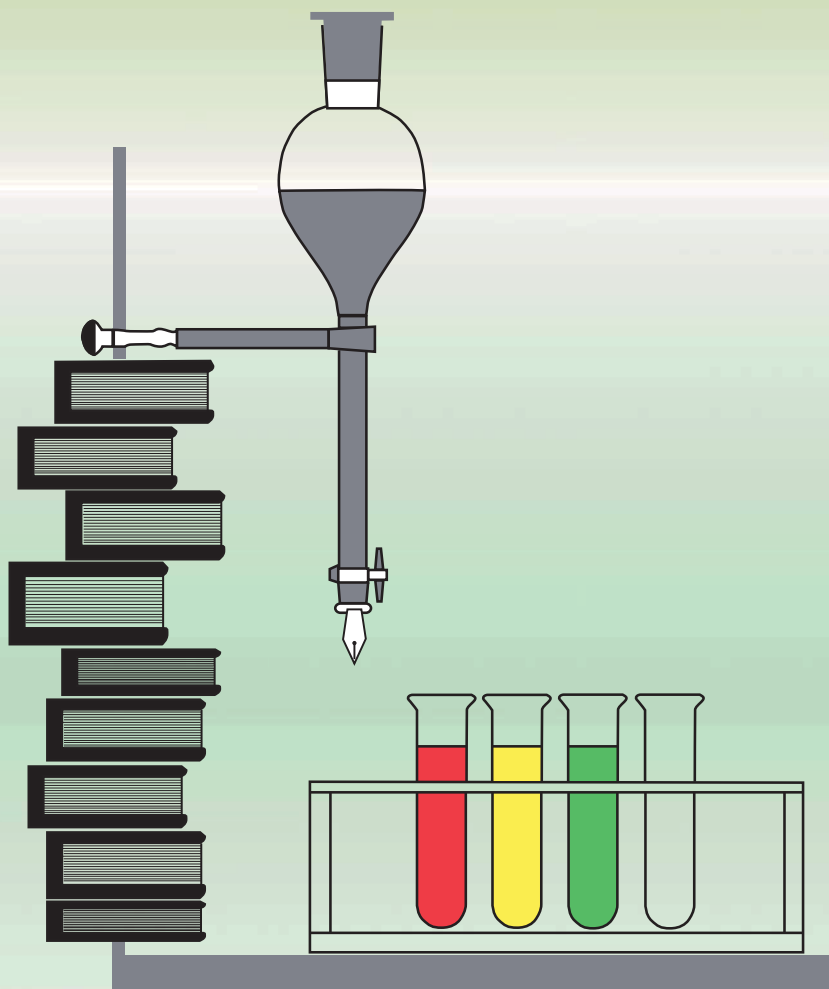


Writing with Chemistry Specific Genres Teaching Guide ③

Causal Explanation



True Light Middle
School of Hong Kong



Support Centre for Teachers
Using Chinese as the Medium of Instruction

Faculty of Education,
The University of Hong Kong

Science Education Section
Education Bureau

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FOREWORD

What is Subject Specific Genre?

The organisation of a language is called "Genre". Every subject has its unique nature and content; the way of thinking as well as the form of expression is also different. These features are reflected on the style of language and therefore each of the subjects has a unique genre, which is called "Subject Specific Genre".¹

Different subject specific genres have different communicative functions which would in turn develop different features of genres. The process of using a genre to attain a specific communicative function is called genre structure. Having a good grasp of different genre structures can help students organise various writing materials more appropriately. Not only does every genre have its unique language structure, it also has its own language features. Language feature refers to the grammatical characteristics commonly found in that genre including the use of vocabulary, sentence patterns and others.¹

The relationship between genre, writing and learning

Language can help us construct knowledge and it plays an important role in learning and teaching. Students should have a sound language foundation so as to construct content knowledge efficiently and carry out critical thinking. Writing is the outcome of a series of procedures like knowledge input, processing and knowledge output. These procedures can help students clarify and consolidate the knowledge they acquired. Therefore, teaching students to use subject specific genre in writing chemistry essays can help them enhance their ability of expressing scientific concepts.¹

On the other hand, there are some suggested learning and teaching activities related to the NSS Chemistry and Combined Science (Chemistry Part) curricula; "reading and writing" is one of the examples. Chemistry teachers can take this opportunity to teach students to write with chemistry specific genre in order to improve students' ability of expressing chemistry knowledge. This can also arouse their interests in learning chemistry.

