

PRACTICAL MAKING SOLUBLE SALTS!

SAFETY
Wear goggles.

Warm
gently

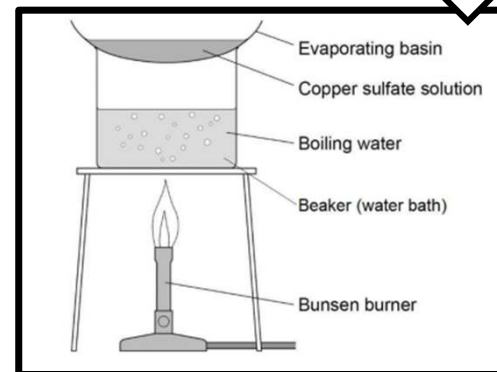
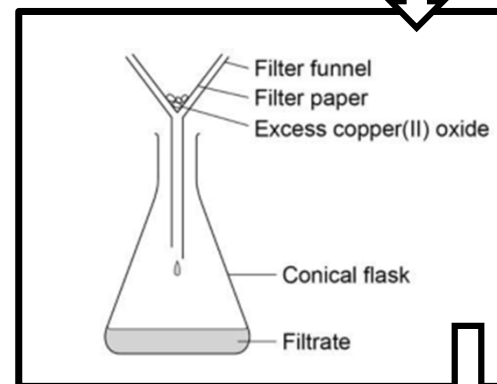
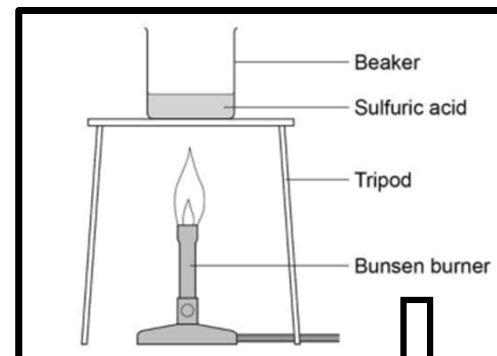
Soluble salts can be made by reacting an with a metal or an base (metal oxide, metal hydroxide or metal carbonate). When making a salt it is important that the appropriate reagents are chosen. You can do this by working out what reagents you need by knowing the name of the you want to produce.

Here's how its done.

This example involves making copper sulfate (CuSO_4).

1. Add insoluble copper oxide (CuO) to sulfuric acid (H_2SO_4) and stir. Warm gently on a and gauze.
2. The solution will turn blue as the reaction occurs. Showing that copper sulfate is being formed.
3. On of the reaction, off the solution to remove the excess copper oxide.
4. the water so that crystals of copper sulfate form. Stop heating when the first start to appear.
5. Leave for the rest of the water to evaporate off slowly to give larger crystals. Any small excess of on the crystals can be removed by dabbing between filter papers.
6. Leave to .

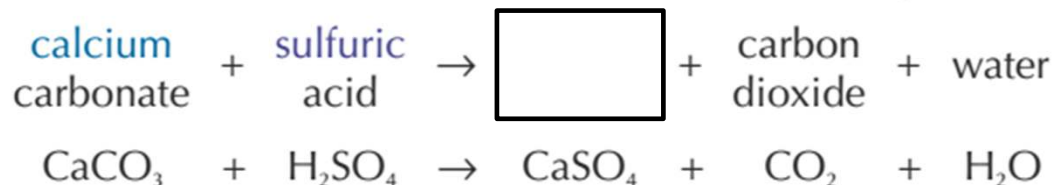
excess
acid
solution
filter
completion
salt
crystals
tripod
dry
insoluble
evaporate
soluble



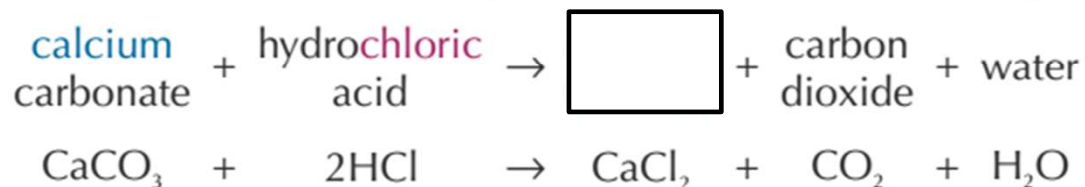


DISPLACEMENT NAME THAT SALT!

