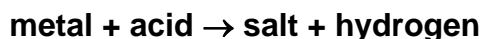


Word equations – information sheet

Word equations are the shorthand used by scientists to describe chemical reactions. There are many possible chemical reactions BUT you are not expected to know about all of them. Luckily many reactions are of similar types. You MUST memorise these five!

1. metal + acid

When a (reactive) metal reacts with an acid, the reaction produces a salt, and hydrogen gas is released. The salt produced depends upon the metal and the acid. If zinc reacts with sulfuric acid, then the salt produced is zinc sulfate.



2. metal carbonate + acid

Metal carbonates also react with acid to give a salt and water and carbon dioxide gas is given off. The salt produced depends upon which acid and which metal carbonate react. If calcium carbonate reacts with hydrochloric acid, the salt is calcium chloride.



3. acid + base / alkali (an alkali is a base that dissolves in water)

When a base & an acid react, the product is a salt and water. The particular salt produced depends upon which acid and which base reacted. When hydrochloric acid reacts with sodium hydroxide, the salt produced is sodium chloride (yes, this really is what we know as "salt").



4. metals + air

Metals react with oxygen in the air to form oxides. For example, when sodium reacts with oxygen the compound is called sodium oxide. Reactive metals burn (eg Na burns to form sodium oxide) while less reactive metals form an oxide layer (eg Cu reacts to form a layer of copper oxide on the metal).



5. metals + water

The alkali metals in group 1 and the alkaline metals of group 2 are so called because, when they react with water, they form alkalis (soluble bases) and hydrogen. Eg When sodium reacts with water, it forms sodium hydroxide and hydrogen. Other reactive metals may also react with hot water.



These examples show the patterns that are found in FIVE important types of reaction. If you learn the patterns, you should find it easy to work out how to complete word equations. If you know these patterns you can then attempt symbol equations if you are asked to write them.

Sulfuric acid makes salts called sulfates.
Hydrochloric acid makes salts called chlorides.
Learn this!!



If you are asked to write a word equation don't include symbols like CO₂ because you are too lazy to write "carbon dioxide" OR are trying to be smart / show off! They will be marked wrong!

Word equations - TEST YOURSELF

Fill in the gaps with the products formed.

Task 1

REACTANT →	oxygen	hydrochloric acid	sulfuric acid
REACTANT ↓			
magnesium	magnesium oxide		
aluminium*		aluminium chloride + hydrogen	
iron			iron sulfate + hydrogen
copper		<i>No reaction – Cu is too unreactive to react with dilute acids</i>	

- reacts slowly at first because of the aluminium oxide layer that forms on aluminium.

Task 2

REACTANT →	hydrochloric acid	sulfuric acid
REACTANT ↓		
zinc	zinc chloride + hydrogen	
sodium hydroxide		sodium sulfate + water
calcium carbonate	calcium chloride + water + carbon dioxide	

Task 3

REACTANT →	water
REACTANT ↓	
lithium	lithium hydroxide + hydrogen
sodium	
calcium	

Word equations - ANSWERS

Task 1

REACTANT → REACTANT ↓	oxygen	hydrochloric acid	sulfuric acid
magnesium	<i>magnesium oxide</i>	<i>magnesium chloride + hydrogen</i>	<i>magnesium sulfate + hydrogen</i>
aluminium*	<i>aluminium oxide</i>	<i>aluminium chloride + hydrogen</i>	<i>aluminium sulfate + hydrogen</i>
iron	<i>iron oxide</i>	<i>iron chloride + hydrogen</i>	<i>iron sulfate + hydrogen</i>
copper	<i>copper oxide</i>	<i>No reaction – Cu is too unreactive to react with dilute acids</i>	

*Reacts slowly at first because of the aluminium oxide layer that will have formed on the aluminium. Once this has all reacted the reaction between acid & metal will be quite vigorous.

Task 2

REACTANT → REACTANT ↓	hydrochloric acid	sulfuric acid
zinc	<i>zinc chloride + hydrogen</i>	<i>zinc sulfate + hydrogen</i>
sodium hydroxide	<i>sodium chloride + water</i>	<i>sodium sulfate + water</i>
calcium carbonate	<i>calcium chloride + water + carbon dioxide</i>	<i>calcium sulfate* + water + carbon dioxide</i>

*This reaction starts but soon stops due to the formation of an insoluble layer of calcium sulfate on the calcium carbonate particles. This stops the acid reaching and reacting with the unreacted calcium carbonate.

Task 3

REACTANT → REACTANT ↓	water
lithium	<i>lithium hydroxide + hydrogen</i>
sodium	<i>sodium hydroxide + hydrogen</i>
calcium	<i>calcium hydroxide + hydrogen</i>

Word equations - Completing word equations

1. Hydrochloric acid + sodium hydroxide → _____ + water
 2. Sodium + _____ → sodium oxide
 3. Hydrochloric acid + _____ → calcium chloride + water + carbon dioxide
 4. Potassium + water → _____ + _____
 5. Zinc + hydrochloric acid → _____ + hydrogen
 6. _____ + sodium hydroxide → sodium chloride + water
 7. Sulfuric acid + _____ → magnesium sulfate + water + carbon dioxide
 8. Potassium + oxygen → _____
 9. _____ + hydrochloric acid → zinc chloride + hydrogen
 10. Sodium + water → _____ + hydrogen
-

Word equations - Completing word equations - ANSWERS

1. sodium chloride
2. oxygen
3. calcium carbonate
4. potassium hydroxide + hydrogen
5. zinc chloride
6. hydrochloric acid
7. magnesium carbonate
8. potassium oxide
9. zinc
10. sodium hydroxide



LEARN THESE!!!

metal + acid → salt + hydrogen	metal + oxygen → metal oxide
acid + base → salt + water	metal + water → metal hydroxide + hydrogen
metal carbonate + acid → salt + carbon dioxide + water	