1 岑紹基、謝錫金、祁永華、鄺偉良、陳偉發、勞惠昌、陳曦圖、謝翰章 (2003)。《中學會考化學科專科語體資料冊》(第二版)。香港：香港大學教育學院母語教學教師支援中心。

The design and content of this book

In order to assist chemistry teachers to teach subject specific genres, and also help students express content knowledge with the use of subject specific genres and ultimately help them improve their writing skills in chemistry, the Science Education Section of Curriculum Development Institute has compiled *Writing with Chemistry Specific Genres-Teaching Guide* for teachers' reference and usage.

The teaching guide has a total of four booklets. Each booklet introduces one common type of chemistry specific genres:

Writing with Chemistry Specific Genres-Teaching Guide 1 – Descriptive Report
Writing with Chemistry Specific Genres-Teaching Guide 2 – Procedural Account
Writing with Chemistry Specific Genres-Teaching Guide 3 – Causal Explanation
Writing with Chemistry Specific Genres-Teaching Guide 4 – Comparison

The arrangement of contents for the above four booklets is similar. Each booklet has two chapters; they are "Instructional Design" and "Learning and Teaching Materials" for Chemistry Specific Genres. Chapter one "Instructional Design" provides two teaching schemes for the aforementioned genre. Each scheme consists of a series of teaching activities which is designed to help chemistry teachers teach chemistry specific genres in a systematic way. As for the worksheets and references adopted in the teaching schemes, they are all put in chapter two "Learning and Teaching Materials".

This book has already been uploaded onto the website "Writing with Chemistry Specific Genres" of the Education Bureau for teachers' reference.
(Website: <http://resources.edb.gov.hk/~science/genre/index-e.html>)

Chapter 1 Instructional Design for “Causal Explanation”

“Causal Explanation” is one of the commonly used chemistry specific genres. Its major function is to explain the characteristics of things or why phenomena happen. “Causal Explanation” puts special emphasis on the causal relationship of things. Therefore this genre is characterised by its frequent use of words expressing cause and effect.

1.1 Scheme 1

Level of Students: Secondary Four to Secondary Five

Genre: Causal Explanation

Topic: NSS Chemistry Curriculum Topic II “Microscopic World I” and

NSS Combined Science (Chemistry Part) Curriculum Topic II “Microscopic World”

Implementation Period: Late phase of Secondary Four to intermediate phase of Secondary Five

Key Points	Teaching Activities	Learning and Teaching Materials	Estimated Time
<ul style="list-style-type: none">Teach students common vocabulary and sentence patterns of the writing topics, communicative function, genre structure and language features of “Causal Explanation”	(I) Brief Notes on “Causal Explanation” <ul style="list-style-type: none">Introduce the genre “Causal Explanation”Use Question 4 of HKCEE 1999 Chemistry Paper I as a model essay to analyse the structure and features of “Causal Explanation”	Brief Notes on Causal Explanation (Section 2.1 of this booklet)	10 minutes
<ul style="list-style-type: none">Develop students’ ability of analysing questionsTeach students how to judge the most suitable genre for each questionLead students to make use of relevant chemical knowledge of “Microscopic World”	(II) Question Analysis <ul style="list-style-type: none">Finish Worksheet 1Discuss answers of Worksheet 1<ul style="list-style-type: none">Review common vocabulary and sentence patterns of writing topics of “Causal Explanation”Discuss important notes of relevant chemical knowledge when answering questions	Worksheet 1: Question Analysis (Section 2.2 of this booklet)	20 minutes

