

## Reactions Involving Acids and Bases

- Acids take part in several characteristic reactions:

1) Active metals react with acids in a single displacement reaction  
active metal + acid  $\rightarrow$  hydrogen + ionic compound

2) All acids react with carbonates in a double displacement reaction

carbonate + acid  $\rightarrow$  carbon dioxide + water + ionic compound

3) Acids undergo precipitation reactions with some ionic compounds

ionic compound + acid  $\rightarrow$  precipitate + acid

4) Acids react with bases in another double displacement reaction  
often called a neutralization reaction

base + acid  $\rightarrow$  ionic compound + water

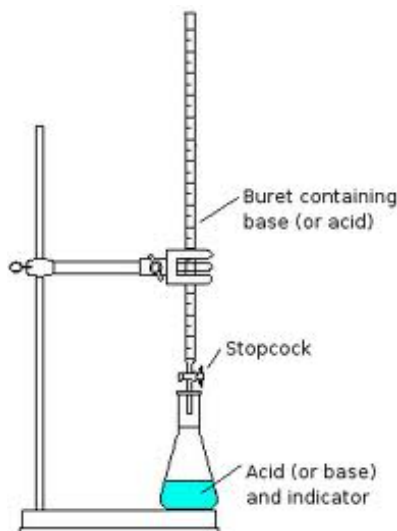
- During a neutralization reaction  $H^+$  ions from an Arrhenius acid and  $OH^-$  ions from an Arrhenius base combine to form water.
- The metal cation from the base and the ion from the acid combine to form a salt.

### ***Titration***

- a laboratory procedure involving the carefully measured and controlled adding of a solution from a buret into a measured volume of a sample solution
- it is used to determine the concentration of substances in solution

### ***Titrant***

- the solution in the buret during a titration (standard solution with KNOWN concentration)



In the buret → standard solution  
(KNOWN concentration)

In the flask → precise volume  
(UNKNOWN concentration)

In the flask → indicator to detect the end  
point

### ***Equivalence Point***

- the point at which the amount of titrant is just enough to react with all the reactant in the sample.

### ***Endpoint***

- the point in a titration at which the indicator changes colour
- this is at, or close to, the point at which the titrant and sample in the flask have completely reacted

### ***Steps in Titration***

1. Place standard solution in buret
2. Place a precise volume of a solution of unknown concentration in a flask
3. Add an indicator to the flask
4. Record the volume in the buret as your initial reading
5. Open the stopcock of the buret and allow the standard solution to enter the flask, while swirling the flask
6. Slow down the flow of standard solution being added to ensure you don't surpass the endpoint by too much
7. Once the end point is reached, record the final volume in the buret
8. Subtract the initial volume from the final volume in the buret to obtain the total volume of standard solution used to neutralize the unknown solution.