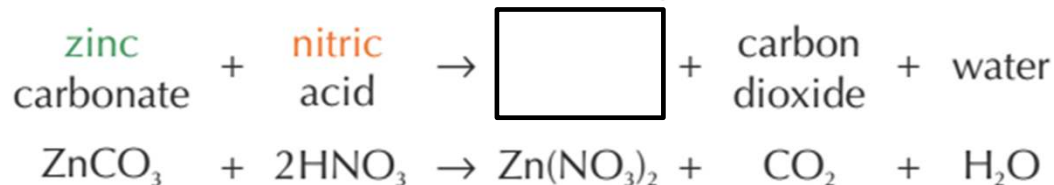
If calcium carbonate reacts with sulfuric acid, a sulfate is produced.



If calcium carbonate reacts with hydrochloric acid, a chloride is produced.

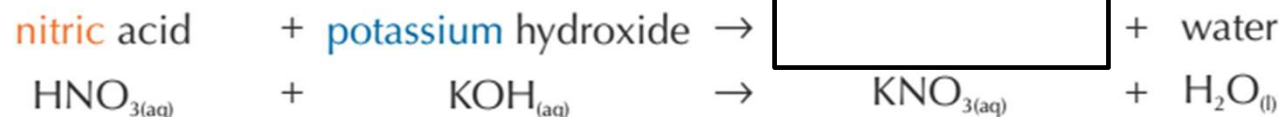
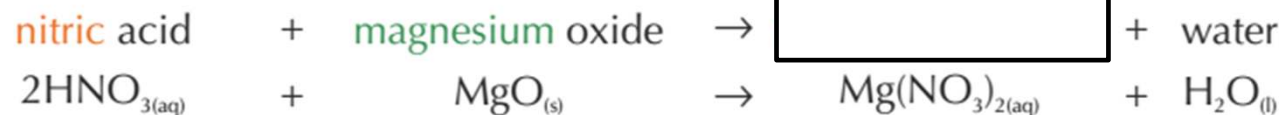
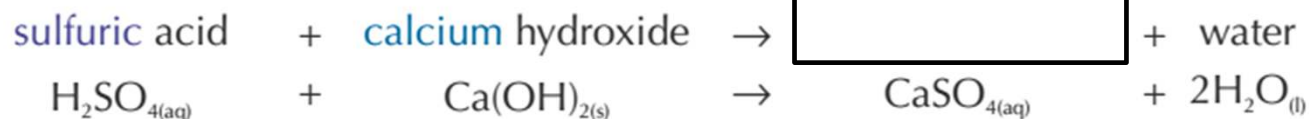


When zinc carbonate reacts with nitric acid, zinc nitrate is formed.





DISPLACEMENT NAME THAT SALT!



There is lot going on with this topic, so a big quiz is the way to do it!

REACTIVITY SERIES (you need to learn it)!

We usually extract metals from ores (rocks).

Metals in ores are chemically bonded to other elements and lots of them have been oxidised (gained oxygen). How do we extract some metals from their oxides?

By reduction with carbon or by

How do we know which one to use?

We can look at the

REACTIONS WITH WATER

What is the general word equation for reacting a metal with water?

metal + water \rightarrow metal hydroxide +

What is the general word equation for reacting a metal oxide with water?

metal oxide + water \rightarrow + hydrogen

REACTIONS OF ACIDS

What is the general word equation for reacting a metal carbonate with an acid?

metal carbonate + acid \rightarrow + water + carbon dioxide

What is the general word equation for reacting a metal oxide with an acid?

metal oxide + acid \rightarrow salt +

What is the general word equation for reacting a metal hydroxide with an acid?

metal hydroxide + acid \rightarrow salt +

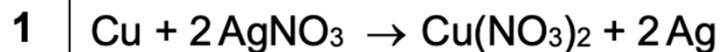
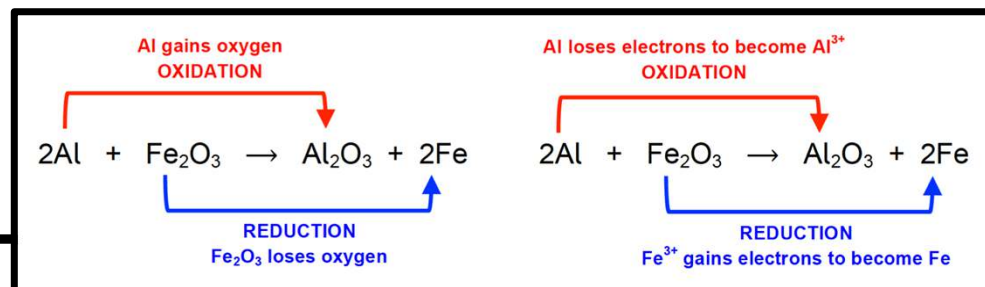
What is the general word equation for reacting a metal with an acid?

