

# FORM FOUR CLUSTER KCSE MODEL5

## CHEMISTRY PAPER 3 QUESTIONS

1. You are provided with:

-6.5g of solid A.

- Solution B containing 20g per litre of sodium hydroxide

-Phenolphthalein indicator.3

You are required to determine;

-The solubility of solid A at different temperatures.

-The number of moles of water of crystallization in solid A.

### Procedure I

a) Place all solid A in a boiling tube

Using a burette add 4cm<sup>3</sup> of distilled water into the boiling tube. Heat the mixture while stirring with the thermometer to about 70°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 A first appear; Record this temperature in table I.

b) Using the burette, add 2cm<sup>3</sup> of distilled water to the contents of the boiling tube. Warm the mixture while stirring with the thermometer until all the solid A dissolves. Allow the mixture to cool while stirring. Note and record the temperature at which crystals of solid A just appear.

c) Repeat procedure (b) two more times and record the temperature in the table 1.

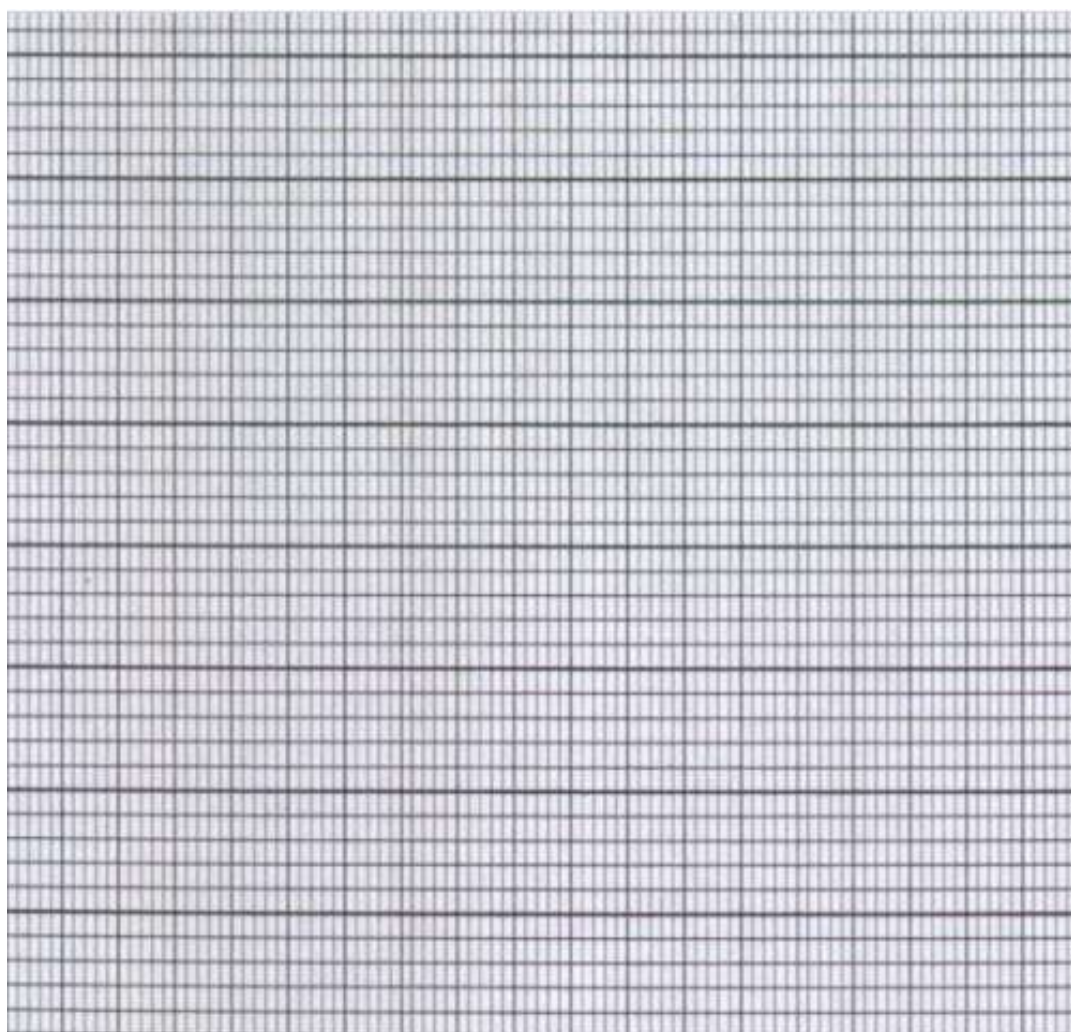
Retain the content of the boiling tube for use in procedure 2.

