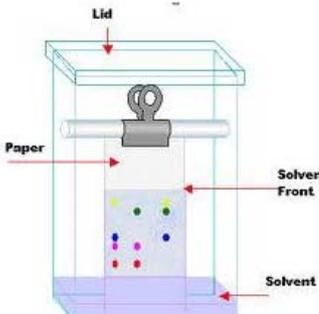




Key Area: Chemical Analysis

Learning Statement	😊	😐	☹️
There are two types of chemical analysis: <ul style="list-style-type: none">• Qualitative analysis• Quantitative analysis.			
Qualitative analysis allows the presence of a substance to be detected.			
Quantitative analysis allows the presence of a substance to be detected and allows us to work how much of the substance there is.			
Qualitative Analytical Methods 1. Flame Testing <ul style="list-style-type: none">• When metal compounds are placed in a flame, characteristic colours are produced.• Different metals give different colours, therefore the presence of a metal in a compound can be detected using flame colour.• Flame colours can be found in the data booklet on page 6. 2. Precipitation <ul style="list-style-type: none">• Metal ions can also be detected using precipitation reactions.• The colour of the precipitate formed (insoluble solid) allows us to determine which metal ion was present.• Non-metal ions can also be detected using precipitation. 3. Chromatography <ul style="list-style-type: none">• Chromatography can be used to separate mixtures of substances.• Chromatography involves spotting small quantities of a substance on a piece of chromatography paper, then placing this chromatography paper vertically in a solvent. The solvent flows up the paper and separates the single spot for the substance into a spot for each component of the mixture.  <ul style="list-style-type: none">• Advanced forms of chromatography are available that allow better separation of mixtures. High Performance Liquid Chromatography (HPLC) and Gas Phase Chromatography (GPC) and Liquid Chromatography Mass Spectrometry (LCMS) are all example of such techniques.			
Quantitative			

1. Titration

A titration can be used to determine the concentration of acid or base used in a neutralisation reaction.

In a titration a pipette is used to transfer a known volume of acid or base into a conical flask. An indicator is then added to the conical flask. The indicator allows the end point of the titration to be easily observed.

A burette is filled with acid or base of a known concentration.

The burette is then used to accurately add known volumes of acid or base into the conical flask. When a colour change is observed, the reaction has reached its end point.

The measurements in a titration are often recorded in a table such as the following:

	1 st (Rough)	2 nd	3 rd
Initial Volume (cm ³)			
End Volume (cm ³)			
Titre (cm ³)			

The average titre can be worked out using concordant values. Concordant values are values that are within 0.2 cm³ of each other.

Using the values obtained from the titration experiment, the formula:

$$\frac{\text{ACID}}{V_1 C_1} = \frac{\text{BASE}}{V_2 C_2}$$

$\frac{\quad}{n_1} = \frac{\quad}{n_2}$

Where:

V_1 = Volume of acid	V_2 = Volume of base
C_1 = Concentration of acid	C_2 = Concentration of base
n_1 = Number of moles of acid from reaction equation.	n_2 = Number of moles of base from reaction equation.

