FORM FOUR CLUSTER KCSE MODEL11

CHEMISTRY PAPER 3 QUESTIONS

1. You are provided with :

-Solution A – containing 21.2 g per litre of anhydrous sodium carbonate Na_2CO_3.

-Solution B- Nitric acid solution.

-Solution C – Metal hydroxide M (OH) X.

Procedure I

1. Fill the burette with solution B.

2. Using pipette, transfer 25cm3 of solution A into a clean conical flask and add 1-2 drops of methyl orange indicator.

3. Titrate with solution B from the burette.

4. Repeat the titration to obtain accurate results and record the data in the table below.

TABLE I

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

(4 marks)

i. Find the average volume of B used.

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ii. The equation for the reaction that has taken place is

$$Na_2CO_{3(aq)} + 2HNO_{3(aq)} \rightarrow 2NaNO_{2(aq)} + H_2O_{(l)} + CO_{2(g)}$$

Calculate the number of moles of sodium carbonate (Na_2CO_3) in

i. 25 cm3 of solution A.

ii. Calculate the number of moles of the acid in the titre obtained.

iii. Find the molarity of nitric acid solution B.

Pipette 25cm3 of solution C into a clean conical flask. Add 1-2 drops of methyl orange indicator. Titrate with solution B from the burette. Repeat the titration to obtain accurate results and fill the table II below

Table II

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

i. Find the average volume of solution B used.

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ii. Calculate the number of moles of B in the reading volume.

iii. Determine the equation for the reaction between hydroxide M(OH)X and nitric acid.
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iv. What is the value of x in M(OH)X

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2. You are provided with a) Solution W

b) Solid Zinc powder labeled solid Q.

You are required to determine the concentration of solution W in moles per litre.

Procedure

Using a measuring cylinder, measure 50cm3 of solution W and transfer into 100cm3 plastic beaker.

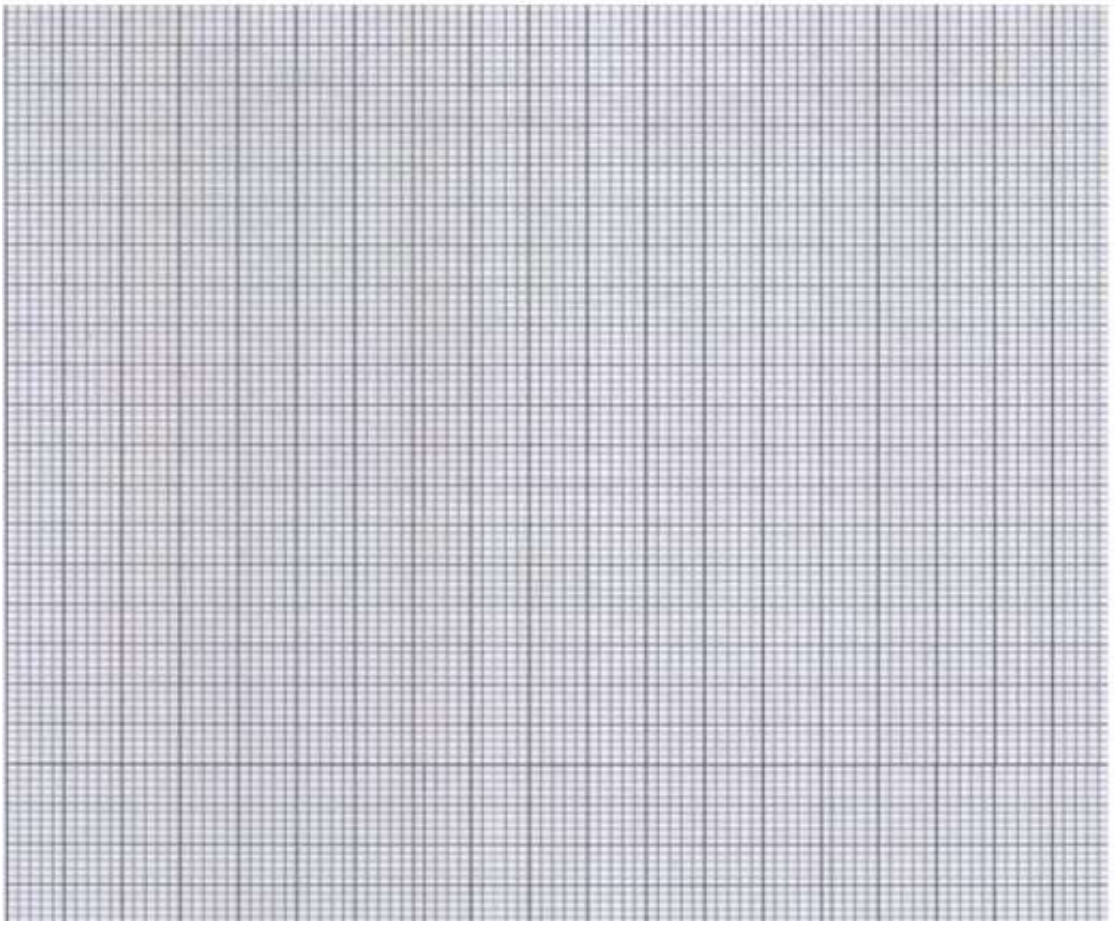
Take the initial temperature of solution and record it in the table below under the time =0.

Add all the solid Q at once to the solution in the beaker and start a stop watch immediately.

Stir well and take the temperature of the mixture after every half-minute to the sixth minute.
Record your results in the table below.

Time (min)	0	½	1	1½	2	2½	3	3½	4	4½	5	5½	6
Temp (^0C)													

b) i) On the grid provided plot a graph of temperature (y –axis) against time.



ii) Using graph determine the highest temperature change. (ΔT)

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c) Calculate the amount of heat given out during the reaction. (Assume density of solution = 1.0g/cm3, specific heat capacity of solution 4.2jg-1k-1)

d) Given that the molar heat of reaction between solution W and Zinc 130kJmol-. Calculate the;

i. Number of moles of W that were contained in 50cm3 of solution W. (1 mark)

ii. Concentration of solution W in moles per litre.

3. You are provided with Solid A. You are require to carry out the tests shown below and write your inferences in the spaces provided. Identify any gases given out.

TEST	OBSERVATION	INFERENCES
a) Heat strongly a spatula end full of A in a clean, dry test-tube.	(½)	(½)
b) Place a spatula end full of A in a boiling tube. Add about 5 cm^3 of distilled water and shake. Divide the resultant mixture into four portions.	(½)	(½)
c) To the first portion add nitric acid followed by Barium Nitrate solution.	(½)	(½)
d) To the second portion, add Nitric acid, followed by Lead II Nitrate solution.	(½)	(½)
e) To the third portion add a few drops of Sodium hydroxide drop wise till in excess.	(½)	(½)
f) To the forth portion add aqueous ammonia drop wise till excess.	(½)	(½)