Our country, our future

525/1

S6 CHEMISTRY

Exam 2

PAPER 1

DURATION: 2 HOUR 45 MINUTES

For Marking guide contact and consultations: Dr. Bbosa Science 0776 802709,

INSTRUCTIONS TO CANDIDATES

Attempt All questions

1. (a) Name three radiations emitted by radioisotopes (1 ½ marks)

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(b) What is meant by the following terms:

(i) Decay constant. (1 mark)

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(ii) Half life (1mark)

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(c) The half-life for $^{223}_{88}Ra$ is 1620 years. Calculate the time taken for 90% of radium to disintegrate. (2 ½ mark)

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2.(a) What is meant by the term first electron affinity. (1mark)

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(b) The first electron affinities of some elements of period 3 are given below

Element	Al	Si	P	S
First electron affinity ($kJmol^{-1}$)	-44	-134	-71.7	-200

(i) State how the electron affinities vary (1mark)

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(ii) Explain your answer in (i) (3marks)

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3. Complete the following reactions and name the main product.

(a) $CH_3CH_2COOH \xrightarrow[\textbf{heat}]{\text{Soda lime}}$ (2marks)

(b) CaC_2 (s) + H2O(l) $\longrightarrow$ (2marks)

(c) $CH_3C{\equiv}CH \xrightarrow[\textbf{Lindlar's catalyst}]{\textbf{H}_2}$ (2marks)

4. (a) What is meant by the term boiling point elevation constant . (1marks)

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(b) (i) The boiling point of benzene under certain pressure condition is 80.0^0C. Calculate the boiling point of a solution containing 5g of 2,4,6-trinitrophenol ($HOC_6H_2(NO_2)_3$ in 100g of benzene under these pressure conditions. Kb = 2.6^0C per 1000g of benzene) (3mks)

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(iii) State any three assumptions made in the calculation (1 ½ mark)

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5. (a) When prop-1-ene was reacted with hydrogen chloride in the presence of a peroxide 1-chloropropane is formed but when the reaction occurs in absence of a peroxide, 2-chloropropane is the main product. Write the mechanisms leading to the formation of the two products.

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(b) Explain why the products are different in (a) (2marks)

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6 State what's observed and write equation for the reactions when

(a) Dilute sodium hydroxide is added drop wise to a solution of chromium (III) sulphate (3mks)

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(b) Potassium iodide is added to aqueous copper (II) sulphate (2 ½ marks)

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7 (a) (i) Explain what is meant by the term electronic configuration; (01mark)

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(ii) State two deductions that can be made from electronic configurations (2marks)

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(iv) Write electronic configuration of copper (Cu atomic number 29) (2marks)

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8. Name one reagent(s) that can be used to differentiate between the following species. In each case state what is observed if each species is separately treated with the reagent.

(a) $H_2C=CH_2$ and $HC\equiv CH$

Reagent …….

Observations

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(b) Al^{3+} and Pb^{2+}

Reagent …….

Observations

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9. 100cm^3 of concentrated hydrochloric acid were diluted to 1dm^3 with distilled water. 26.8cm^3 of the diluted solution required 25cm^3 of 0.5M sodium carbonate solution, with methyl orange indicator for complete neutralization. Calculate the molar concentration of the concentrated hydrochloric acid. (3 marks)

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10. (a) Explain what is meant by the term colligative property. (2marks)

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(c) 0.72g of a compound M was dissolved in 80g of water and the resultant solution had a freezing point of -0.14^{0}C. When 2.9g of the same compound was dissolved in 111g of benzene the freezing point was depressed by 0.6^{0}C.

(K_f for water =1.86^{0}Cmol^{-1}kg^{-1} and K_f for benzene is 5.5^{0}Cmol^{-1}kg^{-1})

(i) Calculate the apparent molecular mass of M in

Water (2 ½ mark)

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Benzene (2 ½ marks)

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(ii)Explain why the molecular mass of M differs in the solvents. (2 mark)

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