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VCE Chemistry ½
AOS 1 Revision II [0.12]
Workshop

Error Logbook:

New Ideas/Concepts	Didn't Read Question
Pg / Q #: _____ Notes:	Pg / Q #: _____ Notes:
Algebraic/Arithmetic/ Calculator Input Mistake	**Working Out Not Detailed Enough**
Pg / Q #: _____ Notes:	Pg / Q #: _____ Notes:

Section A: Warm Up (15 Marks)

INSTRUCTION: 15 Marks. 10 Minutes Writing.

Question 1 (1 mark)

List the following substances in order of decreasing boiling point.

A. Mg, Fe, HCl, H_2

B. H_2, HCl, Mg, Fe

C. Fe, Mg, HCl, H_2

D. H_2, HCl, Fe, Mg

Question 2 (4 marks)

For the following pairs of metals, state which is more reactive and briefly explain why.

a. Sr and Ba. (2 marks)

_____

_____

_____

b. Al and Mg. (2 marks)

_____

_____

_____

Space for Personal Notes

Question 3 (10 marks)

Adam comes to class one day adorned with silver jewellery, which captures the attention of his fellow classmates and initiates a conversation regarding metallic bonding and properties.

a. Draw a metallic lattice of silver, including at least four atoms of silver. Ensure to label the type of bonding present, and the charge of relevant particles in the lattice. (3 marks)

b. Adam has a copper ring alongside one of his silver rings. Despite having them both for the same amount of time, he notices that the copper ring has oxidised faster. Explain why this is the case with reference to metal reactivity. (2 marks)

_____

_____

_____

c. Would silver or iron be expected to have a higher melting point, and why? (2 marks)

_____

_____

_____

d. Write the full balanced chemical equation for the reaction between iron and oxygen. (1 mark)

_____

e. With reference to the diagram drawn in **part a.**, define and explain what "lustre" is. (2 marks)

_____

_____

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Section B: Ramping Up (12 Marks)

INSTRUCTION: 12 Marks. 9 Minutes Writing.

Question 4 (1 mark)

Which one of the following statements is correct about ionic compounds?

A. The process of forming an ionic compound includes the process of substances ionising.

B. The compound Na_2SO_4 is an ionic compound that is not soluble in water due to the presence of SO_4^{2-}.

C. The compound Na_2SO_4 is an ionic compound that is not soluble in water due to the presence of Na^+.

D. The process of forming an ionic compound mainly comprises the electron transfer between two ions.

Question 5 (7 marks)

On his trip to the stationary store, Arjun comes across a section of graphite pencils. Seeing these pencils, he is immediately reminded of the revision he did in class when he covered 1.13 AOS 1 revision Workbook + Summary + Test.

a. Explain the structure of graphite with reference to the following points: (3 marks)

- Number of covalent bonds formed.
- Lattice Structure.
- Electron distribution.

_____

_____

_____

_____

b. Why is graphite able to conduct electricity, whereas diamond is not? (1 mark)

_____

_____

c. What is the key difference between the structure of diamond and graphite? (1 mark)

_____

_____

d. With reference to a diamond structure, explain why it is a good conductor of heat. (2 marks)

_____

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Question 6 (4 marks)

With recent rises in plastic waste, environmental pollution, and climate change, world leaders from around the world have been in discussion with environmental scientists in order to discuss changes which can be made to decrease the amount of waste and environmental impact.

a. The US is one of the countries which is described as having a majority linear economy. Explain what this means. (2 marks)

_____

_____

_____

b. Due to the malleability and ductility of metals, they are easily recyclable and thus, can contribute to developing a circular economy. With reference to what a circular economy is, is it possible to have a 100% circular economy? (2 marks)

_____

_____

_____

Section C: Getting Trickier I (14 Marks)

INSTRUCTION: 14 Marks. 11 Minutes Writing.

