**C4 Chemical Changes Pack for Year 10 - Acids and Alkalis**

**Facts**

**Reactions of acids:**

* Acid + metal 🡪 salt + hydrogen (sulphuric acid + magnesium 🡪 magnesium sulphate + hydrogen)
* Acid + alkali/base 🡪 salt + water (nitric acid + copper oxide 🡪 copper nitrate + water)
* Acid +metal carbonate 🡪 salt +water +carbon dioxide
* The salt produced depends on the acid used and the positive ions in the base, alkali or carbonate
* Acid + metal oxide/hydroxide/carbonate 🡪 soluble salt. The solid is added to the acid until it doesn’t react any more. The excess solid is filtered to leave a solution of the salt.



* An alkali is a soluble base
* A neutralisation reaction occurs when an acid is reacted with an alkali (e.g. soluble metal hydroxides)/ base (e.g. insoluble metal hydroxides and oxides)
* Neutralisation reaction: H+ (aq) +OH- (aq) 🡪H2O (l)
* Salt solutions can be crystallised by evaporation to produce solid salts.
* Acids dissociate to form hydrogen ions (H+) in aqueous solutions.
* Aqueous solutions of alkalis contain hydroxide ions (OH-)
* The pH scale is a measure of how acidic or alkaline a solution is. A solution with pH below 7 is acidic and a pH above 7 is alkaline.
* The pH of the solution can be measured using universal indicator paper or a pH probe.
* A strong acid (e.g. hydrochloric, nitric and sulphuric) is completely ionised in aqueous solution.
* A weak acid (e.g. ethanoic, citric and carbonic) is only partially ionised in aqueous solution.
* As the pH decreases by 1 unit, the hydrogen ion concentration of the solution increases by a factor of 10.

**Task 1: Watch Free Science lessons (if you can) and do a mind map of the information**

**GCSE Science Chemistry (9-1) Acids and Alkalis**

**GCSE Science Chemistry (9-1) Acids reacting with Metals**

**GCSE Science Chemistry (9-1) Acids reacting with Metals 2**

**GCSE Science Chemistry (9-1) Three reactions of Acids**

**GCSE Science Chemistry (9-1) Required practical 1: Making Soluble Salts**

**GCSE Science Chemistry (9-1) Strong and Weak Acids**

**GCSE Science Chemistry (9-1 Triple) Required practical 2: Carrying out a Titration**

**GCSE Science Chemistry (9-1 Triple) Titration calculations 1**

**GCSE Science Chemistry (9-1 Triple) Titration calculations 2**

**Task 2: Test yourself! Answer these quick fire questions.**

1. What ion is responsible for acidity?
2. What ion is responsible for alkalinity?
3. Is pH 1 acid, alkali or neutral?
4. Is pH 7 acid, alkali or neutral?
5. Is pH 14 acid, alkali or neutral?
6. Write down the neutralisation equation.
7. Give an example of a strong acid.
8. Give an example of a weak acid.
9. What is a concentrated acid?
10. What is a dilute acid?

**Task 3: Complete the table below. The first one has been done for you.**

|  |  |  |  |
| --- | --- | --- | --- |
| Formula of salt | Name of salt | Original metal | Original acid |
| NaCl | Sodium chloride | Sodium | Hydrochloric acid |
| LiCl |  |  |  |
| CaSO4 |  |  |  |
| MgSO4 |  |  |  |
| KNO3 |  |  |  |

**Task 4: Write a word equation for the reactions between:**

* + Aluminium and hydrochloric acid
	+ Magnesium and hydrochloric acid
	+ Calcium and nitric acid
	+ Beryllium and sulphuric acid
	+ Iron and sulphuric acid

**Task 5: Write a word equation for a reaction which forms:**

* + Aluminium sulphate
	+ Calcium chloride
	+ Barium nitrate
	+ Rubidium chloride

Challenge: write symbol equations for every reaction in Q1 and Q2

**Task 6: Complete these short answer questions.**

1. Sulphuric acid is a strong acid. Explain what this means.
2. Which ions does sulphuric acid split up into?
3. 2g of sulphuric acid is dissolved in water, and the pH is found to be 2. What mass of acid would be required for a pH of 1?
4. Complete the table below, using the words “high,” “medium” or “low” to represent pH. The first one has been done for you.

|  |  |  |
| --- | --- | --- |
|  | Concentrated | Dilute |
| Strong acid | *Low*  |  |
| Weak acid |  |  |

1. Write a word equation for the reaction between sulphuric acid and sodium hydroxide
2. Write a symbol equation for this reaction
3. Write an ionic equation for this reaction
4. 10g of acid is dissolved in water, followed by another 10g. What happens to the pH?
5. In terms of the number of H+ ions in solution, explain why a strong acid has a lower pH than a weak acid.

**Task 7: For each of the reactions below, write:**

* 1. A word equation
	2. A balanced symbol equation (assume that all hydroxides are dissolved in water)
	3. An ionic equation

Potassium hydroxide and hydrochloric acid

Magnesium hydroxide and hydrochloric acid

Sodium hydroxide and nitric acid

Sodium hydroxide and sulphuric acid

Iron (III) hydroxide and sulphuric acid

**Task 8: Answer this examination question.**