metal + acid \rightarrow salt +

Reactivity series		Extraction method
Metal	Reactivity	
potassium	high reactivity	electrolysis
sodium		
lithium		
calcium		
magnesium		
aluminium (carbon)		
zinc	low reactivity	reduction with carbon
iron		
tin		
lead (hydrogen)		
copper		
silver	low reactivity	mined from the Earth's crust
gold		



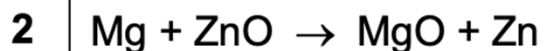
REDOX



half equation

half equation

ionic equation



half equation

half equation

ionic equation

Anything above carbon is extracted using electrolysis because they are more reactive than carbon.

Anything below carbon can be extracted using carbon as they are less reactive. This is called reduction.

Remember! Hydrogen is not a metal.

Potassium	K	<div style="display: flex; align-items: center;"> <div style="flex: 1; border-left: 2px solid black; margin: 0 10px;"></div> <div style="flex: 1; text-align: center;"> <div style="color: blue; font-size: 2em;">↑</div> <div style="color: blue; font-size: 0.8em;">more reactive</div> <div style="color: blue; font-size: 2em;">↓</div> <div style="color: blue; font-size: 0.8em;">less reactive</div> </div> </div>
Sodium	Na	
Lithium	Li	
Calcium	Ca	
Magnesium	Mg	
CARBON	C	
Zinc	Zn	
Iron	Fe	
HYDROGEN	H	
Copper	Cu	



STRONG AND WEAK ACIDS BLANKETY BLANK

The of an acid depends on how many H^+ (hydrogen ions) dissociate (ionise) in solution.

STRONG ACIDS

Strong acids completely (dissociate) in solution. This means that a strong acid like HCl will ionise fully into H^+ and Cl^- ions.

WEAK ACIDS

Weak acids ionise in solution and some of the H^+ ions will be released. acids are weak acids as well as citric acid and carbonic acids.

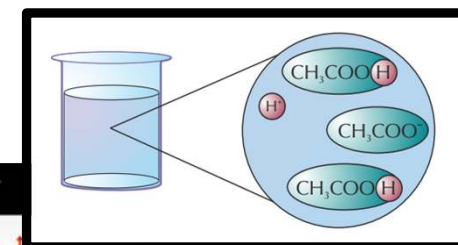
When weak acids ionise, it is a (\rightleftharpoons) reaction. This sets up an equilibrium between the dissociated and acid. Only a few H^+ ions are in weak acids.

THE EFFECT OF ACID STRENGTH ON pH

pH is a measure of the of H^+ ions in solution. The lower the pH, the higher the concentration of H^+ ions and the more acidic the is. For every decrease of 1 on the pH scale, the concentration of H^+ ions increases by a factor of 10.

released
partially
concentration
undissociated
reversible

strength
ionise
solution
carboxylic



The atmosphere on Venus contains droplets of sulfuric acid solution.

Suggest a pH value for sulfuric acid solution.

pH =
(1 mark)

Name the ion which makes sulfuric acid solution acidic.

.....
(1 mark)



Solutions of ethanoic acid and hydrochloric acid with the same concentration have different pH values.

Explain why the solution of ethanoic acid has a higher pH than the solution of hydrochloric acid.

[2 marks]

.....

.....

.....

.....

A student wants to compare the reactivity of an unknown metal, **Q**, with that of zinc.

The student is provided with:

- silver nitrate solution
- metal **Q** powder
- zinc powder
- a thermometer
- normal laboratory equipment.

No other chemicals are available.

Describe a method the student could use to compare the reactivity of metal **Q** with that of zinc.

Your method should give valid results.

