SUNSHINE SECONDARY SCHOOL MOCK 2015

CHEMISTRY PAPER 1

1. (a) What is the importance of the shape of a conical flask? (1 mark)

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2. A mixture consists of sulphur powder and iron filings.

(i) Describe how to obtain sulphur from the mixture using methylbenzene. (2 marks)

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(ii) Is the mixture homogeneous or heterogeneous? Explain. (1 mark)

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3. Nitrogen gas can be prepared in the laboratory using a mixture of ammonium chloride solution and sodium nitrite solution.

(a) The reaction occurs in two steps. State the two steps in the correct order. (2 marks)
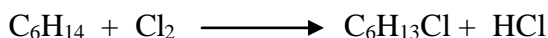
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(b) State two uses of nitrogen. (1 mark)

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4. (a) Draw structural formulae of two positional isomers with molecular formula C_4H_8.

(2 marks)

(b) Study the equation below and answer the questions that follow.

$C_6H_{14} + Cl_2 \longrightarrow C_6H_{13}Cl + HCl$

(i) State the condition under which this reaction occurs. (1 mark)

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(ii) Give the general name of this type of reaction. (1 mark)

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5. (a) Define hydration energy. (1 mark)

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(b) Given that: the hydration energies of Ca^{2+} and Cl^- are -1891 kJ mol^{-1} and -384 kJ mol^{-1} respectively, and that the lattice energy of calcium chloride is +2237 kJ mol^{-1}.Calculate the molar enthalpy change of solution of calcium chloride. (3 marks)

6. The standard electrode potentials of a metal G and iron are given below.

$Fe^{2+}(aq) + 2e \longrightarrow Fe(s)$ -0.44V

$G^{2+}(aq) + 2e \longrightarrow G(s)$ -0.91V

A piece of iron is coated with metal G. If the coating is scratched, would the iron be protected form rusting? Explain. (3 marks)

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7. (a)Why is the percentage of carbon (IV) oxide in the atmosphere fairly constant? (1 mark)

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(b) Calculate the volume of carbon(IV)oxide in 8,000 m^3 of air contained in a hall.(2 marks)

8. State two conditions that would make the boiling point of water to be higher than 100^oC. (2 marks)

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9. Explain the effects of the accumulation of nitrogenous compounds in water masses? (2 marks)

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10. Study the table below and use it to answer the questions that follow. (The letters do not represent the actual symbols of the elements).

Element	Q	R	S	T	U
Atomic number	5	20	3	18	5
Atomic mass	10	40	7	40	11

(a)   Select two letters that represent the same element? Give a reason. (2 marks)

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(b)   Give the number of neutrons in an atom of element S.   (1 mark)

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11. Dry carbon (II) oxide gas was passed over heated lead (II) oxide.

(a)   Write an equation for the reaction.   (1 mark)

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(b)   Give one industrial application of the above reaction.   (1 mark)

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(c)   Name another gas that can be used in the above reaction.   (1 mark)

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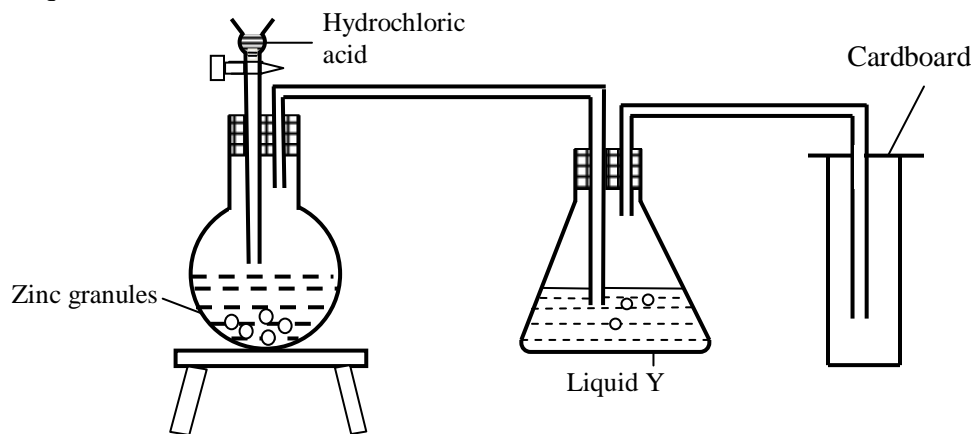
12.   (a) Proteins are obtained from amino acids monomers. Complete the equation below to show the polymer formed.   (1 mark)

$H_2NCH_2COOH + H_2NCHCH_3COOH \longrightarrow$

(b) Name the type of polymerization shown above.   (1 mark)

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13. The set up below was used to prepare dry hydrogen gas. Study it and answer the questions   that follow.

(i) With a reason, identify the mistake in the set-up above.   (1 mark)

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(ii) What would be liquid Y? (1 mark)

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(iii) Give two physical properties of hydrogen gas (1 mark)

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14. Study the following equilibrium equation.

$2X_2(g) + Y_{2(g)} \rightleftharpoons 2X_2Y_{(g)}$ $\Delta H = -197kJ/mol$
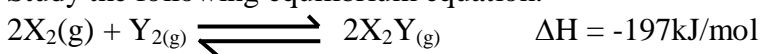
(a) Suggest two ways of increasing the yield of X_2Y. (1 mark)

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(b) Draw the energy level diagram for the forward reaction. (2 marks)

15. 5.0g of calcium carbonate were allowed to react with 25cm^3 of 1.0M hydrochloric acid until there was no further reaction. Calculate the mass of calcium carbonate that remained unreacted. (3 marks)

(Ca = 40, C = 12, O = 16)

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16. (a) State Graham's law of diffusion. (1 mark)

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(b) 50cm^3 of Carbon (IV) Oxide diffuses through a porous plate in 15 seconds. Calculate the time taken by 75cm^3 of Nitrogen (IV) Oxide to diffuse through the same plate under similar conditions. (C = 12, 0 = 16, N = 14) (2 marks)

17. A student fetched water from a river in a limestone area. He used it for washing and realized that it did not lather easily.

