CHEMISTRY S. 4

**SECTION A**

Attempt **ALL** questions in this Section.

1. a) Define the term ‘Mixture’

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b) 1.2g of a mixture of sodium carbonate and copper(ii) carbonate was repeatedly shaken with water and then filtered. The residue was dried and found to weigh 0.65g.

i) State what was observed.

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ii) Calculate the percentage composition of the mixture.

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2. An element Y belongs to period 3 and group VI of the periodic table.

a) Write the lectronic configuration of Y.

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b) i) Derive the chemical formula of the compound formed between Y and potassium an element of group I of the periodic table.

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iii) A dry stream of hydrogen gas was repeated over 1.536g of an oxide of Y. Given that hydrogen gas completely reduced the oxide of Y such only 1.120g of Y remained, determine the empirical formular of oxide of Y.

[O = 16, Y=55.5]

3. A mixture of iron and sulphur was thoroughly mixed with excess dilute sulphuric acid and then warmed followed by filtration briefly explain what happened.

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4. a) Name any two oxides that can be reduce by hydrogen gas.

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b) Write equation of reaction(s) to support your answer in (a) above.

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5. Determine the percentage increase in mass when 0.1g of iron was strongly heated with sulphur. [Fe = 56, S = 32]

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6. A magnesium ribbon was held such that one end is in a Bunsen flame.

i) State what happened.

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ii) Write equation of reaction to support your answer in b(i) above.

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7. a) Sodium metal is extracted from molten sodium chloride.

i) Briefly explain how the melting point of sodium chloride is lowered during the extraction.

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ii) Write the half cell equation leading to the form of sodium during the extraction.

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b) Name any other metals that can be extracted just like sodium.

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8. Briefly explain how magnesium reacts with water.

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9. Using an example, state what can be observed when ammonia gas acts as a reducing agent.

i) Sulphur

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ii) concentrated nitric acid

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iii) triirontetra oxide

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**SECTION B**

Attempt only **TWO** questions from this Section.

11. a) State two industrial uses of oxygen gas.

b) Briefly describe an experiment that can be used to manufacture oxygen gas.

c) i) Define the term fuel.

ii) Name two major products formed when a fuel is completely burnt in oxygen gas.

ii) State two examples of fuel used by man.

d) State one difference between a rust and oxide.

12. a) State the raw materials used in Haber produce and their sources.

b) Briefly explain how the product in Haber process can be converted to nitric acid.

c) Nitrogen gas is relatively inert due to a strong non-polar covalent bond between the atoms in its molecule. Briefly explain how magnesium and calcium can react with nitrogen gas.

d) A small amount of lead(ii) nitrate was strongly heated to give a brown fume that turned a moist blue litmus paper red together with a yellow residue. Briefly explain what happened.

13. a) Phosphorus , calcium , zinc and iron were separately burnt in excess oxygen gas and the product in each case was added to excess water. With the help of equations, briefly explain what happens in each case.

b) i) Name two air pollutants that can cause acid rain.

ii) suggest one method that can reduce on the air pollution.

c) Calculate the total volume of carbondioxide that can saturate 20cm3 of 0.1M sodium hydroxide solution at room temperature.

[1 mol of gas occupies 24dm3]

14. a) State one application of electroplating.

b) Determine the total mass of a substance liberated at the anode when 0.5Amps are passed through dilute sulphuric acid solution for only 1 minute using graphite electrodes. [1F = 96500C, H = 1, s = 32, O = 16]

c) Briefly explain why the anode in (b) above regularly needs replacement.

d) i) Define the term a primary cell.

ii) State two domestic examples of a primary cell.

c) Briefly explain why solid copper (II) sulphate does not conduct electricity until it is dissolved in water to form a solution.

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