Name ……..

Signature ……

P525/1
CHEMISTRY
Paper 1
1 Hour 45 minutes

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S.6 BEGINNING OF TERM 1 2005 EXAMS
CHEMISTRY
PAPER 1
TIME: 1 hour 45 min.

Instructions:
Attempt all questions in the spaces provided
The periodic table with relative atomic masses is supplied at end of paper
Illustrate your answers with equations where applicable.

1. (a) Identify element X in the following equation for a nuclear reaction

$$^{235}_{92}U + {}^{1}_{0}\mathbf{n} \longrightarrow {}^{160}_{62}\mathbf{Sn} + 4\,{}^{1}_{0}\mathbf{n} + {}^{\quad}_{\quad}X$$

(01 mark)

X is ……..

(b) An element Y has three naturally occurring isotopes with Isotopic masses and relative abundances as shown below:

Istotopic mass	Relative abundance (%)
23.98	78.60
24.98	10.11
25.98	11.29

Calculate the average atomic mass of Y (03 marks)

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2. Write equations to show how the following compounds can be synthesized
   (a) $CH_3CH_2\ C \equiv CCH_2CH_3$ from but-l-ene

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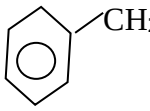
(b)  CH_2CH_2OH to  $C \equiv CCH_3$

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(c) $CH_3CH_2CH = CH_2$ from Bromoethane (3 marks)

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3. (a) When 8.8g of a hydrocarbon, Z was burnt in excess air, 14.4g of water and 13.44dm^3 of carbondioxide were obtained at s.t.p. Determine the empirical formula of Z (3 ½ marks)

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(b) The vapour density of Z is 22. Write the name and the molecular formula of Z

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(1 mark)

(c) ((i) Write equations to show how Z can be synthesised from an alcohol (2 ½)

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(ii) Indicate a mechanism for the first stage of the reaction in (c) (i) (02)

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4. (a) Potassium manganate (VII) is a commonly used reagent in volumetric analysis and yet it is not a primary standard.

(i) What is meant by the term ‘primary standard’?

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(ii) State two reasons why potassium manganate (VII) is not a primary standard

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(b) Explain why hydrochloric acid is not used to acidify a solution of potassium Manganate (VII) solution in volumetric analysis

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(c) Calculate the oxidation state of the element in bracket in the following species

(i) $[Cr(H_2O)_4Cl_2].Cl.\ 2H_2O$ (Cr) (1 ½ marks each)

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(ii) Cl_2O_3 (Cl)

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(iii) $K_2S_2O_8$ (S)

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5. Complete the following equations and suggest a mechanism in each case (3 marks each)

(a) $(CH_3)_2\ C{=}CH_2 \xrightarrow{Cl_2 \mid H_2O}$

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(b) $H - C \equiv C - H + H_2O \xrightarrow[warm]{Hg^{2+} \mid H^+(aq)}$

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(c) $CH_3\overset{\overset{I}{|}}{C}H - CH_2I \xrightarrow[heat]{\bar{O}Et\ Na^+ \mid EtOH}$

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6. (a) State Graham's law (2 marks)

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(b) A certain volume of oxygen diffused through a porous membrane in 120s, under the same condition the same volume of a gas x diffuses in 12s. Calculate the relative molecular mass of X

(3 ½ marks)

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7. (a) Explain the meaning of the following terms

(i) Osmosis (2 marks)

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(ii) Osmotic pressure (2 marks)

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(b) A solution of polyvinylchloride $(CH_2CHCl)n$ in an organic solvent has a concentration of 4gdm $^{-3}$ and an osmotic pressure of 65Nm $^{-2}$ at 20^{o}C. Calculate the value of n

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8. A bromoalkane Y with molecular formula C_4H_9Br when reacted with concentrated hydrochloric acid in the presence of anhydrous zinc chloride formed two layers of liquids immediately.
   (a) Write the name and the structural formula of Y (01 mark)

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   (b) Write an equation and indicate a mechanism for the reaction between Y and sodium methoxide in methanol (03 marks)
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9. A concentrated solution of sulphuric acid contains 94% of sulphuric acid and has a density of 1.80 gcm^{-3} at room temperature
   (a) Calculate the molarity of the acid (3 marks)
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   (b) What volume of the concentrated acid will be required to make 2.5dm^3 of 2M sulphuric acid solution?
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10. Calculate the heat of hydrogenation of ethyne from the following thermochemical data

$$C_2H_4(g) + 3O_2(g) \longrightarrow 2CO_2(g) + 2H_2O(l) \qquad \triangle H = -139\ Kjmol^{-1}$$

$$C_2H_2(g) + 2\tfrac{1}{2}\ O_2(g) \longrightarrow 2CO_2(g) + H_2O(l) \qquad \triangle H = -1310\ Kjmol^{-1}$$

$$H_2(g) + \tfrac{1}{2}\ O_2(g) \longrightarrow H_2O(l) \qquad \triangle H = -285 Kjmol^{-1}$$

(4 marks)

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11. (a) Complete the table below

Element	Formula of oxide	Type of bonding in the oxide
Al Si P		

(3 marks)

(b) Write an equation for the reaction between the oxide of aluminium and sodiumhydroxide (3 ½ marks)

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12. State what would be observed and write equation for the reactions that take place when the following pairs of compounds are reacted (2 marks each)

(a) Ethyne and silver nitrate in aqueous ammonia

Observation

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Equation

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(b) But – 1 – ene and acidified potassium permanganate solution

Observation

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Equation

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13. During the extraction of aluminium, a current of 0.2 ampere was passed for one hour through aluminium sulphate solution.

(a) Write an equation for the reaction that took place at each electrode (3 marks)

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(b) Calculate the mass of aluminium produced (4 marks)

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END