Name _____ Adm No. _____

Candidate's Signature _____

Date _____

233/3
CHEMISTRY
PAPER 3
PRACTICAL
TERM 1 2016
2¼ HOURS

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INSTRUCTIONS TO CANDIDATES

1. Write your name and admission number in the spaces provided above.
2. Sign and write the date of examination in the spaces provided above.
3. Answer all the questions in the spaces provided in the question paper
4. You are NOT allowed to start working with the apparatus for the first 15 minutes of the 2 ¼ hours allowed for this paper. This time is to enable you to read the question paper and make sure you have all the chemicals and apparatus that you may need.
5. All working MUST be clearly shown where necessary.
6. Mathematical tables and silent electronic calculators may be used.

FOR EXAMINER'S USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1	12	
2	16	
3	12	
TOTAL SCORE	**40**	

This paper consists of 7 printed pages

Turn Over

1. You are provided with :

- Acid solution of H_nX containing 0.06 moles in $1dm^3$, labeled solution A.
- Sodium hydroxide, solution B containing 4g/l.
- Phenolphthalein indicator.

You are required to determine the basicity of acid A.

Procedure

Fill the burette with acid, H_nX solution A. Pipette $25cm^3$ of sodium hydroxide, solution B and transfer it into a clean dry conical flask. Add 2 drops of phenolphthalein indicator. Titrate using the acid and record your results in the table below. Repeat the titration to obtain three consistenttitres. (4 marks)

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

(a) Determine the average volume of acid A used. (1 mark)

(b) Calculate the concentration of sodium hydroxide solution B in moles per litre
(Na = 23, O = 16, H = 1) (2 marks)

(c) Calculate the moles of sodium hydroxide used. (2 marks)

(d) Calculate the moles of acid, H_nX used. (1 mark)

(e) Determine the basicity of acid H_nX. (1 mark)

(f) Write a balanced chemical equation for the reaction. (1 mark)

2. You are provided with:
(i) Solid S which is 1.2g magnesium powder.
(ii) Solution T which is 0.02M copper (II) sulphate.

You are required to determine the molar enthalpy of displacement for the reaction between magnesium powder and copper (II) sulphate

Procedure

Measure 100cm^3 of solution T into a plastic beaker. Measure the temperature of this solution after every half minute for 1 ½ minutes. Add the entire amount of solid S to the contents of the plastic beaker at the 2nd minute. Stir with the thermometer and record the temperature after every half minute and fill the table below.
(4 marks)

Time (min)	0	½	1	1 ½	2	2 ½	3	3 ½	4	4 ¼	5	5 ½	6	6 ½	7
Temperature (^{0}C)															

(a) Draw a graph of temperature (^{0}C) against time (t) in minutes. (3 marks)

3. 4.

(b) Use your graph to determine the highest temperature rise. (1 mark)

(c) Assuming that there is no heat lost to the surroundings, find the amount of heat produced.
(Specific heat capacity of solution = 4.2 J $g^{-1}k^{-1}$) (2 marks)

(d) Write a balanced ionic equation for the displacement reaction between copper (II) ions and magnesium powder. (1 mark)

(e) Find the number of moles of:
(i) Copper (II) ions in the solution used. (2 marks)

(ii) Magnesium added to the copper (II) sulphate solution. (Mg = 24) (1 mark)

(iii) Calculate the heat change when one mole of copper (II) ions is displaced by

magnesium. (2 marks)

3. You are provided with solid H.
Carry out the tests below to identify the ions present in substance H. Fill your observations and inferences in the table below.

Experiment	Observations	Inferences
(i) Dissolve a spatula endful of solid H in distilled water and stir. Divide the solution into 5 portions	(1 mark)	(1 mark)
(ii) To the 1st portion add 3 drops of barium nitrate solution	(1 mark)	(1 mark)
(iii) To the 2nd portion add 3 drops of lead (II) nitrate solution.	(1 mark)	(1 mark)
(iv) To the 3rd portion add sodium hydroxide solution dropwise until in excess.		

(v) To the 4th portion add aqueous		

ammonia solution dropwise until in excess.	(1 mark)	(1 mark)
(vi) To the 5^{th} portion add 3 drops of dilute hydrochloric acid.	(1 mark)	(1 mark)