[4 marks]

[illegible]

8



 **Multiple Choice Quiz: Acids, pH & Reactions**

1. What determines the strength of an acid?

- ☐ A. Temperature of the solution
 - ☐ B. Amount of water added
 - ☐ C. Number of hydroxide ions released
 - ☐ D. Number of H^+ ions that dissociate in solution
-

2. Which of the following is a strong acid?

- ☐ A. Ethanoic acid
 - ☐ B. Carbonic acid
 - ☐ C. Hydrochloric acid (HCl)
 - ☐ D. Citric acid
-

3. What happens when a weak acid ionises in water?

- ☐ A. Sets up a reversible reaction with partial ionisation
 - ☐ B. Forms a neutral solution
 - ☐ C. Releases no H^+ ions
 - ☐ D. Completely dissociates into ions
-

4. What is the effect of acid strength on pH?

- ☐ A. Stronger acids have lower pH values
 - ☐ B. Acid strength does not affect pH
 - ☐ C. Stronger acids have higher pH values
 - ☐ D. Weak acids always have a pH of 7
-

5. By what factor does H^+ ion concentration increase when pH decreases by 1?

- ☐ A. 10
- ☐ B. 2
- ☐ C. 5
- ☐ D. 100

6. Which method is used to extract metals that are less reactive than carbon?

- ☐ A. Electrolysis
 - ☐ B. Distillation
 - ☐ C. Reduction with carbon
 - ☐ D. Filtration
-

7. What is the general word equation for reacting a metal with water?

- ☐ A. Metal + water → metal hydroxide + hydrogen
 - ☐ B. Metal + water → metal carbonate + hydrogen
 - ☐ C. Metal + water → metal oxide + hydrogen
 - ☐ D. Metal + water → salt + water
-

8. What is the general word equation for reacting a metal oxide with water?

- ☐ A. Metal oxide + water → metal hydroxide
 - ☐ B. Metal oxide + water → salt + water
 - ☐ C. Metal oxide + water → metal hydroxide + hydrogen
 - ☐ D. Metal oxide + water → metal carbonate + hydrogen
-

9. What is the general word equation for reacting a metal carbonate with an acid?

- ☐ A. Metal carbonate + acid → metal hydroxide + water
 - ☐ B. Metal carbonate + acid → salt + hydrogen
 - ☐ C. Metal carbonate + acid → salt + oxygen
 - ☐ D. Metal carbonate + acid → salt + water + carbon dioxide
-

10. What is the correct word equation for reacting a metal oxide with an acid?

- ☐ A. Metal oxide + acid → salt + carbon dioxide
 - ☐ B. Metal oxide + acid → salt + hydrogen
 - ☐ C. Metal oxide + acid → metal hydroxide + water
 - ☐ D. Metal oxide + acid → salt + water
-

11. What is the correct word equation for reacting a metal hydroxide with an acid?

- ☐ A. Metal hydroxide + acid → metal oxide + water
 - ☐ B. Metal hydroxide + acid → salt + hydrogen
 - ☐ C. Metal hydroxide + acid → salt + carbon dioxide
 - ☐ D. Metal hydroxide + acid → salt + water
-

12. What is the correct word equation for reacting a metal with an acid?

- ☐ A. Metal + acid → salt + carbon dioxide
 - ☐ B. Metal + acid → salt + water
 - ☐ C. Metal + acid → metal hydroxide + hydrogen
 - ☐ D. Metal + acid → salt + hydrogen
-

13. Which combination is used to make copper sulfate?

- ☐ A. Copper oxide and sulfuric acid
 - ☐ B. Copper and hydrochloric acid
 - ☐ C. Copper carbonate and nitric acid
 - ☐ D. Copper hydroxide and ethanoic acid
-

