SCORING GUIDE 2024

545/2
CHEMISTRY PAPER 2
(PRACTICAL)
MOCK 2024
AUGUST
TIME:2 HRS

MEBU EXAMINATIONS CONSULT

Uganda Certificate Of Education

MOCK ASSESSMENTS 2024

CHEMISTRY PAPER 2

(PRACTICAL)

TIME:2HRS

ITEM 1

S.3 students of Luube seed secondary School in Luwero District were carrying out a scientific experiment on neutralization reactions. During the experiment, John was randomly picked by the chemistry teacher and instructed to add a prepared solution of an acid to an alkaline solution in a reaction vessel. The students noticed that the reaction vessel became warmer when they touched it. John and his classmates could not understand why and how much heat had been generated.

Sodium hydroxide reacts with hydrochloric acid according to the following equation.

$$NaOH + HCl_{(aq)} \longrightarrow NaCl_{(aq)} + H_2O_{(l)} + Heat$$

The heat produced varies with the volume of acid added to the base.

You are provided with;

BA1 which is sodium hydroxide solution

BA2 which is Hydrochloric acid solution

TASK:

(a) As a learner of chemistry;

(i) Design an experiment you will carry out to determine the amount of heat, produced during the reaction when **BA1** is added to **BA2**.

RESPONSES

Aim: An experiment to determine the maximum heat produce during reaction of **Sodium Hydroxide** and **Hydrochloric Acid.**

Or

An experiment to determine the maximum heat produced during reaction between BA1 and BA2. **(02 Scores)**

Variables of the experiment.

- ✓ **Dependent variable: Temperature** of solution.
- ✓ **Independent variable:** Volume of **HCl** added **(03 Scores)**
- ✓ **Controlled variable:** Volume of **NaOH** measured/fixed.

Hypothesis: The reaction between **BA1** and **BA2** produces heat.

Or

The reaction between **BA1** and **BA2** is **exothermic**. **(02 Scores)**

Apparatus to be used

Beakers **(01 Score)**

Thermometer

Burrete

Measuring cylinder.

b). Carry out the experiment and record your findings.

Procedures:

- **20cm^3** or **25cm^3** of **BA2** is pipetted into a plastic beaker and its **initial temperature** is **recorded**.
- The **initial temperature of BA1** is also recorded and then filled into a burette to **zero mark**.
- **BA1** is added to **BA2** in the beaker at uniform intervals of **5cm^3/10cm^3** each time stirring and noting the **highest temperature** for atleast **six** readings upto **35cm^3/40cm^3** etc. **(04 Scores)**

Risks

Blockage of thermometer.

Acid pouring on the skin. **(01 Score)**

Breakage of burettes.

Mitigations.

Use of a pipette sucker.

Use of personal protective equipments.

Placing the thermometer into its case. **(01 Score)**

Use of a filter funnel.

Presentation of Data.

Initial temperature of BA1=**25.0^0C**

Initial temperature of BA2 = **27.5^0C/28.0^0C** **(03 Scores)**

Average initial temperature = **26.25^0C/26.5^0C**

Volume of BA2 used =**25cm^3**

Table of Results.

Volume of pipette used: **25.0cm^3** **(01 Score)**

Volume of BA1 added (Cm^3)	0	5	10	15	20	25	30	35	40
Highest temperature of mixture (^OC)	28.0	31.0	33.5	35.5	36.5	35.0	34.0	33.0	32.0
Temperature change (^OC)	0.0	3.0	5.0	7.0	8.0	7.0	6.0	5.0	4.0

Accept±0.5 **(05 Scores)**

Heat evolved = Heat gained by mixture.

