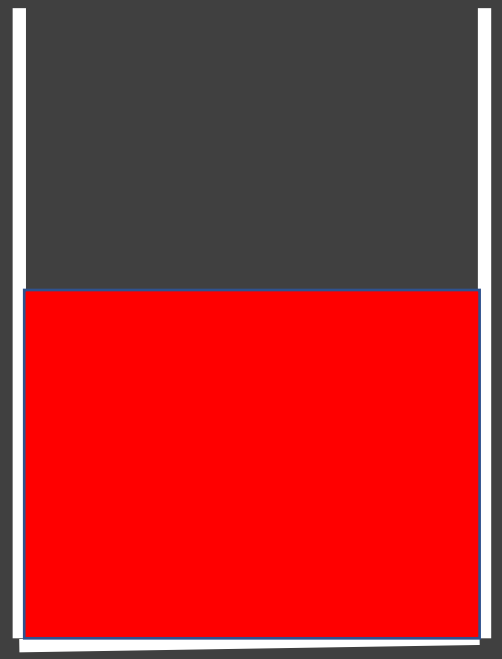
Solution Calculations and Titration Experiments

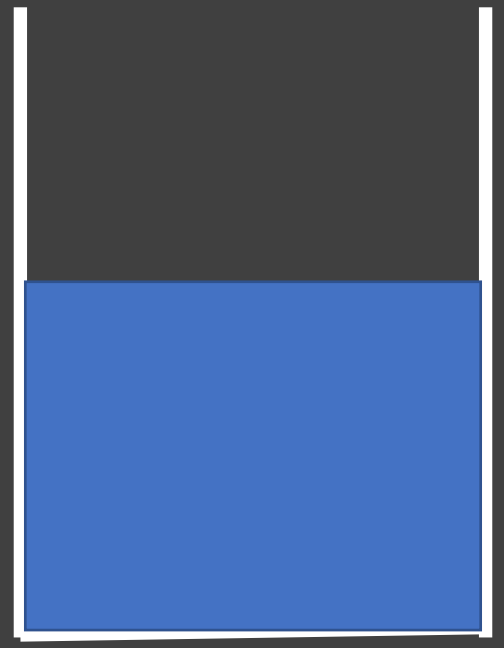
These slides may be downloaded at https://www.chemistrytuition.net/

Reacting Solutions

$$HCl_{(aq)} + NaOH_{(aq))} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$$

