

HEAT OF NEUTRALISATION

NURUL ASHIKIN BT ABD RAHMAN

NEUTRALISATION

OBJECTIVES

- ◉ To measure, using a calorimeter, the energy changes accompanying neutralization reactions.
- ◉ Learn the Kelvin temperature scale.
- ◉ Define heat capacity.

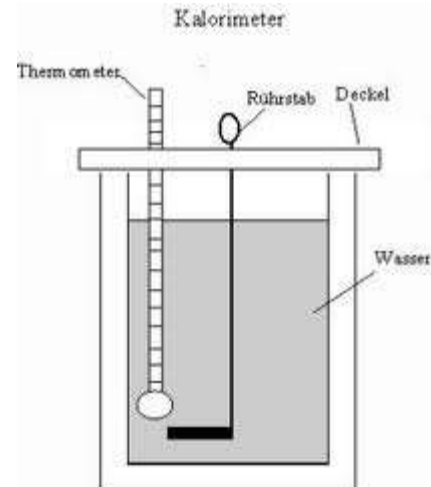
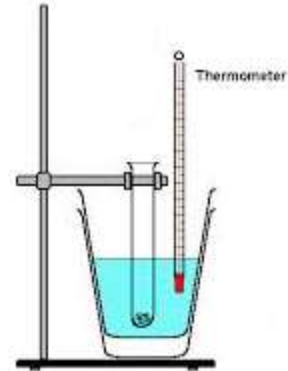
MATERIALS

- ◉ Calorimeter
- ◉ Thermometer
- ◉ HCL
- ◉ NaOH
- ◉ Funnel
- ◉ Pipette
- ◉ Buret
- ◉ Stand



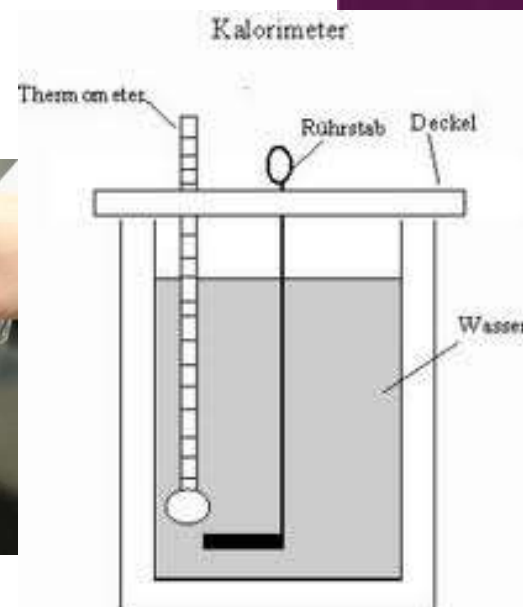
PROCEDURE

- Obtain a calorimeter and add it 100 ml of distilled water.
- Secure a thermometer to stand up in the calorimeter, using ring stand.
- Measure the initial temperature (T_1) of water.



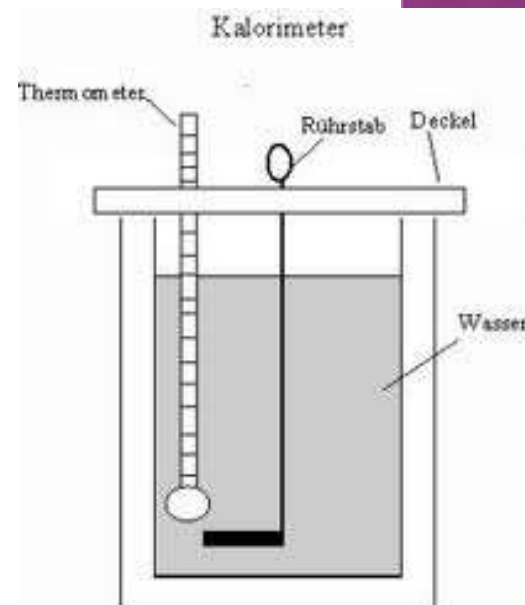
PROCEDURE

- ⦿ Putting 4 gm NaOH and storing them carefully.
- ⦿ Measure the temperature (T_2) of this solution.
- Then have to 1 drop phenolphthalein as an indicator.