d) i) Complete table I by calculating the solubility of solid A at different temperatures.

**Table I**

Volume of water in the boiling tube (cm <sup>3</sup> )	4.0	6.0	8.0	10.0
Temperature at which crystals of solid A first appear( °C)				
Solubility of solid A (g/100g of water				

i) On the grid provided, plot a graph of solubility of Solid A (vertical axis) against temperature (horizontal axis)



ii) From your graph, at what temperature will 100g of solid A dissolves in 100cm<sup>3</sup> of water .

### Procedure 2

a) Transfer the content of the boiling tube into a 250ml volumetric flask. Rinse the boiling tube and the thermometer with distilled water and add to volumetric flask. Add more distilled water to make up to the mark, label this solution A Place solution B in a clean burette. Using a pipette and pipette filler, place 25.0cm<sup>3</sup>of solution A into a 250ml conical flask. Add 3 drops of phenolphthalein indicator. Titrate solution A with solution B. Record your results in table II.

b) Repeat the titration two or more times and complete the table.

**Table II**

<u>Titre</u>	I	II	III
Final burette reading (cm <sup>3</sup> )			
Initial burette reading (cm <sup>3</sup> )			
Volume of solution B used (cm <sup>3</sup> )			

Determine the;

i) Average volume of solution B used.

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ii) Number of moles sodium hydroxide solution.

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iii) The number of moles of solution A given that 2 moles of solution B react completely with 1 mole of solution A. ....

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iv) Relative formula mass of A.

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v) Given that A has the formula  $L.nH_2O$ . Determine the value of n. Given that the relative formula mass of L is 90.0 (O = 16.0, H= 1.0) .....

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2. a) You are provided with solid C.

Carry out the following tests and write your observations and inferences in the spaces provided.

i) Place about one half of solid C in a test -tube and heat it strongly. Test any gases produced with both red and blue litmus papers.

Observations	Inferences

ii) Place the rest of solid C in a boiling tube. Add about 10cm<sup>3</sup> of distilled water. Shake well.

To a 2cm<sup>3</sup> portion of the solution, add about 1cm<sup>3</sup> of hydrogen peroxide and shake well.

To the resulting mixture, add aqueous sodium hydroxide dropwise until in excess.

Observations	Inferences

b) You are provided with solution D. Carry out the following tests and write your observations and inferences in the spaces provided.

Divide solution D into two portions

i) To one portion of solution D in a test – tube, add 3 drops of barium nitrate. Retain the mixture for use in test (ii) below.

Observations	Inferences

ii) To the mixture obtained (i) above, add about 5cm<sup>3</sup> of 2M Nitric

Observations	Inferences

iii) To portion two of solution D in a test –tube, add 2 drops of acidified potassium dichromate (VI) and warm the mixture.

Observations	Inferences

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

a) Place five drops of liquid E on a clean dry watch glass and ignite it.

Observations	Inferences

b) Place about 2cm<sup>3</sup> of liquid E in a clean dry test- tube, add all the sodium hydrogen carbonate provided.

Observations	Inferences

c) Place about 2cm<sup>3</sup> of liquid E in a test- tube, add about 1cm<sup>3</sup> of acidified potassium dichromate(VI) and warm the mixture.

Observations	Inferences