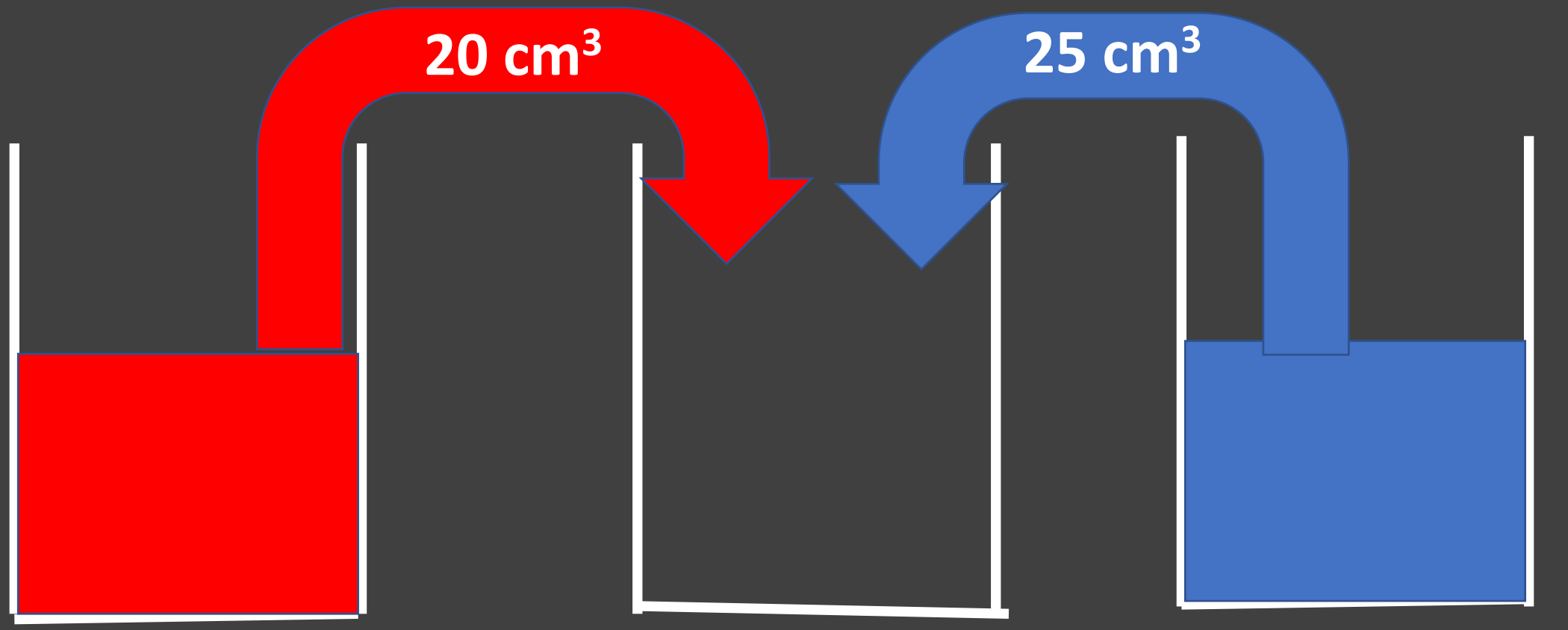


$0.5\ mol/dm^3$
$HCl_{(aq)}$



$NaOH_{(aq)}$
unknown
concentration

$$HCl_{(aq)} + NaOH_{(aq))} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$$



0.5 mol/dm³
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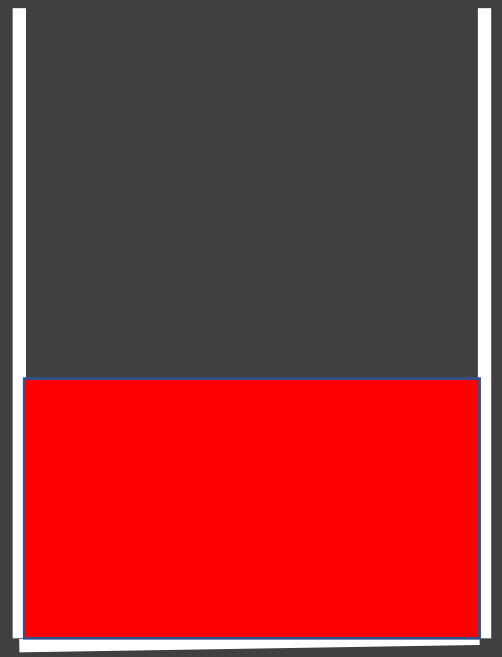

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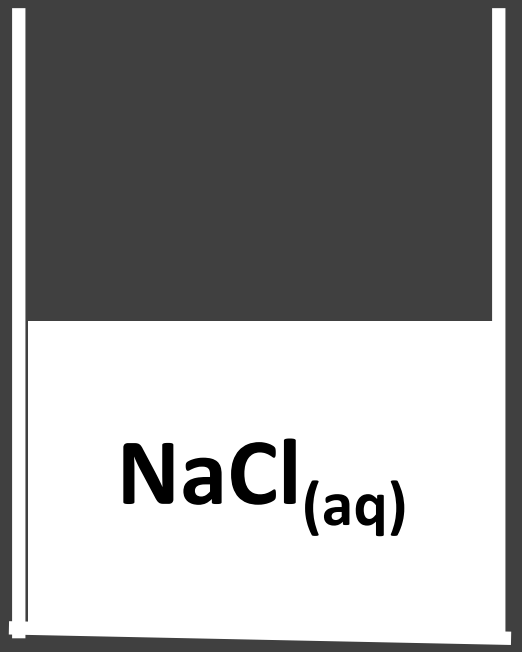