1.1 Scheme 1

Key Points	Teaching Activities	Learning and Teaching Materials	Estimated Time
<ul style="list-style-type: none"> Teach students how to organise information by using Graphic Organiser With the aid of the paragraph formatting and vocabulary provided in the writing framework, help students recognise the genre structure and vocabulary of "Causal Explanation" 	(III) Guided Writing <ul style="list-style-type: none"> Review chemical knowledge related to the question Finish Worksheet 2 in groups Group presentation Finish homework: Worksheet 3 	Worksheet 2: Guided Writing-Graphic Organiser (Section 2.3 of this booklet) Worksheet 3: Guided Writing-Writing Framework (Section 2.3 of this booklet)	30 minutes
<ul style="list-style-type: none"> Review the genre structure and language features of "Causal Explanation" with students Help students master the features of "Causal Explanation" and express chemical knowledge in a clear and logical manner through writing with "Causal Explanation" 	(IV) Writing Assignments for "Causal Explanation" <ul style="list-style-type: none"> Review the genre structure and common vocabulary of "Causal Explanation" Apply the genre "Causal Explanation" to write an essay related to "Microscopic World" Distribute Assessment Rubric to students and lead a more in-depth discussion with students 	Brief Notes on Causal Explanation (Section 2.1 of this booklet) Suggested Writing Topics for NSS Chemistry Curriculum and NSS Combined Science (Chemistry Part) Curriculum-Causal Explanation (Section 2.4.2 of this booklet) Assessment Rubric for Writing Assignment (Section 2.5 of this booklet)	40 minutes

1.2 Scheme 2

Level of Students: Secondary Four to Secondary Five

Genre: Causal Explanation

Topic: NSS Chemistry Curriculum Topic II "Microscopic World I" and

NSS Combined Science (Chemistry Part) Curriculum Topic II "Microscopic World"

Implementation Period: Late phase of Secondary Four to intermediate phase of Secondary Five

Key Points	Teaching Activities	Learning and Teaching Materials	Estimated Time
<ul style="list-style-type: none"> Teach students common vocabulary and sentence patterns of the writing topics, communicative function, genre structure and language features of "Causal Explanation" 	(I) Brief Notes on "Causal Explanation" - Introduce the genre "Causal Explanation" - Use Question 4 of HKCEE 1999 Chemistry Paper I as a model essay to analyse the structure and features of "Causal Explanation"	Brief Notes on Causal Explanation (Section 2.1 of this booklet)	10 minutes
<ul style="list-style-type: none"> Let students develop a deeper understanding about the genre structure "Causal Explanation" 	(II) "Online Interactive Exercise" - Students should finish "Online Interactive Exercise: HKCEE 2001 Chemistry Paper I Question 5" by themselves at home or in school's computer room.	Online Interactive Exercise (Website: http://resources.edb.gov.hk/~science/genre/index-e.html)	20 minutes

1.2 Scheme 2

Key Points	Teaching Activities	Learning and Teaching Materials	Estimated Time
<ul style="list-style-type: none"> Review the genre structure and language features of "Causal Explanation" with students Help students master the features of "Causal Explanation" and express chemical knowledge in a clear and logical manner through writing with "Causal Explanation" 	<p>(III) Writing Assignments for "Causal Explanation"</p> <ul style="list-style-type: none"> Review the genre structure and common vocabulary of "Causal Explanation" Apply the genre "Causal Explanation" to write an essay related to "Microscopic World" Distribute Assessment Rubric to students and lead a more in-depth discussion with students 	<p>Brief Notes on Causal Explanation (Section 2.1 of this booklet)</p> <p>Suggested Writing Topics for NSS Chemistry Curriculum and NSS Combined Science (Chemistry Part) Curriculum-Causal Explanation (Section 2.4.2 of this booklet)</p> <p>Assessment Rubric for Writing Assignment (Section 2.5 of this booklet)</p>	40 minutes
<ul style="list-style-type: none"> Assess students' progress in applying "Causal Explanation" in writing chemistry essays 	<p>(IV) Assessment</p> <ul style="list-style-type: none"> Incorporate questions with effective communication into tests or examinations and the required genre for these questions is "Causal Explanation" Teachers may set questions on other topics 	<p>Questions with Effective Communication in HKCEE Chemistry Paper I-Causal Explanation (Section 2.4.1 of this booklet)</p> <p>Suggested Writing Topics for NSS Chemistry Curriculum and NSS Combined Science (Chemistry Part) Curriculum-Causal Explanation (Section 2.4.2 of this booklet)</p>	40 minutes

