MARKING SCHEME

BUNAMFAN CLUSTER EXAMINATION 2022

END OT TERM ONE 2022

233/3

CHEMISTRY

PAPER THREE(PRACTICAL)

JUNE 2022

2 HOURS 15 MINUTES

QUESTION 1.

PROCEDURE I

TABLE 1

Titration	I	II	III
Final burette reading, cm^3			
Initial burette reading, cm^3			
Volume of solution M used, cm^3			

(4 marks)

Complete table……………… 1mk or ½ mk or 0
Decimal…………………….. 1mk or 0
Accuracy…………………….1 mk or ½ mk or 0
Principles of averaging………1 mk or ½ mk or 0
Final accuracy……………… 1 mk or ½ mk or 0

(a) Calculate the average volume of solution M used.   (1 mark)

V = a +b+c/3 or a+b/2 or b+c/2
Working…………………….1/2 mk
Correct ans…………………1/2 mk
Correct to atleast 2dp unless exactly to 1dp or whole no.

(b) Concentration   (1 mark)

    23.5/392 = 0.06M

    Ans should be exact otherwise penalize ½ mk/

(c) Calculate number of moles of solution Fe^{2+} in 25 cm^3. (1 mark)

  25 x 0.06/1000 =   0.0026 moles

  Ans in 4dp otherwise penalize ½ mk for rounding off.

(d) The concentration 1 marks)
    Mole ratio 5:1
    Moles in c x 5 = ans
    Ans x1000/ av volume
    = final ans

    PROCEDURE II
(e) Calculate the average volume of solution A used in table II.. (1 mark)

  AS IN TABLE 1

(f) Calculate the number of moles of manganate (VII) ions in table II
    above. (1 mk)

  Ans in (d) av volume table 2 / 1000

  = correct ans.

(g) Given that 2 moles of of manganate (VII) ions react with 5 moles of
    the dibasic acid C, calculate the number of moles of the dibasic acid
    used in moles per litre. (1 mk)

  Mole ratio = 2:5,

  Moles of dibasic acid= Ans in (f) x 5/2

  = ans

  Molarity = ans x 1000/25

  =correct ans

(h) Calculate the:

(I)   Formula mass of the dibasic acid, solution C.($H = 1.0$, $O = 16.0$)   (1 mk)

        5/ ans in (g)

        Correct ans .

        Ans can be whole number or DP

(II)   Formula mass of X in the dibasic acid C.(1 mk)

Ans in h(I) $= 2+x+2(18)$

X = Ans in h(I) - 38

= Correct ans.

ANS BETWEEN 80-90 otherwise penalize ½ mk

Ans can be whole number or dp.

QUESTION 2

You are provided with solid M. carry out the tests and write your observations and inferences in the spaces provided.

(a) Describe the appearance of solid M. (1 mark)

Appearance
White solid/white powder/white crystal (1 mark)

(b) Place the solid M in a boiling tube. Add about $12cm^3$ of distilled water and Shake well. Divide the solution into five portions and carry out the tests below.

(I) To the first portion, dip both red and blue litmus paper.

Observations	Inferences
Blue litmus changes red…. ½ mk Red litmus paper remain red…1/2 mk (1 mark)	Acidic solution. (1 mark)

(II) To the second portion, add sodium hydroxide solution dropwise until in excess.

Observations	Inferences
White ppt that dissolves in excess to form a colourless solution (1 mark)	$Zn^{2+}/Al^{3+}/Pb^{2+}$ (1 mark)

(III) To the third portion, add aqueous ammonia dropwise until in excess.

Observations	Inferences
White ppt that is insoluble (1 mark)	Al^{3+}/Pb^{2+} (1 mark)

(IV)   To the fourth portion, add three drops of sodium chloride solution.

Observations	Inferences
No white ppt	Al^{3+} present… 1 mk
	Award 1/2mk for Pb^{2+} absent if Al^{3+} is
	not inferred.
(1 mark)	(1 mark)

(V)   To the fifth portion, add two drops of barium nitrate followed by five drops of nitric(V) acid.

Observations	Inferences
	SO_4^{2-} present.
White ppt…..1/2 mk	Award ½ mk for SO_3^{2-} and CO_3^{2-}
No effervescence….1/2 mk	ABSENT if SO_4^{2-} is not binferred.
(1 mark)	(1 mark)

3. You are provided with solid P. Carry out the following tests and record your observations and inferences in the spaces provided.

(a) Place about one third of the solid P on a clean metallic spatula and ignite using a Bunsen burner.

Observations	Inferences
Melts to a colourless liquid that burns with yellow sooty flame (1 mark)	=C=C= ……1 mk Or triple bond structure.. (1 mark)

(b) Place the remaining solid P in a boiling tube. Add about 10cm^{3}of distilled water and Shake well.

Observations	Inferences
Dissolves to form a colourless solution (1/2 mark)	Polar/ soluble substance (1/2 mark)

(c) Divide the mixture into three portions.
   i. To the first portion add two drops of acidified potassium manganate(VII).

Observations	Inferences
Purple potassium manganate(VII) solution changes colourless/ decolourised. (1 mark)	=C=C= ……1/2 mk or triple bond structure. ROH …..1/2 mk

   ii. To the second portion, add two drops of bromine water.

Observations	Inferences
Orange bromine water changes colourless/ decolourised. (1 mark)	=C=C= OR TRIPLE BOND STRUCTURE. (1 mark)

   i. To the third portion, describe the procedure you can use to determine the PH using the reagents given.

Procedure:
To the solution add few drops of universal indicator solution. Match colour with PH chart to get corresponding PH. (1 mark)

   ii. Carry out your procedure in (iii) to determine the PH.

Observations	Inferences
PH= 4 or 5 or 6 ………1 mk Reject range of PH eg PH 4-6 (1 mark)	Weakly acidic. (1 mark)