Research and Discovery Academy

Assessment Cover Sheet

Name:		**Form Class:**	
Subject:	Chemistry Year 10	**Date:**	See Below
Teacher:	Mr Graham, Mr Melady	**Time Allowed:**	2 Weeks
Semester:	2	**Year:**	2009

Assessment No		**Assessment Technique**	EEI
Topic/s:	A qualitative and quantitative analysis of white powder 2k9 (a mixture of sodium carbonate and sodium chloride)		
Common Curriculum Elements:	**Discuss** - write about the various opinions or facts on the object **Define** - State meaning and identify essential qualities **Describe/Identify** – say what something is **Interpret**-make sense of; assign a meaning to **Formulate**-invent: come up with an idea, plan, explanation, theory, or principle after a mental effort **Link:** Find connections between things **Explain** - State the how and why. Seek to clarify the subject by exposing the method by which it works and what causes it to what it does. **Critically Analyse** - Separate or break up a whole into its smaller parts in order to discover/describe them, and their inter-relationship		

Instructions & Conditions:

You must:

- Maintain a journal that catalogues the investigative process followed over the duration of the EEI.
- Develop an investigative process for the EEI.
- Conduct and manage the investigation to ensure efficient collection of data in a safe environment.
- Analyse and discuss data. This should extend to developing models to explain collected data in terms of the underlying concepts and ideas.

Your teacher will provide:

- Timely guidance and advice to get (and keep) your EEI moving.
- Suggested World Wide Web (WWW) links (not exhaustive) to useful sites pertaining to your topic.
- Class time to work on the EEI
- Criteria to guide your performance

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	Due Date	Teacher signature	Date
EEI assigned	28/10		
PHASE 3	30/10		
PHASE 2 + Checkpoint	6/11		
Draft of report submitted	9/11		
Final report	16/11		

LEVEL OF ACHIEVEMENT

Unit 2: What is the most important substance?

the best we can be

The Investigation:

To prove that sodium carbonate and sodium chloride are present in the white powder. To conduct an investigation to find the mass of each present in 5g of mixture

Background information:

- **qualitative and quantitative analysis is the processes of**
- determination of the elements, functional groups or compounds present in a sample
- chemical analysis to determine the amounts of each element in the substance

How to undertake an EEI

Phase of EEI	Step to Complete. You should:	Date Due	Complete
Phase One: Dividing your sample and qualitative analysis	Using a top pan balance separate your mixture into 3 samples. (1g and two 2g) Conduct qualitative tests on the smallest sample. Dissolve the 1 g sample in distilled water (approx half a test tube) **DIVIDE THIS AMOUNT INTO TWO** Add dilute HCl to one sample, write down observations Conduct a flame test on the remaining solution. Add dilute $CuSO_4$ to the other sample write down your observations		
PhaseTwo: Quantitative Analysis 1 TITRATION This process can be used to determine the mass of sodium carbonate in the original mix	1. Research your method 2. Clarify: a. The chemical principles b. Measurement techniques 3. Plan your approach 4. Decide what initial trials you will undertake, how many trials etc. 5. Complete a **Research Proposal** sheet for your teacher to review and give approval. 6. Complete the **Risk Assessment** sheet for your teacher to review and give approval. 7. Locate any equipment necessary.		
PhaseThree: Quantitative Analysis 2 Precipitation This process can be used to determine the mass of sodium carbonate in the original mix	8. Research a suitable precipitation reaction. 9. Precipitate a solution of white powder so that all the CO_3^{2-} content is converted to precipitate 10. Filter the precipitate, dry. Reweigh to determine number of moles. Find mass of carbonate in the original mix.		
Phase Four: Research	11. Research the industrial preparation of either sodium hydroxide, sulphuric acid, sodium carbonate chlorine or ammonia. **12.** How is this chemical used		

Hints for journal writing:

- You will need a logbook/diary to record in one place your thoughts and notes about everything from selection of a topic through to completion of your investigation. It is a no-frills, on-the-spot recording of the essentials of your work. It need only be intelligible to you but it may be used to verify the authenticity of your work.
- You will need to submit your journal along with your final report. Your journal and your draft is your way of providing evidence that *you engaged in the research process* and that the report is *your own word*

Hints for report writing:

The format of the report required for this task is outlined below. A more detailed breakdown, including examples may be accessed from the following address: http://unilearning.uow.edu.au/report/2b.html. Note that there are slight differences in the suggested structures. These are reflective of the intended audience.

