

# KCSE TRIAL 2020

## CHEMISTRY PAPER 3

1. You are provided with the following:

- 1.0M Hydrochloric acid; solution Y
- 0.5M Sodium hydroxide; solution Z

Anhydrous sodium carbonate of unknown mass; solid X

You are required to determine the mass of sodium carbonate that was used in the reaction.

### Procedure

Using a measuring cylinder, measure  $60\text{cm}^3$  of 1M hydrochloric acid, solution Y and transfer into  $100\text{cm}^3$  beaker. Add all sodium carbonate (solid X) and stir gently until there is no effervescence. Transfer the solution into a clean 100ml measuring cylinder and add distilled water to make  $100\text{cm}^3$  of the solution. Transfer the solution onto  $250\text{cm}^3$  beaker and shake. Label this solution F.

Fill the burette with solution Z. Pipette  $25.0\text{cm}^3$  of solution F and transfer to a conical flask. Add 3 drops of Phenolphthalein indicator and titrate with solution Z. Record your results in the table 1 below. Repeat the procedure to complete the table.

(a). Table 1.

(4 marks)

Final burette readings ( $\text{cm}^3$ )	I	II	III
Initial burette reading ( $\text{cm}^3$ )			
Volume of solution Z ( $\text{cm}^3$ )			

(i). Determine the average volume of solution Z.

(1 mark)

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(ii). Calculate the number of moles of sodium hydroxide (solution Z) used.

(1 mark)

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(iii). Find the number of moles of hydrochloric acid in  $25.00\text{cm}^3$  of solution F (2 marks)

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(iv). Determine the number of moles of hydrochloric acid in  $100\text{cm}^3$  of solution F (2 marks)

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Calculate the number of moles of hydrochloric acid in the original  $60\text{cm}^3$  of solution Y. (1 mark)

(v). Calculate the number of moles of hydrochloric acid in the original  $60\text{cm}^3$  of solution Y. (1 mark)

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(vi). Calculate the number of moles of hydrochloric acid that reacted with sodium carbonate. (1 mark)

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(vii). Determine the mass of sodium carbonate that reacted with the acid (Na=23, C=12, O=16) (2 marks)

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2. A. You are provided with

- Solid M
- A thermometer
- A test tube

You are required to determine the melting point of solid M

**PROCEDURE**

a). Place  $150\text{cm}^3$  of tap water in a 200 ml or 250 ml beaker

b). Heat the water to near boiling.

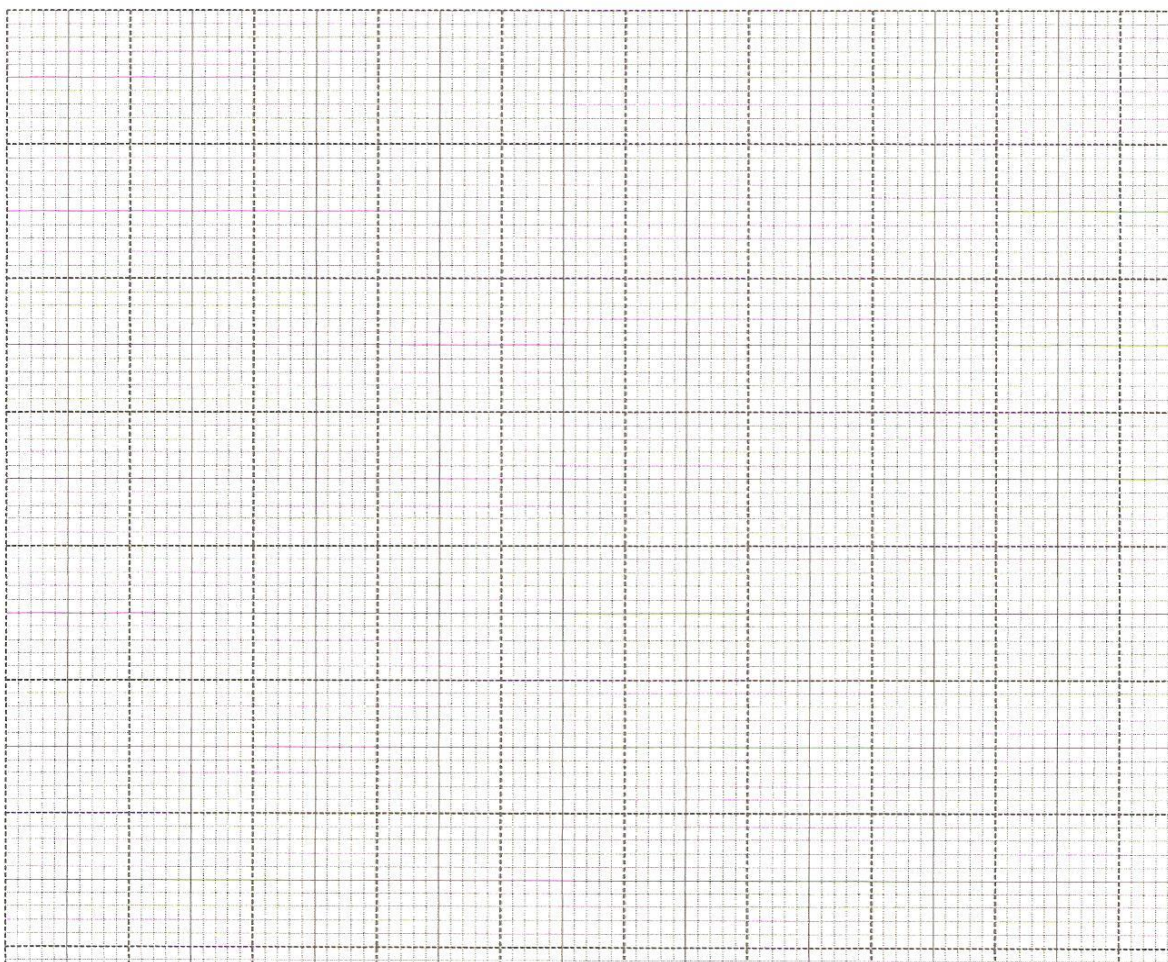
c). Insert a thermometer in the test tube containing solid M and take its temperature then record it in the table below under time 0.

