

F4 Chemistry Inquiry-Based experimental Competition 2006–2007

Guideline

Getting Copper from its Ore

Introduction

- This project aims to provide opportunity for F.4 chemistry students to search information, design and conduct an investigation with a view to solving an authentic problem related to Chemistry.
- Students are expected to make use of their knowledge and understanding of chemistry (learnt in normal lessons and from extra-readings from webs or books in libraries), together with generic skills (*including creativity, critical thinking, communication, problem solving, Information Technology application and presentation skills*) to engage in group based experimental investigative study. Through the learning process in this project study, Form 4 students can thus develop their skill in scientific investigation, enhance their practical skills and consolidate the relevant concepts covered in SS1.

Group Formation

Every group of **3-4 students** in classes 4B, 4C, 4D and 4E are going to solve the problem of the following scenario:

Scenario

You are a chemist working for a mining company. A sample of copper ore weighing about 5 g is collected for analysis. It is believed that the ore contains a mixture of CuCO_3 and Cu(OH)_2 . Your job is to design and carry out a method to extract as much as possible copper metal from the given ore sample.

Student Tasks:

Each group has to hand in a **draft laboratory written proposal** to their chemistry teacher before **5th March 2007**. After the draft laboratory written proposal marked by their chemistry teacher, students will receive the comment from their chemistry teacher in a presentation session. After the presentation session, each group may modify their experimental procedures **within one week** and then hand in a **modified review of laboratory written proposal** before going to the laboratory to do the experiment. (The exact date for carrying out the experiment will be inform later) Finally, each group has to hand in their **final laboratory written report** to their chemistry teacher **2 weeks after** completing the experiment in the laboratory.

Analysis questions

1. What types of reactions will achieve the desired outcome? Can it be achieved in one step or more?
2. How to isolate your product from other excess reagents?
3. Illustrate your ideas using balanced chemical equations and a flow chart (if necessary).
4. What would be the expected observations in each step of the experiment?

Materials and equipment provided

Dilute sulphuric acid, dilute hydrochloric acid
Electronic balance, oven, 250 cm³ beakers (2), filter paper and funnel, demonized water, crucible, tongs, glass rods, spatula, measuring cylinders, charcoal, graphite electrodes and d.c. power supply.

You may not need to use all of the above items. Other chemicals or apparatus may be provided upon request.

Assessment

1. Draft laboratory written proposal (30%)

It must include:

- Cover page - include, class, eng name, chin name and class number of the group leader and all group members, name of project advisor and the submitted date)
- Objective(s)
- Chemical principle / Theory
- Experimental procedures (as detail as possible)
- Discussion on both advantages and limitations of each method you suggest
- Laboratory Safety (You have to search the hazards or precautions of all the chemicals used and then filled in the **risk assessment form** provided.)
- References (books, magazines, scientific publications, newspapers, CD-ROMs and Internet).

2. Modified laboratory written proposal (20%)

3. Laboratory written report (40%)

It must include

- Cover page – include class, English name, Chinese name, class number of the group leader and all group members, name of project advisor and the submitted date
- Objective(s)
- Introduction
- Chemical principle / Theory
- Experimental Procedures
 - include all the major experimental steps, mass of reagents used and etc.
- Result and calculation
 - Data is better represented in form of Tables
 - you should include the calculation of extraction efficiency and the general effectiveness of the whole experiment.)
- Discussion
 - Any experimental errors or mistakes that you made during the whole experiment should be mentioned.

$$\text{Extraction efficiency} = \left(\frac{\text{mass of copper extracted}}{\text{mass of ore sample}} \times 100 \right) \% \text{ of your method(s).}$$

- Conclusion /Interpretation of Results
- References
 - Books, magazines, scientific publications, newspapers, CD-ROMs and Internet.
- List of duties of all group members (must be honest).
- Word limit for the report is 2000 words [not include references section];
 Fonts size: 10; Single-line spacing)

4. Correct handling of chemical equipments in the laboratory (5%)
5. Team work throughout the whole experiment (5%)

Deadline: Draft Laboratory written proposal

Date: **26 / 3 / 2007 (Day 5) (Mon)**

Time: 16:00

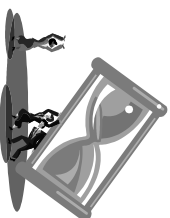
Delay: **5 marks will be deducted per school day**

Modified Laboratory written proposal

Date: **1 week after the presentation session**

Time: 16:00

Delay: **5 marks will be deducted per school day**



Laboratory written report

Date: **2 weeks after carrying out the experiment**

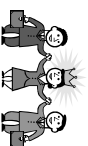
Delay: **5 marks will be deducted per school day**

Awards / Prize

- This project mark will contribute 5% out of total 15 % of final assessment mark (T3A1) for each students
- **Book coupons (\$250)** will be presented to the best group in each class based on the draft and modified laboratory written proposal, experimental skills and final report.

Enquiries

Enquiries regarding the project can be contacted to your group project advisors.



Name of project advisors	e-mail address
Ms. Lam Chun Man Jamin	jaminlam@stlonis.edu.hk (for 4B and 4E students)
Mr. San Sheung Ming	sansir@stlonis.edu.hk (for 4C and 4D students)



春迎

**The Lunar New Year Holidays
And Easter holiday wisely!**



Start your group project as soon as possible and make use

Description of assessment criteria

Criteria		Max score	Score Award
<i>Laboratory written proposal</i>		<u>30</u>	
1.	Cover pages	2	
2.	Objective(s)	2	
3.	Chemical principle/Theory	5	
4.	Experimental procedures	10	
5.	Discussion of advantages and disadvantages of your method	4	
6.	Risk assessment	5	
7.	Appropriate citation of written and / or web-based references.	2	
<i>Modified Laboratory proposal</i>		<u>20</u>	
<i>Laboratory written report</i>		<u>40</u>	
1.	Cover pages	1	
2.	Objective(s)	2	
3.	Introduction	2	
4.	Chemical principle/Theory	4	
5.	Experimental procedures	10	
6.	Result and calculation	5	
7.	Discussion	7	
8.	Conclusion/Interpretation of Results	4	
9.	Appropriate citation of written and / or web-based references.	2	
10.	Neat and organized work	3	
<i>Laboratory work</i>		<u>10</u>	
1.	Correct handling of chemical equipments in the laboratory	5	
2.	Team work throughout the whole experiment	5	
Total		100	