1.3 Teaching Tips



- Students need to clarify the causal relationship between things when writing with "Causal Explanation". Once students have accumulated a certain amount of chemistry knowledge and equipped themselves with better thinking skills as well as logical thinking ability, they are at an advantage in learning "Causal Explanation". Therefore it is proposed that teachers may teach students "Causal Explanation" during the intermediate period of the learning and teaching process of NSS Chemistry Curriculum (that is from the late phase of secondary four to intermediate phase of secondary five).
- Both teaching schemes 1 and 2 are comprised of four teaching activities. Teachers may choose either one of the schemes according to their preference.
- Teachers may adjust the weighting of assessment criteria in accordance with students' aptitude and other factors.
- Students solely following the genre structure of "Causal Explanation" in writing essays can already attain specific communicative function for that genre. However, if students are more competent, teachers can advise students to pay more attention to the arrangement of paragraphs and transition. Teachers can also encourage them to summarise the main points or express their opinion in the closing paragraph in order to make the whole essay well-structured and more coherent.
- Teachers may incorporate questions with effective communication into tests or examinations in order to evaluate students' learning progress in applying "Causal Explanation" in chemistry writing.
- Teachers can directly use worksheets provided in this booklet to teach chemistry specific genres. They can also consult the design of worksheets and tailor-make teaching materials for students on other topics.



NOTE

Chapter 2 Learning and Teaching Materials for “Causal Explanation”

2.1 Brief Notes on Causal Explanation

Common vocabulary and sentence patterns of the writing topics

- Explain why ... occurs
- Account for ...
- Give reasons for why ... occurs.
- What causes ...?

Communicative Function

- To explain the characteristics of things or why phenomena happen

Structure

Parts of the Structure	Contents and Functions
Phenomenon Identification	- state the things or phenomena to be explained
Explanation Sequences	- explain the various characteristics of things or different reasons for the occurrence of the phenomena in paragraphs

Language Features

Language Features	Examples
Use words expressing cause & effect	Because, because of, due to, owing to, since, as, on account of, cause...to, contribute to, lead to, the reason for, the cause of, as a result, consequently, as a consequence, therefore, hence, thus, when

Sample Text

HKCEE 1999 Chemistry Paper I Question 4:

State, with explanation, which of the two compounds, magnesium chloride and tetrachloromethane, has a higher melting point.

Structure	Suggested Answer	Language Features
Phenomenon Identification	The melting point of magnesium chloride is higher than that of tetrachloromethane.	___ Use words expressing cause & effect
Explanation Sequences	This is because tetrachloromethane has a simple molecular structure. The attraction forces or van der Waals' forces between molecules are weak. In contrast, magnesium chloride has a giant ionic structure, so a high temperature is required to break down the strong ionic bonds between ions. Therefore , the melting point of magnesium chloride is higher than that of tetrachloromethane.	

2.2 Question Analysis

Worksheet 1

Read the following question carefully. Underline the keywords on the topic to determine the type of genres to be used, and put down the name of the genre in part (1). After that, find the relevant chemical knowledge from textbooks or other ways according to the prompt (a, b, c), and write down the important notes in part (2).

Question :

Na_2O , MgO , SiO_2 and SO_2 are oxides of Period 3 elements in the Periodic Table. Discuss how the melting points^a of these oxides are related to their bonding^b and structure^c.

(HKCEE 2004 Chemistry Paper I Question 5)

(1) The writing genre required for the answer: _____

(Hint: descriptive report / procedural account / causal explanation / comparison)

(2) Relevant chemical knowledge:

a. _____

b. _____

c. _____

2.2 Question Analysis

Suggested Answer for Worksheet 1

Read the following question carefully. Underline the keywords on the topic to determine the type of genres to be used, and put down the name of the genre in part (1). After that, find the relevant chemical knowledge from textbooks or other ways according to the prompt (a, b, c), and write down the important notes in part (2).