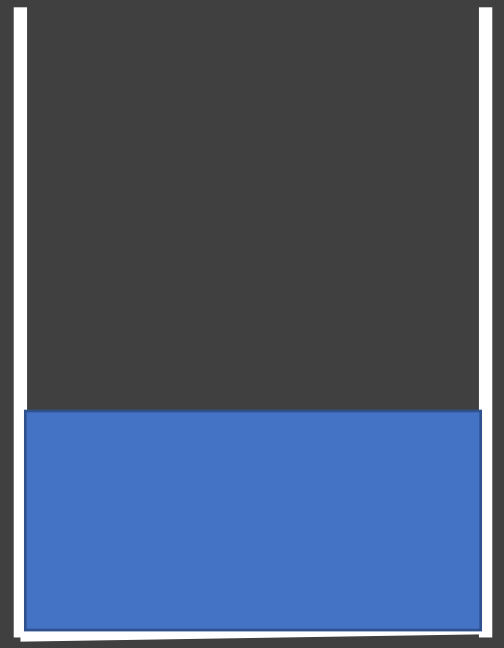

$NaOH_{(aq)}$
unknown
concentration

$$HCl_{(aq)} + NaOH_{(aq)} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$$

0.020 dm^3 of 0.5 mol/dm^3 $HCl_{(aq)}$

0.025 dm^3 of $NaOH_{(aq)}$ unknown concentration

Moles of HCl = conc x volume = 0.5 x 0.020 = 0.010 moles

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1HCl : 1NaOH → Moles of NaOH = 0.010 moles

$$HCl_{(aq)} + NaOH_{(aq))} \rightarrow NaCl_{(aq)} + H_2O_{(l)}$$

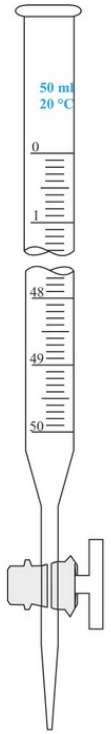
0.020 dm^3 of 0.5 mol/dm^3 $HCl_{(aq)}$

0.025 dm^3 of $NaOH_{(aq)}$ unknown concentration

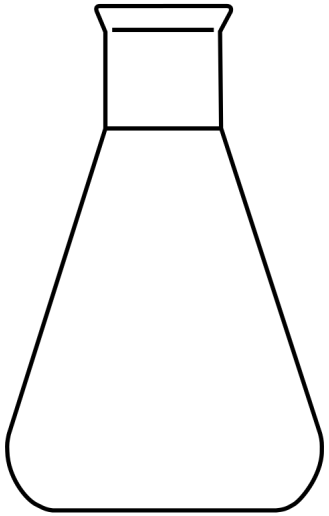
Moles of HCl = conc x volume = 0.5 x 0.020 = 0.010 moles

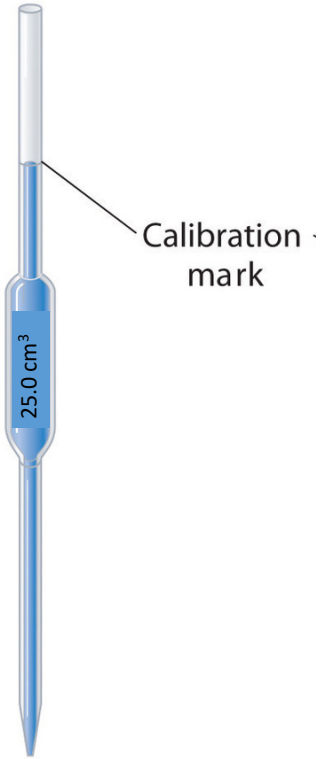
1HCl : 1NaOH → Moles of NaOH = 0.010 moles

$$\text{Concentration of NaOH} = \frac{\text{moles}}{\text{Vol}} = \frac{0.010}{0.025} = 0.40 \text{ mol/dm}^3$$