Question 7 (7 marks)

Sodium nitrate is a white crystalline chemical often used to make explosives for military or land clearing purposes.

a. Write the formula of sodium nitrate. (1 mark)

_____

b. Would sodium nitrate be soluble in water? Explain with reference to ion-dipole forces and ionic bonds. (3 marks)

_____

_____

_____

_____

c. In the lab, Khang pinches a piece of sodium nitrate just to see it crumble in his fingers with ease. Explain what this property is called, explaining why it is seen with reference to the ionic bonding model. (3 marks)

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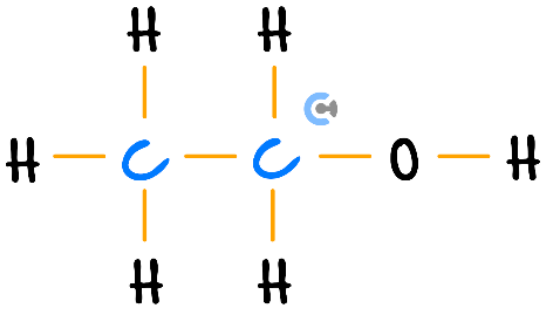
Space for Personal Notes

Question 8 (7 marks)

Below is a molecule of ethanol, a molecule which forms the alcohol used for consumption in alcoholic beverages. At SLC, ethanol exists as a liquid.



a. What is the polarity of ethanol? (1 mark)

_____

b. Explain what the term miscibility means with reference to a miscible mixture and an immiscible mixture. (2 marks)

_____

_____

c. Explain how ethanol would be able to mix with water, with reference to the intermolecular bonds that would form. (2 marks)

_____

_____

_____

d. Explain the process of boiling ethanol. Ensure that your answer touches on the difference between boiling and melting. (2 marks)

_____

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_____

Section D: Getting Trickier II (16 Marks)

INSTRUCTION: 16 Marks. 14 Minutes Writing.

Question 9 (7 marks)

Lithium is an important metal as it is required in the production of most modern electronic devices.

a. Lithium is typically mined as lithium oxide. Write the reaction between lithium and oxygen. (1 mark)

_____

b. Lithium is known to be highly reactive.

i. Explain why this is the case. (2 marks)

_____

_____

_____

ii. If we obtain lithium oxide, but cut it in half, state and explain any observations that can be made. (2 marks)

_____

_____

_____

c. Mining lithium is important, but there are considerations that we also need to be aware of. State an environmental disadvantage associated with mining lithium and how it affects the environment. (2 marks)

_____

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Question 10 (9 marks)

Adam is currently doing a precipitation experiment at school with several ionic compounds.

a. Briefly explain how an ionic compound is formed between calcium and carbonate and write the molecular formula of the resulting compound. (2 marks)

_____

_____

_____

b. Adam wants to produce the compound from **part a.** using other ionic compounds.

i. If he obtains solutions of sodium nitrate and calcium ethanoate, write their reaction and state if a precipitate forms. (2 marks)

_____

_____

_____

_____

ii. If he obtains solutions of potassium carbonate and calcium nitrate, write their reaction and state if a precipitate forms. (2 marks)

_____

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_____

c. Adam managed to produce a large amount of this compound, however, when placed on an iron plate and transported, he slipped and dropped it on the floor. It immediately shattered into pieces, but the iron plate that was used only suffered from a dent. Explain what Adam has witnessed. (3 marks)

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Let's take a BREAK!

Space for Personal Notes

Section E: VCAA-Level Questions I (10 Marks)

INSTRUCTION: 10 Marks. 30 Seconds Reading. 10 Minutes Writing.

Question 11 (10 marks)

Muhammad is very interested in cooking, and he wants to use the best tools available to improve his skills.

a. He finds that his old iron pan has a layer of rust, or iron oxide, forming over it because it was passed down in his family. Write the reaction that occurred to produce the rust if the iron used has a valency of +3. (2 marks)

_____

_____

b. Muhammad would like to purchase a new pan because of this; however, it is difficult to choose. He has a choice between a ceramic pan, an iron pan, and an iron pan with a ceramic handle. Muhammad understands that ceramic comprises of multiple ionic compounds.

i. He wants to be able to stir fry, which involves very high temperatures. Which option would be the least optimal for that purpose? Justify your answer. (3 marks)

_____

_____

_____

_____

ii. Make a final recommendation for Muhammad, stating the benefits and downsides of the recommended pan with reference to their properties. (3 marks)

_____

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_____

c. Is there any suggestion that would help mitigate the downsides identified in **part b.ii.**? Explain. (2 marks)

_____

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Section F: Multiple Choice Questions (8 Marks)

INSTRUCTION: 8 Marks. 8 Minutes Writing.

Question 12 (1 mark)

Which one of the following is NOT considered a precipitate in a reaction between two aqueous ionic solutions?

A. H_2O

B. $AgNO_3$

C. $PbSO_4$

D. $(NH_4)_2SO_4$

Question 13 (1 mark)

What is the main difference between the structures of the covalent lattice found in diamonds and a metal lattice of copper?

