545/2

S4 CHEMISTRY

Exam 7

PAPER 2

DURATION: 2 HOUR

Instructions:
- The paper consists of two sections A and B
- Answers to section A must be written in the spaces provided
- Answers to section B must be written on answer sheets provided
- You will be penalized for untidy work.

SECTION A:

1. A mixture of lead (ii) nitrate and copper (ii) carbonate was shaken with excess water and filtered.
   (a) State what was observed
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   ……
   (b) The dry residue was heated strongly
   (i) State what was observed
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   ……
   (ii) Write an equation for the reaction
   ……
   (c) (i) Name a reagent which can be used to identify the cation present in the filtrate.
   ……
   ……
   (ii) State what is observed when the reagent you have named in (c) (i) is added to a portion of the filtrate.

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2. A gaseous hydrocarbon Y consists of 92.3% carbon
   (a) Calculate the empirical formula of Y
   (C = 12, H = 1)

   (b) 0.065g of Y occupies 56cm^3 at s.t.p
      (i) Calculate the relative formula mass of Y
      (1 mole of a gas at s.t.p occupies 22.4 dm^3)
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      (ii) Determine the molecular formula of Y
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3. Dilute copper (II) sulphate was electrolyzed using copper electrodes
   (a) State what was observed at
      (i) the anode
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      ……

      (ii) the cathode
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   (b) A steady current of 2A was used in the above electrolysis for one hour. Calculate

(i) the quantity of electricity used (1 Faraday = 96500C Cu = 64)

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(ii) the mass of solid deposit obtained from the electrolyte

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4. (a) Define the term ‘allotropy’

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(b) Name two elements, other than carbon that show allotropy

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(c) (i) Name the two allotropes of carbon

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(ii) State two properties of one of the allotropes of carbon you have named in c(i)

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(iii) Explain how the allotrope is used due to its properties named in c (ii) above

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5. (a) Write an equation for the reaction leading to the formation of ammonia on a large Scale

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(b) State any two conditions for the reaction

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(c) Ammonia gas was reacted with copper (II) oxide.

(i) State the conditions for the reaction

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(ii) Write the equation for the reaction

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6. (a) What is meant by the term enthalpy of neutralization?

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(b) When 50 cm^3 of a 1M sulphuric acid was added to 50cm^3 of a 2M sodium hydroxide, the temperature of the resultant mixture rose by 13.6^oC.

(i) write an ionic equation for the reaction

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(ii) Calculate the enthalpy of neutralization of sodium hydroxide (specific heat capacity of water = 4.2 $Jg^{-1}{}^0C^{-1}$, density of water = 1g/cm^3

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7. (a) Chlorine can be prepared from concentrated hydrochloric acid

(i) Name a substance that can react with hydrochloric acid to produce chlorine

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(ii) Write the equation for the reaction

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(b) Chlorine gas was passed through potassium iodide solution

(i) State what was observed

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(ii) Write an ionic equation for the reaction

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8. State one reagent that can be used to distinguish between each of the following pairs of ions and in each case, state what would be observed if each ion is treated with the reagent.

(a) $Pb^{2+}(aq)$ and $Al^{3+(}aq)$

Reagent:

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Observation:

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(b) $SO_4^{2-}(aq)$ and $CO_3^{2-}(aq)$

Reagent:

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Observation:

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9. Ammonium chloride was dissolved in water and resultant solution turned blue litmus paper red

(a) Write the equation for the reaction

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(b) Explain why the blue litmus paper turned red

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10. The cell convention for an electrochemical cell is shown below
$Zn(s)/ Zn^{2+}(aq) // Cu^{2+} (aq) / Cu(s)$
(a) Name two substances that could be used as electrolytes.

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(b) State which one of the electrodes is the cathode.

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(c) Write an equation for the reaction at
(i) the anode

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(ii) the cathode

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(d) Write the equation for the overall cell reaction.

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SECTION B:

Answer at most two questions in this section.

11. (a) Describe how a dry sample of ammonia can be prepared in the laboratory (diagram not required)

(b) Name a reagent that can be used to test for ammonia and state what would be observed if ammonia is tested with the reagent

(c) (i) Draw a labelled diagram of the setup of the apparatus that can be used to show that ammonia can burn in oxygen
(ii) Write an equation for the combustion of ammonia in oxygen.

(d) Dry ammonia was passed over heated lead (II) oxide
(i) State what was observed
(ii) Write an equation for the reaction

12. (a) (i) Draw a labelled diagram to show how carbon dioxide can be prepared in the laboratory

(ii) Write an ionic equation for the reaction leading to the formation of carbon dioxide

(b) Carbon dioxide was passed through calcium hydroxide solution. Describe and explain the reaction that took place.

(c) (i) State what would be observed if burning magnesium ribbon was lowered into a jar of carbon dioxide

(ii) Write an equation for the reaction that takes place in (c) (i)

END