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CHEMISTRY

PAPER 3 (PRACTICAL)

JULY/AUGUST 2009

TIME:2 ¼ HRS

NANDI EAST DISTRICT JOINT EVALUATION TEST 2009

Kenya Certificate of secondary Education

Chemistry

Paper 3

Time 2 hrs

1. You are provided with:

- Exactly 4.8g of solid P in a boiling tube
- Solution Q which is a solution containing 12g of sodium hydroxide in one litre of solution

You are required to determine

- (i) The solubility of solid P of different temperatures
- (ii) The number of moles of water of crystallization in solid P

PROCEDURE

(a) Using a burette add 4cm³ of distilled water to solid P in the boiling tube. Heat the mixture while stirring with the thermometer to 80°C. When all the solid has dissolved, allow the solution to cool while stirring with the thermometer. Note the temperature at which crystals of solid P first appear. Record the temperature in Tables.

(b) Using the burette, add 2 cm³ of distilled water to the contents of the boiling tube. Warm the mixture while stirring with the thermometer until all the solid dissolves. Allow the mixture to cool while stirring. Note and record the temperature at which crystals of solid P first appear.

(c) Repeat procedure (b) two more times and record the temperatures in table 1. Retain the contents of boiling tube for use in procedure (E)

(d) (i) Complete table 1 by calculating the solubility of solid P at different temperatures (Density of water = 1 gcm⁻³)

TABLE

| Volume of water in the boiling tube (cm ³) | Crystallization Temperature | Solubility of solid P(g/100g of water) |
|--|-----------------------------|--|
| 4 | | |
| 6 | | |
| 8 | | |
| 10 | | |

(ii) On the grid provided, plot a graph of the solubility of P (Vertical axis) against crystallization temperature (3 marks)

GRAPH

(ii) Using your graph, determine the temperature (s) at which 75g of solid P would dissolve in 100cm³ of water (1 mark)

E (i) Transfer the contents of the boiling tube into a 250cm³ volumetric flask. Rinse both the boiling tube and the thermometer with distilled water and add to the volumetric flask. Add more distilled water to make up to the mark. Label this solution P. pipette 25,0cm³ of solution Q into a conical flask three drops of phenolphthalein indicator. Titrate solution P against solution Q. Repeat the titration two more times and complete Table 2 below.

| | I | II | III |
|--|---|----|-----|
| Final burette reading (cm ³) | | | |
| Volume of solution P used (cm ³) | | | |
| Initial burette reading (cm ³) | | | |

Calculate the: (4 marks)

(ii) Average volume of solution P

(iii) Number of moles of sodium hydroxide used in solution Q. (Na= 23.0, O = 16.0, H = 1.0) (1 mark)

(iv) Number of moles of P in the titre volume. Given that the formula of solid P is H₂A.XH₂O (1 mark)

(v) The relative formula mass (RFM) of P. (2 marks)

(vi) The formula of P is H₂A. XH₂O. Determine the value of X in the formula. Given that the relative formula mass (RFM) of A is 88. (O = 16, i=1)

2. You are provided with about 0.6g of solid M in a Stoppard container. Carry out the tests below and record your observations and inferences in the spaces provided.

(a) Put the contents of M in a boiling tube and add about 10cm³ distilled water and shake well

Observation

Inference

(1 mark)

(1 mark)

(b) Divide the contents of the solution in 2 (a) into four test- tube portions of about 2 cm³ each

(i) to the first test – tube portions add drop wise until excess

Observation

Inference

(1 mark)

(1 mark)

(ii) to the second portion, add 3 drops of lead (II) nitrate solution and shake well

Observation

Inference

(1 mark)

(1 mark)

- (iii) To the third portion, add 2 drops of 2M silver nitrate solution followed by 3 drops of 2M nitric acid

Observation

Inference

(1 mark)

(1 mark)

- (iii) To the fourth portion, dip a clean dry glass - rod into the solution, then heat the dipped part of the glass rod in a non- luminous flame

Observation

Inference

(1 mark)

(1 mark)

3. You are provided with solution X. Carry out the test below and record the observation and inferences in the spaces provided.

- (i) To 2cm³ of solution X add 1cm³ of Acidified Potassium Manganate (VII)

Observation

Inference

(1 mark)

(1 mark)

(ii) To 20cm³ of solution X add 2-3 drops of bromine

Observation

Inference

(1 mark)

(1 mark)

(iii) To 2cm³ of solution X add 2cm³ of ethanoic acid followed by 3 drops of concentrated sulphuric acid and warm carefully.

Observation

Inference

(1 mark)

(1 mark)

(iv) to 2cm³ of solution X add a spatula full of sodium hydrogen carbonate

Observation

Inference

(1 mark)

(1 mark)