***Chemistry notes:***

***Paper 2 – Required Practical’s:***

**Practical 5 – Measuring Rate of Reaction**

**Precipitation and Colour Change:**

**Method:**

1. You can record the visual change in a reaction if:
   1. The initial solution is transparent
   2. The product is a precipitate which clouds the solution (it becomes opaque)
2. You can observe a mark through the solution and measure how long it takes for it to disappear
   1. the faster the mark disappears the quicker the rate of reaction
3. If the reactants are coloured and the products are colourless (or vice versa)
   1. You can time how long it takes for the solution to lose or gain its colour
4. The results are very subjective
   1. Different people might not agree over the exact point where the mark disappears or the solution changes colour
   2. You cannot plot a rate of reaction graph from the results

A close up of a sign

Description automatically generated**Change in mass:**

**Method:**

1. Measuring the speed of a reaction that produces a gas can be carried out using a mass balance
2. As the gas is released, the mass disappearing is measured on the balance
3. The quicker the reading on the balance drops, the faster the reaction
4. If the measurements are taken at regular intervals
   1. You can plot a rate of reaction graph and find the rate quite easily
5. The mass balance is very accurate
   1. But it has the disadvantage of releasing the gas straight into the room

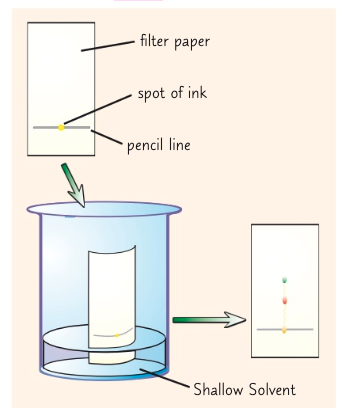
A drawing of a cartoon character

Description automatically generated**The volume of gas given off:**

**Method:**

1. This involves the use of a gas syringe to measure the volume of gas given
2. The more gas given off during a given time interval, the faster the reaction
3. Gas syringes usually give volumes accurate to the nearest cm3 
   1. Therefore, they’re very accurate
   2. You can take measurements at regular intervals and plot a rate of reaction graph
4. If the reaction is too vigorous you can easily blow the plunger out of the end of the syringe

**Practical 6 – Paper Chromatography:**

Paper Chromatography is used to separate a mixture

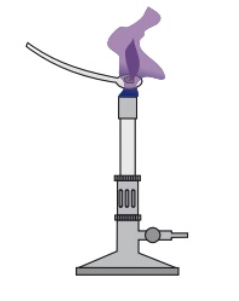
**Method:**

1. Draw a line in pencil near the bottom of a sheet of filter paper
2. Add a spot of ink to the line and place the sheet in a solvent
3. The solvent used will depend on what is being tested
   * + - 1. Some compounds dissolve well in water
         2. However sometimes another solvent is needed
4. Make sure the ink isn’t touching the solvent
5. Place a lid on top of the container to stop the solvent evaporating
6. The solvent seeps up the paper, carrying the ink with it
7. Each different dye in the ink will move up the paper at a different rate so the dyes will separate out
   * + - 1. Each dye will form a spot in a different place
8. If it is insoluble it will not move from the line
9. When the solvent has reached the top of the paper, take it out and leave it to dry
10. The end result is a pattern of spots called a chromatogram

**Practical 7 – Identifying Ions:**

**Flame Tests:**

Compounds of some metals burn with a characteristic colour. So, you can test for various metals by heating your substance and seeing whether it burns with a distinctive colour flame

**Method:**

1. Dip the loop of a clean platinum wire into the sample you want to test
2. Place it in the blue flame of a Bunsen burner
3. Record the colour of the flame

**Results:**

If a sample containing a mixture of ions is used, flame colours can be masked (hidden).