burette

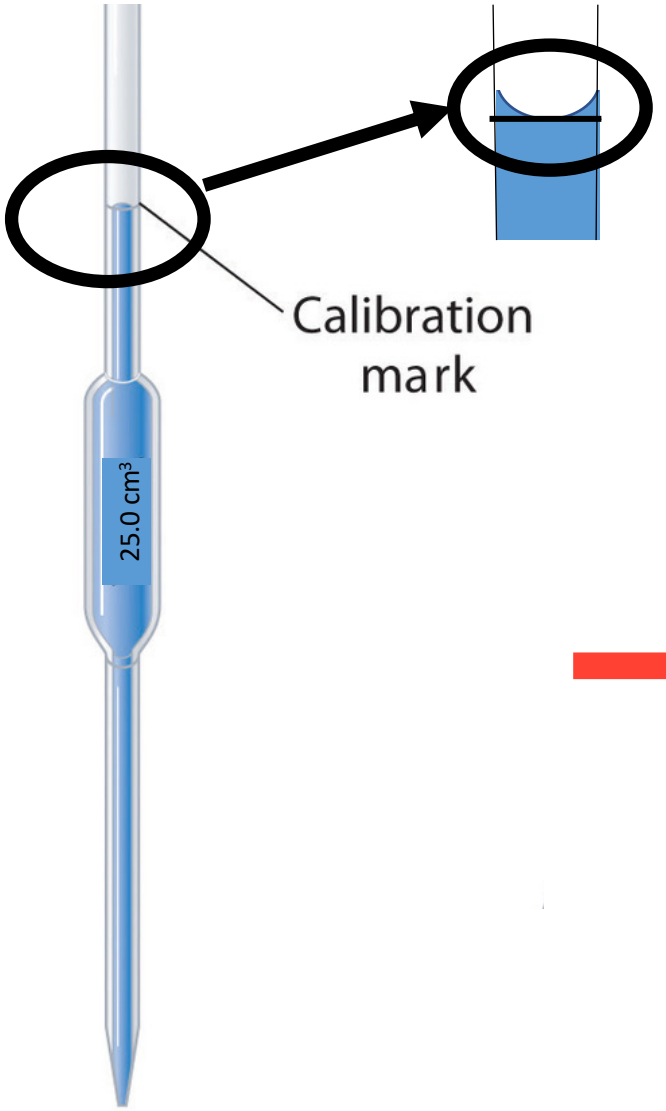




Pipette

Experimental Procedure

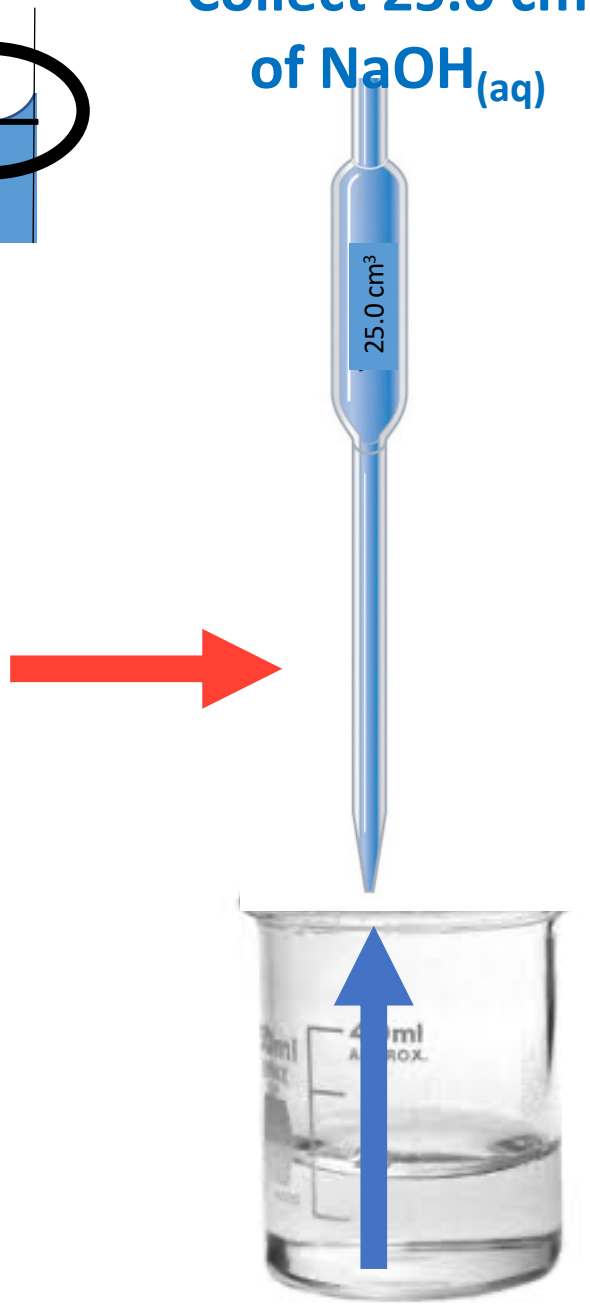
Pipette

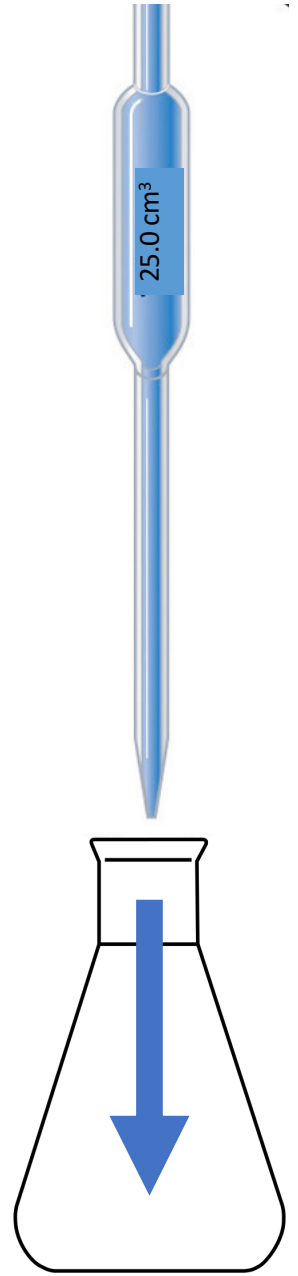


$NaOH_{(aq)}$

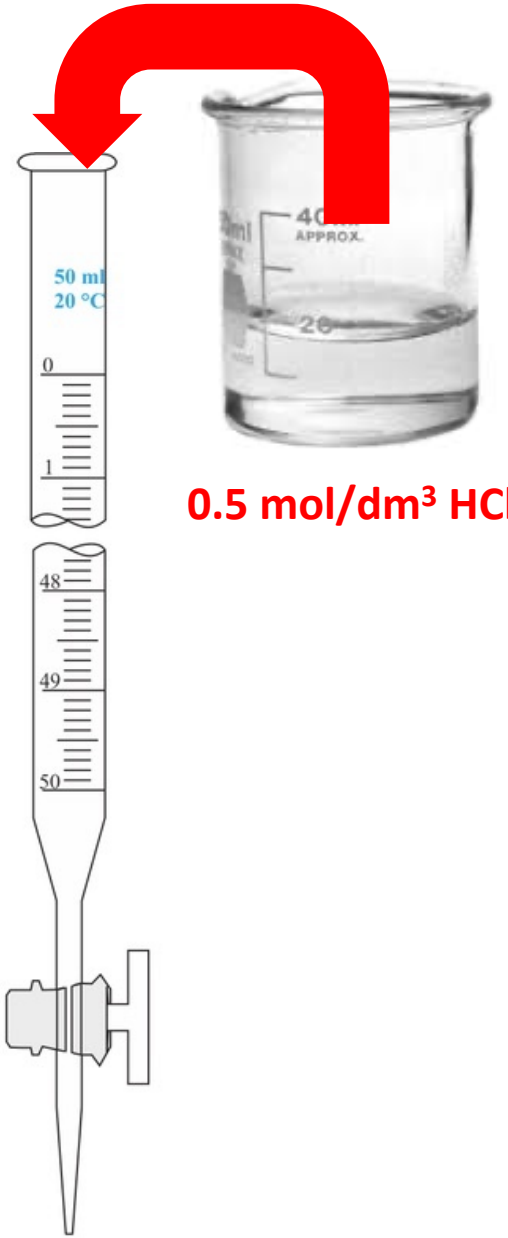
Pipette measures accurately 25.0 cm^3

Collect 25.0 cm^3 of $NaOH_{(aq)}$

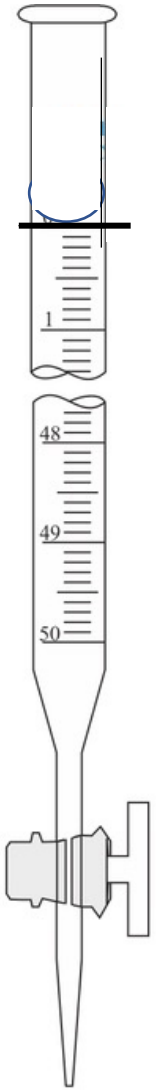




Burette



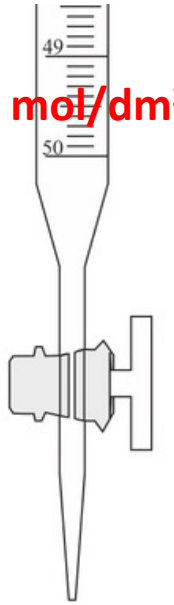