Heat evolved = mcΘ

Heat evolved = (20+25) x 4.2 (36.5-28.0)

Heat evolved = (45x4.2x8.5) **(01 Scores)**

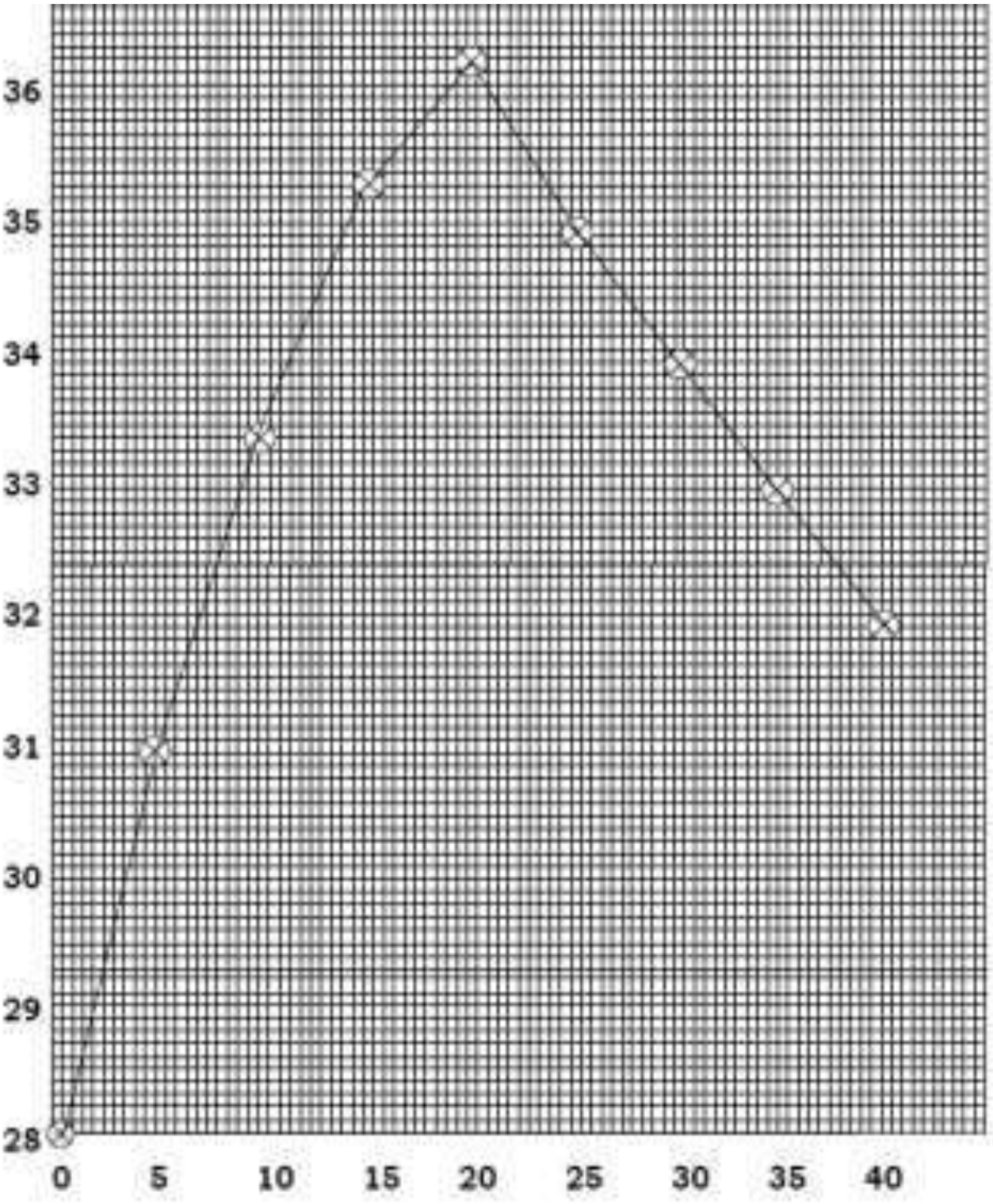
Heat evolved = 1606.5J

Heat evolved = 1.6065J/mol

Heat evolved = -1.6065J/mol

Conclusion: **Heat** is evolved when **sodium hydroxide** reacts with **hydrochloric acid**. The maximum heat liberated when sodium hydroxide reacts with hydrochloric acid is **1606.5J.** **(01 Score)**

A graph of highest temperature against volume of BA1 added



Plotted points on the graph (05 Scores)

Total Scores: 30 Scores