Question :

Na_2O , MgO , SiO_2 and SO_2 are oxides of Period 3 elements in the Periodic Table. **Discuss how** the melting points^a of these oxides are **related** to their bonding^b and structure^c.

(HKCEE 2004 Chemistry Paper I Question 5)

(1) The writing genre required for the answer: causal explanation
(Hint: descriptive report / procedural account / causal explanation / comparison)

(2) Relevant chemical knowledge:

- a. Melting point is the temperature at which energy is used to break the bonds and structures.
- b. Na_2O and MgO have ionic bonds, SiO_2 and SO_2 have covalent bonds.
- c. Na_2O and MgO have giant ionic structures, SiO_2 has a giant covalent structure and SO_2 has a simple molecular structure.

2.3 Guided Writing

Worksheet 2

The writing genre required for the following question is "Causal Explanation". Write down the answers briefly and organise them into the **Graphic Organiser**.

Question :

Na_2O , MgO , SiO_2 and SO_2 are oxides of Period 3 elements in the Periodic Table. Discuss how the melting points of these oxides are related to their bonding and structure.

(HKCEE 2004 Chemistry Paper I Question 5)

Cause	Effect

2.3 Guided Writing

Suggested Answer for Worksheet 2

The writing genre required for the following question is "Causal Explanation". Write down the answers briefly and organise them into the **Graphic Organiser**.

Question :

Na_2O , MgO , SiO_2 and SO_2 are oxides of Period 3 elements in the Periodic Table. Discuss how the melting points of these oxides are related to their bonding and structure.

(HKCEE 2004 Chemistry Paper I Question 5)

Cause	Effect
Na_2O and MgO have giant ionic structures, strong ionic bonds exist between ions	high melting points
SiO_2 has a giant covalent structure, very strong covalent bonds exist between atoms	very high melting point
SO_2 has a simple molecular structure, weak van der Waals' forces exist between molecules	low melting point

2.3 Guided Writing

Worksheet 3

According to the information written in Worksheet 2, answer the question in the following **writing framework**. The framework indicates the paragraphs and the structure of the genre. The vocabulary suggested in the framework are the language features commonly used in "Causal Explanation". Yet, similar wordings can be used instead.

Question :

Na_2O , MgO , SiO_2 and SO_2 are oxides of Period 3 elements in the Periodic Table. Discuss how the melting points of these oxides are related to their bonding and structure.

(HKCEE 2004 Chemistry Paper I Question 5)

Paragraph	Structure	Answer
1	Phenomenon Identification	
2	Explanation Sequence 1	- Words expressing cause & effect (examples: Because, since, as, as a result, therefore, thus)
3	Explanation Sequence 2	- Words expressing cause & effect (examples: Because, since, as, as a result, therefore, thus)
4	Explanation Sequence 3	- Words expressing cause & effect (examples: Because, since, as, as a result, therefore, thus)

2.3 Guided Writing

Suggested Answer for Worksheet 3

According to the information written in Worksheet 2, answer the question in the following **writing framework**. The framework indicates the paragraphs and the structure of the genre. The vocabulary suggested in the framework are the language features commonly used in "Causal Explanation". Yet, similar wordings can be used instead.

Question :

Na_2O , MgO , SiO_2 and SO_2 are oxides of Period 3 elements in the Periodic Table. Discuss how the melting points of these oxides are related to their bonding and structure.