0.5 mol/dm^3 HCl$_{(aq)}$



Each division is 0.01 cm^3

The volume can be read to the nearest 0.05 cm^3

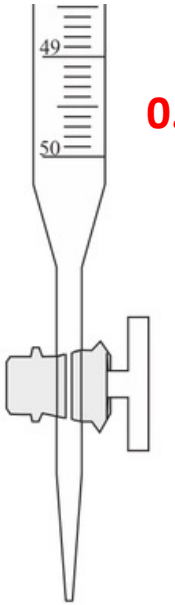
0.5 mol/dm^3 $HCl_{(aq)}$



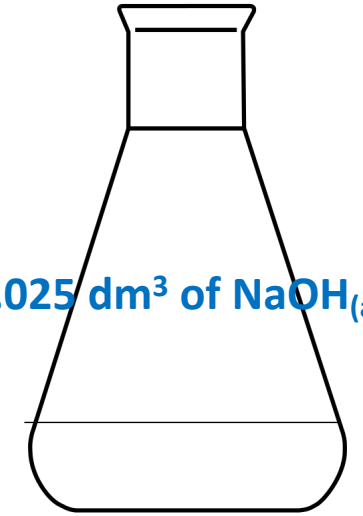
Tap to let out the $HCl_{(aq)}$ slowly

Add indicator

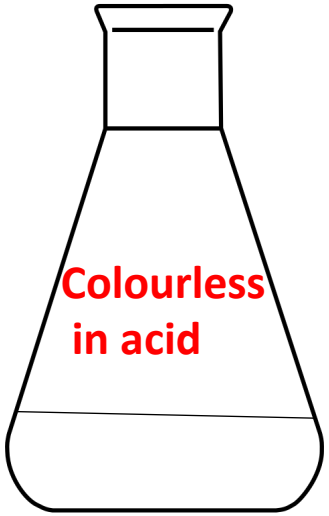
Record initial burette reading = 0.00 cm^3



0.5 mol/dm^3 $HCl_{(aq)}$

