P525/2
CHEMISTRY
Paper 2
August, 2023
2 ½ hrs

UNNASE MOCK EXAMINATIONS

UGANDA ADVANCED CERTIFICATE OF EDUCATION

MOCK EXAMINATIONS

CHEMISTRY

Paper 2

2hours 30minutes

INSTRUCTIONS TO CANDIDATES

- *Attempt **five** questions including **three** from section **A** and any **two** questions from section **B**.*
- *Answers to the question must on the answer sheets provided*
- ***Begin each question on a fresh page.***
- ***Extra questions attempt will not be marked.***
- *Mathematical tables and graph papers are provided.*
- *Non- programmable scientific electronic calculators may be used.*
- *Use equations where necessary to illustrate your answers.*

[H= 1 , C= 12 , O = 16 , F= 19.0]

SECTION A (answer 3 questions)

1) The following are the melting points of elements in period 3 of the periodic table

Element	Na	Mg	Al	Si	P	S	Cl
Melting point(°C)	98	650	660	1412	660	115	-101

a) Explain the differences in melting points (6½mks)

b) Describe the reaction of

i) water with magnesium, silicon and chlorine (6mks)

ii) sodium hydroxide with aluminium, silicon and phosphorus (6mks)

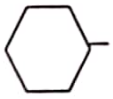
c) Chlorine was passed through cold, dilute sodium hydroxide solution.

i) State what was observed (½ mk)

ii) Write the equation for the reaction that took place (1mk)

2. a) $CH_3CH_2Br \xrightarrow[\text{heat.}]{CH_3CH_2OK \text{ / ethanol}}$ (2mks)

b)  $\xrightarrow[\text{heat}]{Br_2/Fe}$ (4½mks)

c)  $\xrightarrow[\text{heat}]{\text{conc.}H_3PO_4}$ (3½mks)

d) $CH_3COCH_3 + NaHSO_3$ ~~(3½ mks)~~

e)  $=O + NH_2NHCONH_2 \xrightarrow{H^+}$ (4½mks)

d) $CH_3CH_2Cl \xrightarrow[\text{heat}]{KCN/\text{ ethanol}}$ (2mks)

3. Explain the following observations. Write equations for the reactions where necessary

a)When sodium hydroxide solution is added to a solution of potassiumchromium (iii) sulphate a green precipitate is formed which dissolves in excess alkali to form a green solution. The solution changes to yellow when hydrogen heated with hydrogen peroxide solution (6mks)

b)An aqueous solution of 0.01M potassium nitrate and 0.02M solution of glucose have the same freezing points (3mks)

c) Water is a liquid with boiling point of 100°C whereas hydrogen sulphide is a gas. (4mks)

d) The bond angle in water is 105° whereas it is 107° in ammonia (3mks)

e) A solution of tin(II) chloride in water turns blue litmus paper red but that of lead(II) chloride does not. (4mks)

4) Nitrogen and hydrogen react according to the equation

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g) \quad \Delta H^0 = -92.3KJ/mole$

a) Explain what will happen to the value of the equilibrium constant if

i) Pressure of the system is increased (3 mks)

ii) Temperature is reduced (3mks)

iii) Iron is added to the system (3mks)

b) 1.3 moles of nitrogen and 3 moles of hydrogen were reacted at 50 atmospheres and at equilibrium 1.8 moles of hydrogen werepresent. Calculate the

i) equilibrium partial pressures of hydrogen, nitrogen and ammonia (4mks).

ii) equilibrium constant Kp(2mks)

c) Describe how nitric acid is manufactured from ammonia. (5mks)

SECTION B (Answer 2 questions only)

5 a) i) State two reactions in which chromium resembles aluminium. (1mk)

ii) Write the three equations for the reactions in which chromium resembles aluminum (use reactions of chromium only) (3mks)

b) Sodium hydrogen carbonate was added to a solution of chromium(III) sulphate

i) State what was observed (1mk)

ii) write the equation for the reaction that took place (1½ mks)

c) State what is observed and write the equations for the reactions that take place when the following reagents are added to portions of potassium chromate(VI) solution

i) Dilute sulphuric acid
(2½mks)

ii) Hydrogen peroxide followed by dilute sulphuric acid (2½ mks)

ii) Silver nitrate solution (2mks)

d) The following solutions were added to separate portions ofcobalt(II) chloride solution. In each case, state what was observed and write equations for the reactions that took place.

i) Sodium hydroxide solution (4½ mks)

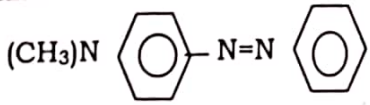
ii) Concentrated hydrochloric acid (2mks)

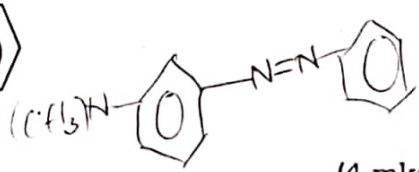
6.Write equations to show how the following compounds are synthesized. Indicate the reagents and conditions

a) Methylbenzene to phenol (5mks)

b) Ethanol to methylpropanoate (4mks)

c) Ethanoic acid to methanol (3mks)

d) Benzene to 



(4mks)

e) But-1-ene from ethene (4 mks)

7.a) (i) Draw a sketch graph to show the change in pH of the solution formed when 25cm^3 of 0.1M ammonia is titrated with hydrochloric acid. (2½ mks)

ii) Explain the shape of the graph (4½mks)

b) A solution was made by reacting 30 cm^3 of 0.1M hydrochloric acid and 50 cm^3 of 0.1M ammonia. Calculate the PH of the resulting solution. (K_b =1.78 x 10^{-5}) (5mks)

c) Magnesium powder reacts with a solution of ammonium sulphate with effervescence, whereas a solution of magnesium sulphate reacts with a solution of sodium ethanoate to form a white precipitate . Explain this observation. (8mks)

8. a) Soap can be prepared from a vegetable oil or an animal fat

i) Distinguish between a vegetable oil and an animal fat. (2mks)

ii) Briefly describe how an oil or fat is used to prepare soap (3½mks)

iii) Write the equation for the formation of soap (1mk)

b) i)Distinguish between soap and a non-soapy detergent (2mk)

ii) Starting from benzene write equations to show how you would prepare a non-soapy detergent. (2½mks)

c) Distinguish between addition and condensation polymerisation (2mks)

d)For each of the following polymers

(i) Write the structural formulae and names of the monomers (4mks)

(ii) Write the equation for the formation of (3mks)

A Nylon-6,10.

B Neoprene rubber

C Perspex

END