Set your report out in the following format:

1. ***Title page*** (in standard format)
2. ***Abstract***
    a. A paragraph, that if read by itself, summarises the project in the least possible words. It should include the aim, principles/techniques employed and a very brief statement of your results and conclusions. Hint: write the abstract last.
3. ***Introduction****:*
    a. State the researchable question
    b. State the hypothesis to be tested
    c. Give an orientation of the reader to chemical principles, overall design, and the reasons for performing particular steps in the method
    d. Discuss and analyse any research. This will be used to tell a story that generates interest in the reader for the field of your research and link to the practical investigation to follow.
    e. Describe your planning and thinking, both in preparing for, and during the investigation. (Include any original plan and how and why it, or techniques, were modified)
    f. Report on the results of any preliminary "pilot" trials you did before starting the main investigation.
4. ***Materials:*** *The materials used and how the investigation was conducted.*
5. ***Method****:*
    A description of what *you* did in the final practical tasks. You may do this in the traditional form (A replicable, stepwise description in 3rd person, past tense).
6. ***Results*** (in forms that are appropriate to your data, eg. prose, tables, graphs, statistical analysis etc)
7. ***Discussion*** (of procedures, data etc as appropriate).
    You will need to show evidence of critical thinking in interpreting your data.
    Answer the six questions in order to craft a good conclusion.
        a) What was the purpose of the experiment?
        b) What were the major findings?
        c) Did this support your original hypothesis (or answer your research question)?
        d) How do your findings compare with other people's findings or with information in your textbook?
        e) What are the possible experimental errors, how did they effect the experiment and how can the experiment be improved?
        f) What explanation can you think of for these findings?
        g) How could this experiment be improved or extended?
8. ***Conclusion***
    A response to your original problem and/or hypothesis.
9. ***Bibliography***

Your research should involve a variety of reputable sources. Any references you make to published material must be acknowledged. The purpose of the annotation is to inform the reader of the relevance, accuracy, and quality of the sources cited. Use the following headings to build your bibliography. For example:

Lim, K., Horton, M. and O'Haver, T. (2004). Making use of IT. *Teaching Science*. Spring 50(3), 38-43 . (This article actually provides guidance for referring to a variety of sources including web based material)

Phase Two: **Name:**
EEI Initial Proposal.

Researchable question and proposed hypothesis:
Identified chemical concepts involved:
Overview of the project (What do you intend to do and how will this be achieved?)
Equipment Required:
Timeline:

EEI Risk Assessment: **Name:**

POSSIBLE HAZARDS

Spillage		Explosion		Moving Parts		Heat/Cold	
Combustion		Corrosion		Electrocution		Infection	
Toxicity		Sharp Objects		Radiation		Other	

Details of Other

HAVE YOU VIEWED MSDS FORMS FOR HAZARDOUS CHEMICALS USED IN THE PRACTICAL ?

Please Circle: YES/NO

HAZARDOUS CHEMICALS LIST			

HAZARDOUS CHEMICALS DISPOSAL METHOD:

RISK MINIMIZATION STRATEGIES

UNDERSTANDING	Shows an understanding of the experiment and the possible hazards	
PREPARATION	class size is appropriate for the experiment class has the appropriate experience for this type of experiment class groups are appropriately spaced for the experiment number of groups are desirable	teacher has previous experience with similar types of experiments hazards have been assessed prior demonstration of skills necessary emergency procedures have been considered
ORGANIZATION	area is appropriate for the experiment movement of people has been taken into account appropriate spillage control methods are on hand	materials have been considered in the activity
SAFE SUPERVISION	hair tied back synthetic parkers/garments removed jewellery removed if appropriate	complete covered in footwear any student wearing contact lenses needs to wear goggles in chemistry experiments protective clothing necessary
EXPERIMENTAL PRACTICES	minimization of skin contact through appropriate practices amounts of chemicals are appropriate need for good ventilation need for use of the fume cupboard students are aware of the toxic nature of the chemicals	students have been reminded about: – lighting and use of the Bunsen Burner – heating in test tubes – heating large vats of liquid – handling hot apparatus/liquid – carrying glassware – handling reagent bottles – inserting glass into rubber stopper
EQUIPMENT USAGE	All glassware and equipment e.g. Distillation/Leibig Condenser, to be handled with care. Teacher demo/instruction preceding usage by students, particularly when heating is involved.	
PERSONAL PROTECTION	use of lab coat necessary goggles necessary	