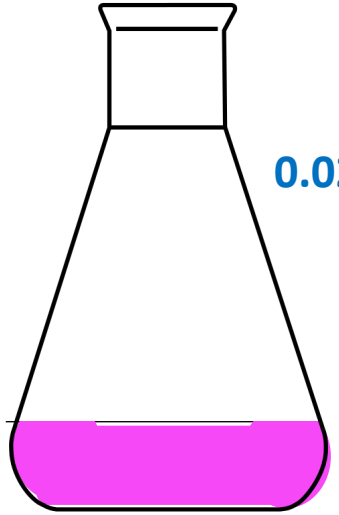


0.025 dm^3 of $NaOH_{(aq)}$



Colourless in acid

Pink in alkali



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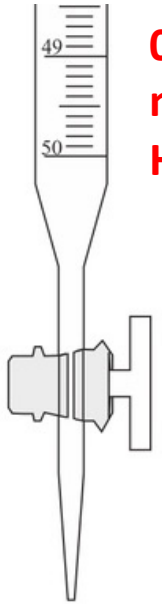

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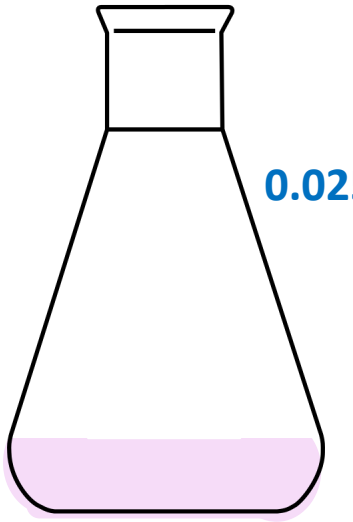


0.025 dm^3 of $NaOH_{(aq)}$

Add $HCl_{(aq)}$ until you see a very light pink colour – the end point.