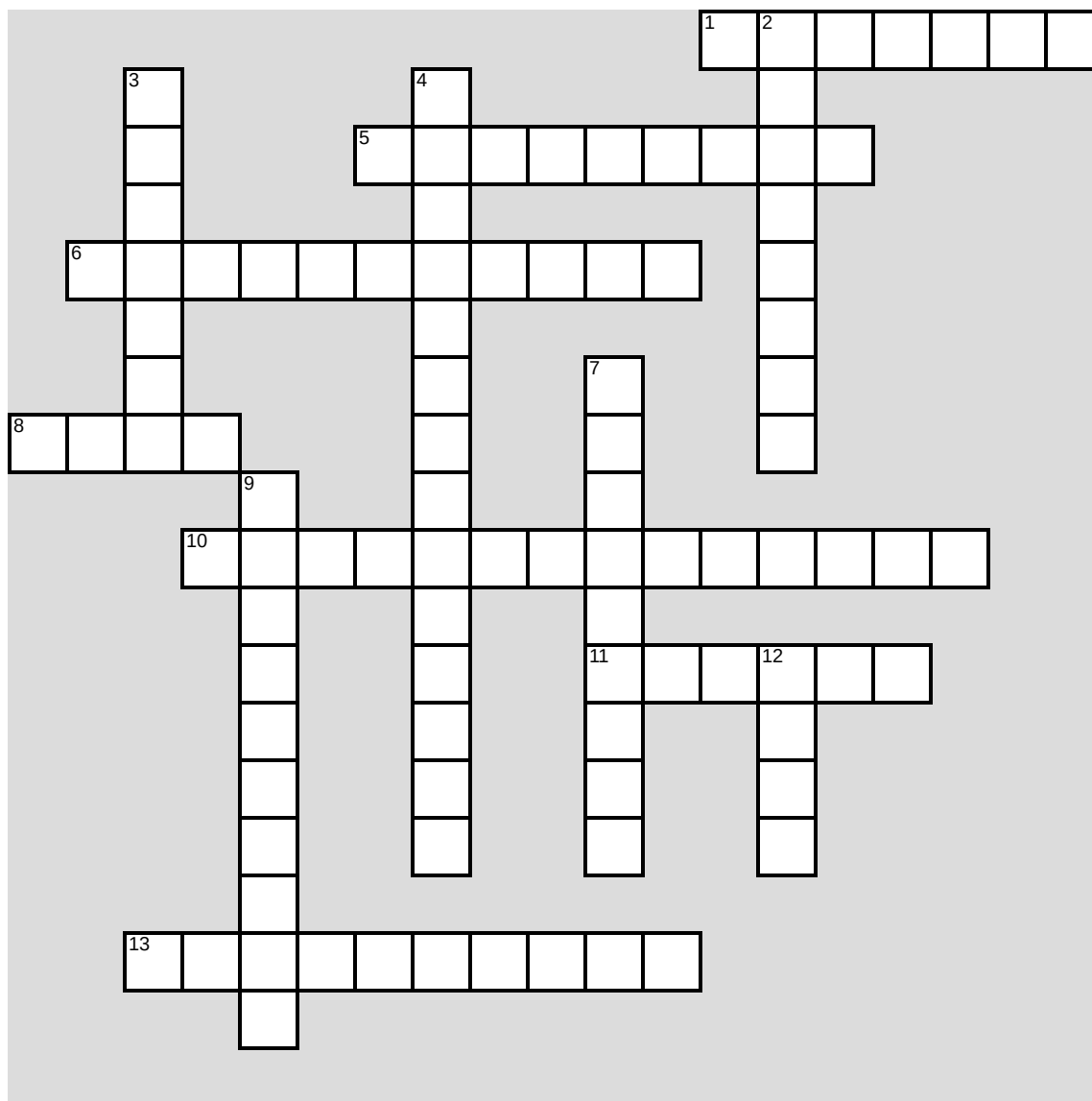
14. What colour does universal indicator turn in an alkaline solution?

- ☐ A. Red
 - ☐ B. Yellow
 - ☐ C. Purple
 - ☐ D. Green
-

15. Why do weak acids have higher pH values than strong acids?

- ☐ A. They release more H⁺ ions
 - ☐ B. They release fewer H⁺ ions
 - ☐ C. They contain more water
 - ☐ D. They are more concentrated
-

CHEMICAL CHANGES 1



Across

- 1** An accurate method of measuring pH (two words).
- 5** These substances partially ionise in solution (two words).
- 6** These substance completely ionise in solution (two words).
- 8** You get water and this product when you react an acid with an alkali.
- 10** The type of reaction that happens when you mix and alkali with an acid.
- 11** A substance that forms a pH of more than 7.
- 13** You get this when you react a metal with oxygen (two words).

Down

- 2** You get this gas when you react a metal with an acid.
- 3** A solution with a pH of 7 and turns green with indicator.
- 4** You get this substance when you react a metal with water (two words).
- 7** Used to measure pH and will give a change in colour.
- 9** The series of how reactive a metal is.
- 12** A substance that forms a solution with a pH of less than 7.