(i) Name the two ions that prevent lathering. (1 mark)

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(ii) Given that the structure of soap is $C_{17}H_{35}COONa$.

Explain by means of ionic equations how the above ions prevent lathering. (2 marks)

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18. A student burnt magnesium ribbon in a gas jar full of sulphur (IV) oxide gas.

(i) State two observations made in the gas jar. (2 marks)

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(ii) Write an equation for the reaction that took place. (1 mark)

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19. M grammes of a radioactive isotope decayed to 5 grammes in100 days. The half life of the isotope is 25 days.

(a) What is meant by half life? (1 Mark)

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(b) Calculate the initial mass M of the radioactive isotope. (2 Marks)

20. (i) With the aid of a well labeled diagram, show that the innermost region of a non luminous flame consist of unburnt gas. (1½ marks)

(ii) Highlight the steps followed when lighting a Bunsen burner. (1½ marks)

21. The diagram below shows an experiment involving chlorine water.
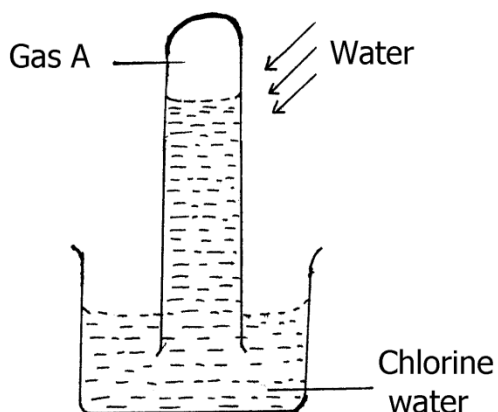
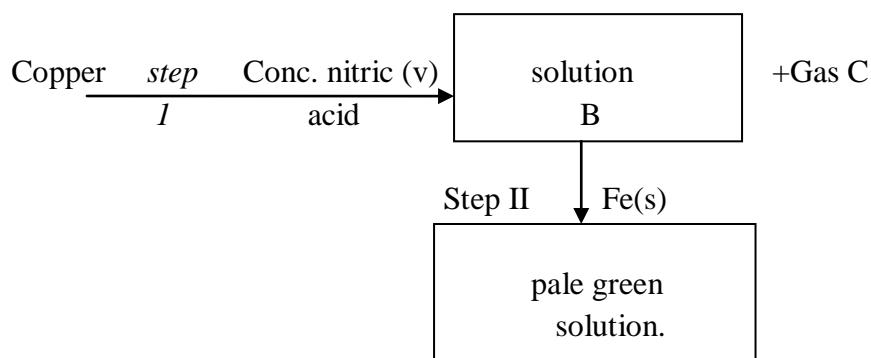a)State and explain the observations made after 24 hours.   (2 marks)

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b)Write an equation to show the formation of gas A.   (1mark)

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c)State one use of chlorine gas.   (1mark)

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22. Study the reaction scheme below and the answer questions that follow.

(i) Identify: (2mark)

    Solution B

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Gas C

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(ii) What type of reaction is taking place in step II   (1mark)

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23. a) Define solubility.   (1 mark)

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b) In an experiment to determine the solubility in water at 30^0c, the following results were obtained.

Mass of empty evaporating dish = 26.2g

Mass of evaporating dish + saturated solution = 42.4g.

Mass of evaporating dish + dry solid Y = 30.4g

Use this data to calculate the solubility of Y at 30^0C .   (3 marks)

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24. In terms of structure and bonding. Explain why water (H_2O) is a liquid at room temperature

while Hydrogen sulphide (H_2S) is a gas.   (2 marks)

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25. Explain why hard water flowing in lead pipes may be safer for drinking than soft water

flowing in the same pipes. (2 marks)

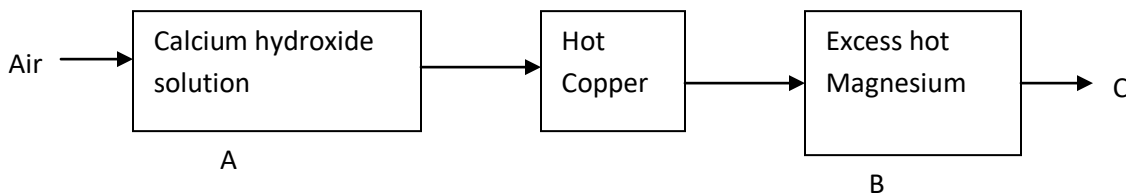……

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26. Air was passed through reagents as shown below.

Air → | Calcium hydroxide solution | → | Hot Copper | → | Excess hot Magnesium | → C

A   B

i)State and explain the observations made when air is passed through chamber A for a long time.

(2 marks)

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ii) Name one component in Explain (1 mark)

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27. Using dots (·) and crosses (x), draw the dimer structure of aluminium chloride and name the   bonds.
   (Al=13, Cl=17) (2 marks)

28. Iron is extracted from its ore by the blast furnace process.

a) Name the chief ore from which iron is extracted from. (1 mark)

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b) An ore is suspected to contain mainly iron. Describe a method that can be used to confirm the

presence of iron in the ore. (2 marks)

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