(HKCEE 2004 Chemistry Paper I Question 5)

Paragraph	Structure	Answer
1	Phenomenon Identification	The melting points of Na_2O , MgO , SiO_2 and SO_2 of Period 3 elements in the Periodic Table are related to their bonding and structure in the following way:
2	Explanation Sequence 1	<u>Since</u> Na_2O and MgO are ionic compounds, strong electrostatic attraction exists between their cations and anions (i.e. strong ionic bonds), forming giant ionic structures. <u>Thus</u> , Na_2O and MgO have high melting points.
3	Explanation Sequence 2	<u>Because</u> SiO_2 has a giant covalent structure, it requires a lot of energy to break the strong covalent bonds between atoms. In addition, a lot of covalent bonds have to be broken in the melting process. <u>As a result</u> , the melting point of SiO_2 is very high.
4	Explanation Sequence 3	<u>As</u> SO_2 has a simple molecular structure, the intermolecular attraction is weak van der Waals' forces. <u>Therefore</u> , SO_2 has a low melting point and exists as gas at room temperature and pressure.

2.4 Suggested Topics of Writing Assignments

2.4.1 Questions with Effective Communication in HKCEE Chemistry Paper I – Causal Explanation

Writing Topic		Curriculum Topic
CE 99 Question 4	State, with explanation, which of the two compounds, magnesium chloride and tetrachloromethane, has a higher melting point.	Structure & Properties
CE 01 Question 5	Explain why anodisation, sacrificial protection and tin-plating can protect metals from corrosion.	Corrosion & Protection of Metals
CE 04 Question 5	Na ₂ O, MgO, SiO ₂ and SO ₂ are oxides of Period 3 elements in the Periodic Table. Discuss how the melting points of these oxides are related to their bonding and structure.	Structure & Properties
CE 06 Question 8	'Elements in Group VII of the Periodic Table exhibit similar chemical properties. However, their reactivity decreases down the group.' Elaborate the first statement above using two reactions of halogens. Also outline an experiment to illustrate the second statement. (You are suggested to use chlorine and bromine as examples of halogens in answering this question.)	Chlorine & Hypochlorite
CE 07 Question 9	A certain brand of rust remover contains an acid of high concentration. The rust remover can be used for removing tough rust stains; while the rust remover, after dilution, can be used for removing comparatively light rust stains. Write some instructions, with reasons, on how the rust remover can be used safely at home. Two sentences have been given below as an introduction. <i>The rust remover should be kept out of reach from children as it contains an acid of high concentration. The rust remover should not be swallowed because it is harmful.</i>	Corrosion & Protection of Metals

Remark: All questions from the Hong Kong Certificate of Education Examination papers are reproduced by permission of the Hong Kong Examinations and Assessment Authority.

2.4.2 Suggested Writing Topics for NSS Chemistry Curriculum and NSS Combined Science (Chemistry Part) Curriculum – Causal Explanation

Writing Topic	NSS Chemistry	NSS Combined Science (Chemistry Part)
Explain why incineration is not a good method of disposal of solid waste in Hong Kong.	Topic V Fossil Fuels and Carbon Compounds	Topic V Fossil Fuels and Carbon Compounds
Explain the non-polar nature of CH ₄ and BF ₃ .	Topic VI Microscopic World II	---
Explain why different products are formed from the electrolysis of sodium chloride solutions of different concentrations.	Topic VII Redox Reactions, Chemical Cells and Electrolysis	Topic VI Redox Reactions, Chemical Cells and Electrolysis
Explain why solar energy is becoming an alternative energy source in the future.	Topic VIII Chemical Reactions and Energy	Topic VII Chemical Reactions and Energy

2.5 Assessment Rubric for Writing Assignment

Teachers write scores and feedback in the appropriate boxes.

(1) Content knowledge (10 marks)

Excellent (9-10 marks)	Good (6-8 marks)	Average (3-5 marks)	Need to improve (0-2 marks)

(2) Structure (6 marks)

Excellent (5-6 marks)	Good (3-4 marks)	Average (2 marks)	Need to improve (0-1 mark)

(3) Use of Language (4 marks)

Excellent (4 marks)	Good (3 marks)	Average (2 marks)	Need to improve (0-1 mark)

(4) Feedback

--

Total Score of
Writing Assignment :

/20

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5. 香港大學教育學院母語教學教師支援中心網頁。
(<http://www.cmi.hku.hk/>)。



NOTE

