SUNSHINE SECONDARY SCHOOL

233/3
CHEMISTRY
PAPER 3
PRACTICAL
PRE MOCK 1 2017
MARCH 2017
$2^1/_4$HRS

NAME………………………………………CLASS………… ADM NO……………..

SIGNATURE…………………INDEX………………………….. DATE ……………………

INSTRUCTIONS

- Answer all the questions on the spaces provided
- All working must be clearly shown where necessary
- Calculations and mathematical tables may be used

FOR EXAMINERS USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
1	11	
2	14	
3	15	
TOTAL	**40**	

1 You are provided with:

Solution M 0.2M hydrochloric acid,

Solution F containing 15.3g per litre of basic compound $G_2X.H_2O$.

You are required to determine the relative atomic mass of G.

PRECEDURE:

Place solution M in a burette ,pipette 25cm^3 of solution F into a 250cm^3 conical flask. Add two drops of methyl orange indicator and titrate. Record your results in the table below. Repeat the procedure two more times and complete table I.

Table I

	I	II	III
Final burette reading			
Initial burette reading			
Volume of solution M used (cm^3)			

(4mks)

a) What is the average volume of solution M.? (1mk)

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b) Given that one mole of F reacts with 2moles of M. Calculate the;

i) Number of moles the basic compound,G_2X, $10H_2O$ in the volume of solution F used. (2mks)

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ii) Concentration of solution F in moles per litre. (2mks)

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iii) Relative formula mass of the basic compound, $G_2X.10H_2O$. (1mk)

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iv) Relative atomic mass of G (Relative formula Mass of X=60 , atomic mass of H=1.0 , O=16.0). (1mk)

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2 You are provided with:

1 1.89g of solid P, solid P is adiabatic acid H_2X.
2 0.5M Solution of the dibasic acid , H_2X , Solution V.
3 Sodium hydroxide, Solution K.

You are required to determine:

a) i) the molar heat of solid P.
ii) the heat of reaction of one mole of the dibasic acid with sodium hydroxide.

b) Calculate the heat of reaction of solid H_2X with aqueous sodium hydroxide.

PROCEDURE I.

Place 30cm^3 of distilled water into a 100ml beaker. Measure the initial temperature of the water and record it in the table II below. Add all the solid P at once; stir the mixture carefully with the thermometer until all the solid dissolves. Measure the final temperature reached and records it in the table II

Table II

Final temperature (^{o}c)	
Initial temperature (^{o}c)	

(2mks)

a) Determine the change in temperature ΔT_1 (1 mk)

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b) Calculate the:

i) Heat change when H_2X dissolves in water, (Assuming the heat capacity of the solution is 4.2Jg^{-1}K^{-1} and density is 1g/cm^3) (2mks)

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ii) Number of moles of the acid that were used. (Relative formula mass of H_2X is 126) (1mk)

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iii) Molar heat of solution ΔH_1 solution of the acid H_2X. (1mk)

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PROCEDURE II.

Place 30cm^3 of solution V into a 100cm^3 beaker. Measure the initial temperature and record it in table III below. Measure 30cm^3 of sodium hydroxide, solution K. Add all of the 30cm^3 of t of solution K at once to V in the beaker. Stir the mixture with the thermometer. Measure the final temperature reached and record it in table III.

Table III.

Final temperature (^oC)	
Initial temperature (^oC)	

(1 ½ mks)

a) Determine the change in temperature, ΔT_2. (½ mk)

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b) Determine the:

i) Heat change for the reaction (Assume the heat capacity of the solution is $4.2Jg^{-1}k^{-1}$ and density is 1g/cm^3 (2mks)

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ii) Number of moles of the acid used (H_2X). (1mk)

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iii) Heat of reaction , ΔH_2 of one mole of the acid H_2X with sodium hydroxide (1mk)

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d) Given that,

ΔH_1 is the heat for reaction $H_2X_{(s)} \xrightarrow{\text{water}} 2H^+_{(aq)} + X^{2-}_{(aq)}$

ΔH_2 is the heat for the reaction $H^+_{(aq)} + OH^-_{(aq)} \longrightarrow H_2O_{(l)}$

Calculate ΔH_3 for the reaction $H_2X_{(s)} + 2OH^-_{(aq)} \longrightarrow 2H_2O_{(l)} + X^{2-}_{(aq)}$ (2mks)

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QUESTION 3A

a)You are provided with solid Q. Carry out the test indicated below and record your observations and deductions in the table below.

i)Place a spatula full of Q in a boiling tube. Add about $10cm^3$ of distilled water and shake. Divide the resultant mixture into 4 portions.

Observation	Deductions
(1mk)	(1mk)

b)To the first portion add Barium nitrate solution followed by dilute nitric acid.

Observation	Deduction
(2mks)	(1mk)

c)To the second portion add 2-3 drops of sodium hydroxide till in excess.

Observation	Deduction
(2mks)	(1mk)

d)To the third portion add 2-3 drops of ammonia solutions till in excess.

Observation	Deduction
(2mks)	(1mk)

e)To the 4th portion add $Pb(NO_3)_2$ solution

Observation	Deduction
    (1mk)	 (1mk)

QUESTION 3B

You are provided with liquid X. You are required to carry the test below.

a)Place about $1cm^3$ of substance X in a test tube. Add a small piece of sodium carbonate solid.

Observation	Deduction
   (1mk)	 (1mk)

b)To about 3cm3 of X in a boiling tube, add acidified potassium chromate (vi) and warm.

Observation	Deduction
    (1mk)	 (1mk)

c)To about 3cm3 of X add acidified potassium manganate (vii)

Observation	Deduction
  (1mk)	 (1mk)

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PRE MOCK

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1. About $50cm^3$ of solution V
2. About $50cm^3$ of solution K
3. 1.89g of solid P oxalic acid accurately weighed and placed in a stopped container.
4. Thermometer
5. 5 dry test tubes in a test tube rack
6. Spatula
7. Bunsen burner
8. About $120cm^3$ of solution M
9. About $90cm^3$ of solution F
10. Liquid X-ethanol
11. Solid Q – 1g of solid zinc sulphate
12. Blue and red litmus papers.
13. A boiling tube.
14. Glass rod

<u>Access to;</u>

a) Bunsen burner
b) 2M sodium hydroxide with a dropper
c) 2M Ammonium hydroxide
d) Barium nitrate solution
e) Lead nitrate solution
f) Dilute nitric v acid
g) Methyl orange with a dropper.
h) Phenolphthalein indicator in a bottle dropper
i) About 15cm3 of liquid X
j) Acidified potassium dichromate (VI) with a dropper.
k) Acidified potassium mangate (vii)

1. Solution V is a prepared by dissolving 63g of oxalic acid to make one litre of solution.
2. Solution K is prepared by dissolving 16g of sodium hydroxide pellets to make one litre of solution.
3. Solution M is prepared by dissolving $17cm^3$ of concentrated hydrochloric acid to make one litre of solution.
4. Solution F is prepared by dissolving 15.3g of hydrated sodium hydrogen carbonate to make one litre of solution.