RISK ASSESSMENT

RISK LEVEL	**LOW RISK**
After carefully considering: 1. the students 2. the experiment 3. your expertise CIRCLE ANY HAZARDS and DETERMINE RISK LEVEL	NO heat, pressure or vacuums, mains voltage, corrosive, volatile, flammable or toxic chemicals, handling of dangerous biological materials or specimens
MEDIUM RISK	**HIGH RISK**
INVOLVES heat, mains voltage, mildly corrosive, volatile, flammable or toxic chemicals, handling of biological specimens, low speed mechanical and/or moving objects and devices, or growing cultures under controlled conditions	INVOLVES extreme heat or cold, cryogenic gases, high pressures or low vacuums, high voltage, highly reactive, corrosive, volatile, toxic or flammable chemicals, radioactive substances, high speed mechanical and/or moving objects, or unknown biological hazards

High Risk practicals MUST be approved by HOD. HOD Signature:

Signature: Date

2009 EEI.

Criterion / Indicator	A	B	C	D	E
Knowledge & Conceptual Understanding	**Have You:** ❑ Consistently and accurately identified all reactions and completed detailed accounts of all analytical processes ❑ Consistently and accurately described all chemical reactions and have included balanced chemical equations •	**Have You:** ❑ Accurately identified all reactions and included most chemical equations. You have detailed most analytical processes ❑	**Have You:** ❑ Identified all key chemical reactions including some balanced chemical equations ❑ Described important aspects of the analytical processes used ❑	**Have You:** ❑ Identified some key chemical reactions and have included some equations ❑ Have described the qualitative and quantitative processes	**You have not:** ❑ Identified some key chemical reactions and have included some equations ❑ Have responded to some analytical process •
Working and Thinking Scientifically	**Have You:** ❑ consistently and accurately applied knowledge to predict insoluble compounds (Hypothesis) ❑ Consistently and accurately presented Results in a logical manner • Consistently and accurately completed titration + precipitation calculations	**Have You:** ❑ Accurately applied knowledge to predict insoluble compounds (Hypothesis) ❑ Accurately presented Results in a logical manner • Accurately responded to titration + precipitation calculations (minor errors)	**Have You:** ❑ Applied knowledge to predict most insoluble compounds (Hypothesis) ❑ Presented Results in a legible manner • Responded to the calculations	**Have You:** ❑ Attempted to predict insoluble compounds (Hypothesis) ❑ Presented Results • Responded to Calculations	**You have not:** ❑ Attempted to predict insoluble compounds (Hypothesis) ❑ Presented Results • Responded to a calculation
Scientific Techniques	Have You: ❑ Consistently and accurately shown effective and logical laboratory skills ❑ Consistently and accurately written balanced chemical equations for all reactions (Discussion) • Consistently and accurately used Stoichiometry to determine the amount of reactants present	Have You: ❑ Accurately shown effective laboratory skills ❑ Accurately written chemical equations for most precipitates formed (Discussion) • Accurately used Stoichiometry to determine the amount of reactants present	Have You: ❑ Shown laboratory skills ❑ Written chemical equations for some precipitates formed (Discussion) • used Stoichiometry	Have You: ❑ Needed direction to use laboratory skills ❑ Written chemical equations (Discussion) ❑ Not used Stoichiometry	**You have not**: ❑ Needed direction to use laboratory skills ❑ Written chemical equations (Discussion) • Not used Stoichiometry
Impacts of Science	**Have You:** ❑ Consistently and accurately described a chemical and what it is used for ❑ Consistently and accurately discussed an industrial process	**Have You:** ❑ Accurately described a chemical, and what it is used for ❑ Accurately discussed an industrial method of production	**Have You:** ❑ Described one of the listed chemicals and its use ❑ Discussed a chemical and its production	**Have You:** ❑ Described one of the chemicals • Shallowly discussed one of the listed chemicals and its production	**You have not:** ❑ Described one of the chemicals ❑ Shallowly discussed one of the listed chemicals

Name:
Comment: