GEM SUB-COUNTY JOINT EVALUATION EXAMS 2016
Paper - 233/3
CHEMISTRY PRACTICAL
PAPER 3

1. **a)** You are provided with
- 2.0M sodium hydroxide solution labelled solution B
- Solution C containing 12.25 g per litre of an mineral acid C

You are required to

i) Prepare a dilute solution of sodium hydroxide, solution B.

ii) Determine the
Relative Formular mass of the acid C
Molar Enthalpy change of reaction between acid C and sodium hydroxide solution B.

Procedure 1.

Using a pipette and a pipette filler place 25.0cm³ of solution B in a 250.0ml volumetric flask. Add to it about 150cm³ of distilled water. Shake well. Add more distilled water to make upto the mark. Label this solution D.

Fill a burette with solution C. Using a clean pipette and a pipette filler, place 25.0cm³ of solution D into a 250ml conical flask. Add two drops of phenolphthalein indicator and titrate with solution C. Record your results in table 1. Repeat the titration two more times and complete the table.

	1	2	3
Final burette reading (cm³)			
Initial burette reading (cm³)			
Volume of solution C used (cm³)			

Calculate the

i) average volume of solution C used. (1 mark)

ii) moles of solution D used. (2 marks)

iii) Concentration in moles per litre of acid in solution C given that the number of moles of acid C used are half the moles of D used. (2 marks)

vi) Relative formula mass (RFM) of solution C. (1 mark)

b) Procedure II.

i) Using a clean burette, place 5.0cm³ of solution C into each of six (6) test-tubes.

ii) Using a 100ml measuring cylinder, place 20cm³ of solution D, sodium hydroxide solution in a 100ml plastic beaker. Measure the temperature of solution D and record it in table 2 below.

iii) To solution D in the beaker, add acid C, solution C from one of the test-tubes. Stir the mixture with the thermometer and record in Table 2, the maximum temperature reached. Continue with step (iv) IMMEDIATELY

iv) Add the acid C, solution C from another test-tube to the mixture obtained in (iii) above, stir and record the maximum temperature reached in Table 2. Continue adding the acid C, solution C from each of the other four test-tubes, stirring the mixture and recording the maximum temperature each time and complete Table 2.

TABLE 2

Volume of solution C acid C added (cm³)	0	5	10	15	20	25	30
Maximum temperature (°C)							

c) On the grid provided, plot a graph of temperature (vertical axis) against volume of acid C solution C added. (3 marks)

d) Using the graph

i) determine the volume of solution C which gave the maximum change in temperature. (1 mark)

ii) determine the temperature change, DT, for the reaction. (1 mark)

e) Using your answer in parts d(i) and d(ii), calculate the molar enthalpy change of the neutralisation reaction between acid C and sodium hydroxide solution.
(Heat capacity = 4.2J g^{-1} k^{-1}; density of the mixture = 1.0gcm^{-3}) (3 marks)

2. You are provided with substance P. Carry out the tests below and write your observations and inferences in the spaces provided.

a) Describe the appearance of substance P. (1 mark)

b) Place about one third of substance P in a dry test-tube and heat it strongly.

c) Place the remaining amount of substance P in a boiling tube. Add about 10cm³ of distilled water and shake well. Retain the

mixture for tests in (d) below.

d) i) To 2cm³ portion of the mixture obtained in (c) above:
Add two to three drops of aqueous lead (II) nitrate to the mixture.
ii) To the mixture obtained in d(i) above add five drops of dilute nitric V acid.

e) To 2cm³ portion of mixture obtained in (c), add aqueous barium chloride dropwise until in excess.

f) Give the formula of the cation and anion present in substance P
Cation ..... .(½ mark)
Anion ..... (½ mark)

3. You are provided with an organic liquid P. Carry out the following tests and record you observations and inferences in the space provided.

a) Place about 4cm³ of liquid P in a boiling tube. Add to it 10cm³ of distilled water and shake well. Label this solution G.

b) Place 2cm³ of solution G in a test-tube. Add to it solid sodium hydrogen carbonate provided.

c) To a second 2cm³ portion of solution G in a test-tube, add 2 to 3 drops of acidified potassium dichromate (VI) and warm.

CONFIDENTIAL INSTRUCTIONS

Each candidate should be provided with the following :
4 beakers of 250ml
4 pieces of visking tubing measuring 10cm each
4 pieces of threads measuring 0.5m each
means of timing
concentrated solution of sodium chloride labelled solution B (200ml)
distilled water labelled solution A (500ml)
0.1% sucrose solution labelled solution C (20ml)
4 labels