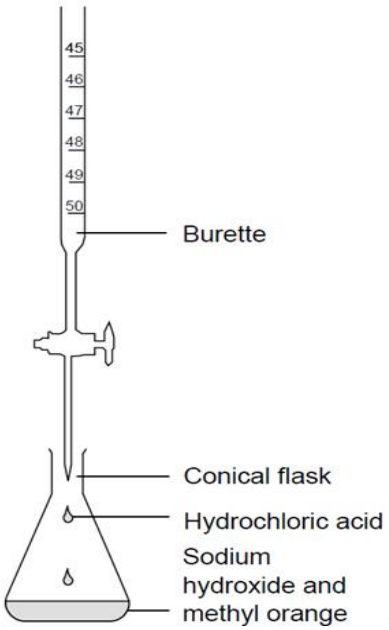
Titration **BTEC Induction 2024**

Equipment:

• 0.5mol/dm^3 hydrochloric acid (HCl) • 0.5mol/dm^3 sodium hydroxide (NaOH) • distilled water • methyl orange indicator • 100cm^3 conical flask • 100cm^3 beaker	• 25cm^3 measuring cylinder • small funnel • white tile • burette • burette holder • pipette • safety glasses



Method:

Read through the instructions carefully before you begin.
Safety glasses must be worn at all times.

1. Set up the equipment as shown in the diagram above with a clamp stand holding the burette
2. Use the funnel to fill the burette with hydrochloric acid.
3. Record the initial volume of acid in the table below.
4. Using the 25cm^3 measuring cylinder pour 25cm^3 of sodium hydroxide into the conical flask. Add 3 drops of methyl orange into the conical flask.
5. Place a white tile under the conical flask.
6. Run the hydrochloric acid into the conical flask, swirling the flask, until the solution turns from orange to pink. This is your approximate value. Record the end volume in the table, to calculate the volume of acid used.
7. Empty the conical flask then rinse with distilled water.
8. Repeat steps 2 to 7, **BUT** now slow down the addition of hydrochloric acid.

   [When you get close to your approximate end point add 1 drop of hydrochloric acid at a time. When the solution in the conical flask just turns pink, this is your end point result.]
9. Repeat the experiment twice more (refilling the burette with hydrochloric acid when required) until concordant results are obtained.
10. Calculate the mean volume of 0. 5mol/dm^3 hydrochloric acid needed to neutralise the alkali.

Titration **BTEC Induction 2024**

Results:

Burette reading	Volume (cm^3)				
	Approximate	**1**	**2**	**3**	**Mean**
Initial					
Final					
Titre (volume used)					

Calculating concentrations for unknown acid:

Step 1: Calculate the number of moles of sodium hydroxide in 25cm^3 of 0.5mol/dm^3 NaOH.

Concentration = number of moles / volume of solution (dm^3)

N.B Remember to convert cm^3 to dm^3 by dividing by 1000.

Step 2: Balance the equation for the reaction.

$$\_\_\_NaOH + \_\_\_HCl \rightarrow \_\_\_\_NaCl + \_\_\_\_H_2O$$

Step 3: Calculate how many moles of acid are needed to neutralise the alkali

e.g. If there is a 1 in front of the acid, and a 2 in front of the alkali, then it is a 1:2 ratio

Moles of alkali:

Moles of acid:

Step 4: Calculate the concentration of the acid.

Concentration = number of moles / volume of solution (dm^3)

Use the number of moles of alkali and the mean volume of acid.

Step 5: Calculate the mass of acid in g.

Number of moles = mass of substance (g) / M_r of substance

Calculate the M_r of the acid and use the number of moles to find the mass.