d). Using a test-tube holder, immerse the test-tube containing solid M into the hot water (Ensure that half of the test-tube is immersed) and immediately start a stop Watch/clock and record the temperature of the contents of the test-tube after every Half-minute and complete the table.

e). Dip the thermometer into the hot bath to clean it then wipe it with tissue paper (4 marks)

Time (Min)	0	½	1	1 ½	2	2 ½	3	3 ½
Temperature (°C)								

(i). On the grid provided, plot a graph of time, (Horizontal axis) against temperature. (3 marks)



(ii). From the graph, determine the melting point of solid M.

(1 mark)

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(iii). Name the type of heat change at the melting point.

(1 mark)

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3. (a). You are provided with solid L. Carry out the tests below and record your observations and inferences in the spaces provided.

(i). Heat gently then strongly half of solid L in a clean dry test tube, test any gas produced using red and blue litmus papers

<b>Observations</b>	<b>Inferences</b>
[1 mark]	[1 mark]

Take the remainder of solid L and put into a boiling tube. Add about 10cm<sup>3</sup> of distilled water and shake. Divide the solution into 3 portions.

(ii). To the first portion, add aqueous sodium hydroxide dropwise until in excess.

<b>Observations</b>	<b>Inferences</b>
[1 mark]	[1 mark]

iii). To the second portion, add about 5cm<sup>3</sup> of aqueous sodium sulphate.

<b>Observations</b>	<b>Inferences</b>
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[1 mark]	[1 marks]

(iv). To the third portion, add about 2cm<sup>3</sup> of lead (II) nitrate.

Observations	Inferences
[1 mark]	[1 marks]

3.(b). You are provided with solid S perform the following tests and record your observations and inferences in the spaces provided.

(a). Put half of the solid on a clean METALLIC SPATULA ignite it in a non-luminous flame.

Observations	Inferences
[1/2 mark]	[1/2 mark]

(b). Put the remaining solid in a clean boiling tube, add water and shake thoroughly. (Retain this mixture for test bi-biii)

Observations	Inferences
[1 mark]	[1 mark]

(b).(i). In about  $2\text{cm}^3$  of the mixture add 2 drops of bromine water.

<b>Observations</b>	<b>Inferences</b>
[1 mark]	[1 mark]

(ii). in about  $5\text{cm}^3$  of the mixture add both blue and red litmus paper.

<b>Observations</b>	<b>Inferences</b>
[1 mark]	[1 mark]

(iii). use the remaining mixture to determine the pH of the mixture.

<b>observations</b>	<b>Inferences</b>
[1 mark]	[1 mark]