* + Lithium Ions, Li+
    - Burn with a crimson (red) flame
  + Sodium Ions, Na+
    - Burn with a yellow flame
  + Potassium ions, K+
    - Burn with a lilac flame
  + Calcium ions, Ca2+
    - Burn with an orange-red flame
  + Copper ions, Cu­2+
    - Burn with a green flame

**Metal Hydroxide Precipitates:**

Many metal hydroxides are insoluble and precipitate out of solution when formed. Some of these hydroxides have a characteristic colour

**Method:**

1. Add Sodium Hydroxide solution to a solution of your mystery compound
   1. In the hope of forming an insoluble hydroxide
2. If the insoluble hydroxide is coloured you can often tell which metal was in the compound

**Results:**

To distinguish between the three white ones: calcium, aluminium and magnesium

1. Add excess NaOH
   1. The solution which turns colourless is Aluminium
2. Then to distinguish between Calcium and Magnesium
   1. Do a flame test to check for calcium
3. Magnesium is the last one out of the three

|  |  |  |
| --- | --- | --- |
| ***Metal Ions*** | ***Colour of Precipitate*** | ***Ionic Equation for Precipitate Formation*** |
| Calcium, Ca2+ | White | Ca2+(aq) + 2OH- (aq)🡪 Ca(OH)2 (s) |
| Copper(II), Cu2+ | Blue | Cu2+(aq) + 2OH- (aq)🡪 Cu(OH)2 (s) |
| Iron(II), Fe2+ | Green | Fe2+(aq) + 2OH- (aq)🡪 Fe(OH)2 (s) |
| Iron(III), Fe3+ | Brown | Fe3+(aq) + 3OH- (aq)🡪 Fe(OH)3 (s) |
| Aluminium, Al3+ | White at first  Then dissolves in excess NaOH to become colourless | Al3+(aq) + 3OH- (aq)🡪 Al(OH)3 (s) |
| Magnesium, Mg2+ | White | Mg2+(aq) + 2OH- (aq)🡪 Mg(OH)2 (s) |

**Identifying non-metal ions:**

**Testing for Carbonate Ions**

**Method:**

1. Add dilute acid to sample
   1. The acid will react with the carbonate to make carbon dioxide gas
      1. You will observe fizzing
      2. However, this doesn’t mean you have carbon dioxide
2. Bubble the gas through limewater
   1. If the limewater goes cloudy
      1. This proves we have carbon dioxide and the carbonate ion is present

A close up of a sign

Description automatically generated**Testing for Halide Ions**

**Method:**

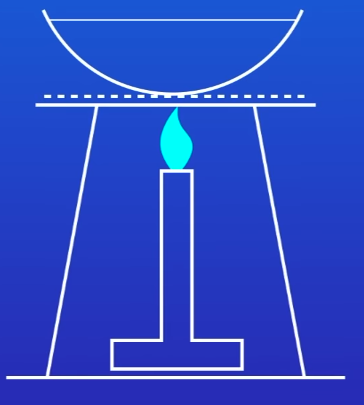
1. Add dilute nitric acid to the solution
2. Add dilute silver nitrate solution
3. Halide ions produce a precipitate of the silver halide
   1. Each halide makes a different coloured precipitate

**Results:**

* Chloride ions
  + White precipitate of silver chloride
* Bromide ions
  + Cream precipitate of silver bromide
* Iodide ions
  + Yellow precipitate of silver iodide

**Testing for Sulfate Ions**

**Method:**

1. Add dilute hydrochloric acid to the solution
2. Add barium chloride solution
3. If Sulfate ions are present
   1. We will see a white precipitate

**Practical 8 – Water:**

* Potable water:
  + Water that is safe to drink
  + Often contains dissolved solids
  + pH may not be 7
* Pure water:
  + Does not contain any dissolved solids
  + The pH is 7

In this practical, we are given a sample of water – We have to check if it is pure

**Check if water is pure**

**Method:**

* Check if it has a pH of 7
  1. Place a small amount of water onto a piece of universal indicator paper
  2. The paper is green if the pH is 7
     1. If the pH is not seven it means that the water is not pure
     2. If it is pH 7, it could still contain dissolved solids
* Test for dissolved solids
  1. First, use a balance to weigh an empty evaporating basin
  2. Record the mass
  3. Fill the basin with our water sample
     1. Place it on a tripod and gauze
  4. Using a Bunsen burner, heat the water until it has all evaporated
  5. Allow the evaporating basin to cool and weigh it again
  6. A close up of a sign

     Description automatically generatedIf the mass of the evaporating basin increased
     1. The water contained dissolved solids
     2. It was not pure
  7. If the mass of the evaporating basin isn’t changed
     1. The water is pure

**Distillation**

**Method:**

1. Set up the apparatus on the right
2. Boil the water gently and it will evaporate and form water vapour
3. This will travel along the delivery tube
4. When the water vapour enters the cold test tube
   1. It condenses back into liquid water
5. This is distilled (pure) water