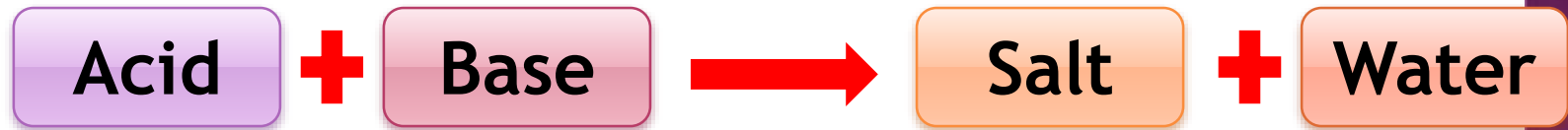


PROCEDURE

- ⦿ Then putting HCl drop by drop and stirring carefully up to change the color of the solution.
 - ⦿ After changing the color the reaction will be finished.
- Then take the final temperature (T_3) of solution and finally take the total volume of the solution by using measuring flask.

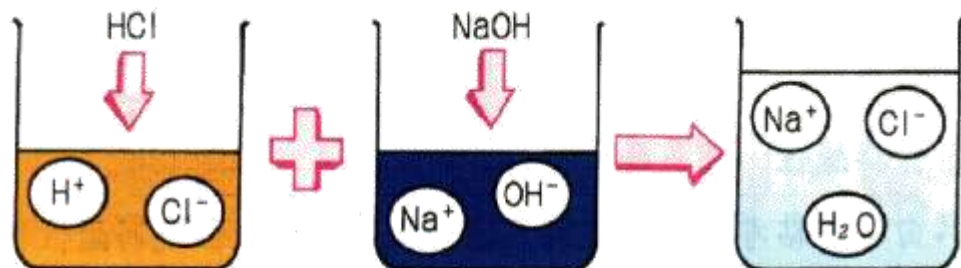


REACTION

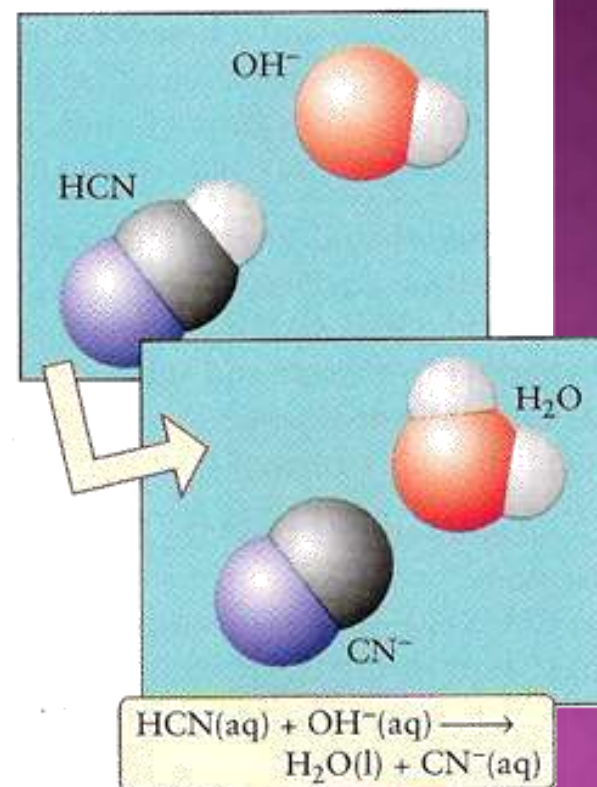


Neutralisation is a reaction between acid and base to produce salt and water.

Reaction Procedure



acid + base \rightarrow salt + water



Result

$$\text{Energy change} = mc \Delta T$$

In which,

m = the mass of the aqueous reaction mixture

c = the specific heat capacity of the aqueous reaction mixture

ΔT = the change in temperature

$$\begin{aligned} Q_{\text{solution}} &= mc \Delta T \\ &= 91 * 4.184 * (-13) \\ &= -4.949 \times 10^3 \text{ j} \end{aligned}$$

$$\begin{aligned} \text{Here,} \\ M &= 91 \text{ g} \\ C &= 4.184 \text{ j/g}^\circ\text{C} \\ \Delta T &= 28 - 41^\circ\text{C} \\ &= -13^\circ\text{C} \end{aligned}$$

Result

$$\begin{aligned}Q_{\text{calorimeter}} &= mc \Delta T \\&= 91 * 4.184 * (-7) \\&= -2.665 \times 10^3 \text{ J}\end{aligned}$$

$$\begin{aligned}\text{Here,} \\M &= 91 \text{ g} \\C &= 4.184 \text{ J/g}^\circ\text{C} \\ \Delta T &= 21 - 28^\circ\text{C} \\&= -7^\circ\text{C}\end{aligned}$$

$$\begin{aligned}- \Delta T_{\text{neutralization}} &= Q_{\text{calorimeter}} + Q_{\text{solution}} \\&= (-2.665 \times 10^3 \text{ J}) + (-4.949 \times 10^3 \text{ J}) \\&= -7.614 \times 10^3 \text{ J}\end{aligned}$$

THE END...