Record final burette reading = 20.20 cm^3

Subtract the initial burette reading from the first = 20.20 – 0.00 = 20.20 cm^3

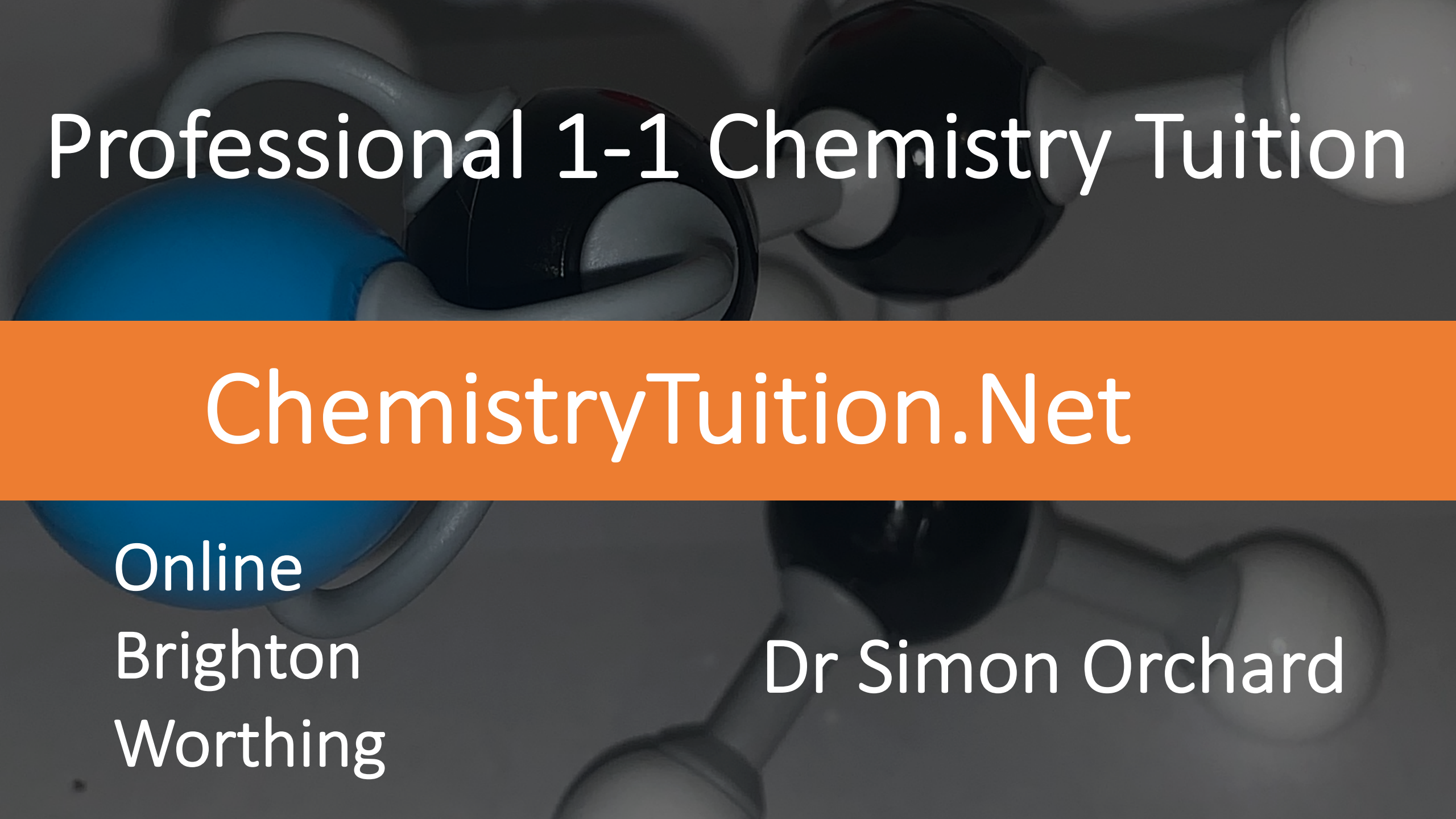
This is your first titre reading

Repeat until you obtain two titre reading within 0.1 cm^3 of each other.

Second titre = 19.95 cm^3
Third titre = 20.05 cm^3

Work out the average titre using the two results within 0.1 cm^3

Average titre = $\frac{19.95 + 20.05}{2}$ = 20.00 cm^3 **This is your result.**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