A. The copper lattice can conduct electricity, whereas diamond cannot.

B. The copper lattice has a higher boiling point than that of diamonds, as diamonds are comprised of just carbon.

C. The diamond lattice comprises covalent bonds between carbon formed by ejecting 1 electron each, whereas the copper lattice comprises copper cations attracted to delocalised electrons.

D. The copper lattice is held together by the electrostatic attraction between the copper cations and the delocalised sea of electrons, whereas the diamond is held together by covalent bonds between carbon.

Question 14 (1 mark)

Which of the following is the correct reaction between copper (II) sulphate and potassium chloride?

A. $2KCl + CuSO_3 \rightarrow CuCl_2 + K_2SO_3$

B. $KCl + CuSO_4 \rightarrow CuCl + KSO_4$

C. $2KCl + CuSO_4 \rightarrow CuCl_2 + K_2SO_4$

D. $KCl + CuSO_3 \rightarrow CuCl + KSO_3$

Question 15 (1 mark)

Select the correct statement that best explains why Lithium is never found with itself, but Gold is often found as a pure metal.

A. Gold is too reactive and will appear in its true form.

B. Gold is too reactive with O_2 and H_2O, whereas Li reacts with neither.

C. Lithium is too reactive with O_2 and H_2O, whereas Au reacts with neither.

D. Li is too unreactive and will not appear in its true form.

Question 16 (1 mark)

Which one of the following reactions correctly describes when zinc reacts with water?

A. $Zn(s) + H_2O(l) \rightarrow ZnH_2O(l)$

B. $Zn(s) + H_2O(l) \rightarrow ZnO(s) + H_2(g)$

C. $Zn(s) + 2H_2O(l) \rightarrow ZnO_2(s) + 2H_2(g)$

D. $2Zn(s) + H_2O(l) \rightarrow Zn_2O(s) + H_2(g)$

Question 17 (1 mark)

What is the charge of the metal ion in the ionic compound $[Ag(NH_3)_2]OH$?

A. $+1$

B. $+2$

C. -1

D. -2

Space for Personal Notes

Question 18 (1 mark)

If we want a component to have a relatively high R_f value in thin-layer chromatography, which of the following actions should we expect to see?

A. The component should desorb strongly into the mobile phase, whilst adsorbing weakly onto the stationary phase.

B. The component should desorb strongly into the stationary phase, whilst adsorbing weakly onto the mobile phase.

C. The component itself should be polar as this is necessary to desorb strongly into the mobile phase.

D. The component itself should be polar as this is necessary to not be adsorbing onto the mobile phase.

Question 19 (1 mark)

In a particular TLC experiment, three components were analysed and their R_f values were obtained. From the following data, calculate the distances that each component travelled.

Component	R_f
X	0.231
Y	0.659
Z	0.582

Data	Measurement
Length of TLC Strip	20.0 cm
Origin Line	1.23 cm
Solvent Front Line	16.85 cm

A. $X = 4.62, Y = 13.18, Z = 11.64$

B. $X = 3.89, Y = 11.10, Z = 9.81$

C. $X = 4.34, Y = 12.37, Z = 10.92$

D. $X = 3.61, Y = 10.29, Z = 9.09$

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Section G: VCAA-Level Questions II (10 Marks)

INSTRUCTION: 10 Marks. 30 Seconds Reading. 10 Minutes Writing.

Question 20 (10 marks)

A TLC experiment was conducted to examine two compounds, *A* and *B*. Silica gel was used as the stationary phase.

a. What is the polarity of the phases of this TLC experiment? (1 mark)

_____

b. There were two beakers containing CH_3Cl and CH_3OH respectively, however, it is not known which one is compound *A* or compound *B*.

i. Compare the polarities of these compounds. (2 marks)

_____

_____

_____

ii. Assign the identities of each compound, if compound *A* stopped at a higher point than compound *B*. Justify your answer. (3 marks)

_____

_____

_____

_____

c. The following tables of data were obtained for this experiment.

Data	Measurement
Distance Travelled by A from Origin.	5.2 cm
Distance Travelled by B from Origin.	2.9 cm
Distance between Solvent Front and Bottom of Plate.	9.7 cm
Distance between Origin Line and Bottom of Plate.	1.6 cm

i. Calculate the R_f for compound A and compound B. (2 marks)

_____

_____

_____

_____

ii. If we switched the polarities of the stationary and mobile phase around, can we expect that the R_f of these compounds will also switch? Justify your answer. (2 marks)

_____

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VCE Chemistry ½

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