

-Spacing between particles:

Far apart.

-Arrangement of particles:

Irregular.

-Movement of particles:

Move freely and constantly collide with each other.

-Forces between particles:

Non-existent.

2) For each change of state answer the questions (5):

Solid to liquid (2):

a) How do you bring about the change?

Heat the solid until it melts.

b) Why does the change occur? (3)

The particles gain kinetic energy and vibrate faster. This allows the particles to overcome the forces of attraction that hold them together in the solid. The regular pattern is broken down and the particles can now slide past one another.

Liquid to solid (2):

a) How do you bring about the change?

Cool the liquid until it freezes.

b) Why does the change occur? (3)

The particles lose kinetic energy and vibrate slower. This allows the forces of attraction between the particles to hold them together. The particles arrange themselves into a regular pattern and are no longer able to slide past one another.

Liquid to gas (2):

a) How do you bring about the change?

Heat the liquid until it boils.

b) Why does the change occur? (2)

The particles gain kinetic energy and move further apart. Eventually the forces of attraction between the particles are completely broken and they are able to escape from the liquid.

Gas to liquid (2):

a) How do you bring about the change?

Cool the gas until it condenses.

b) Why does the change occur? (2)

The particles lose kinetic energy and this allows the forces of attraction to move them closer together. The particles eventually clump together to form a liquid.

Solid to gas (2):

a) How do you bring about the change?

The number of protons and neutrons in total in the nucleus of an atom of an element.

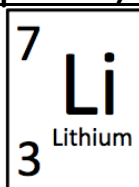
10) What is the larger number on the periodic table?

Mass number.

11) What is the smaller number on the periodic table?

Atomic number.

13) What is the mass, the atomic number, and the number of protons, electrons and neutrons of the following element?



a) Mass number:

7 (the bigger number).

b) Atomic number:

3 (the smaller number).

c) Number of protons:

3 (the smaller number).

d) Number of electrons:

3 (the smaller number).

e) Number of neutrons:

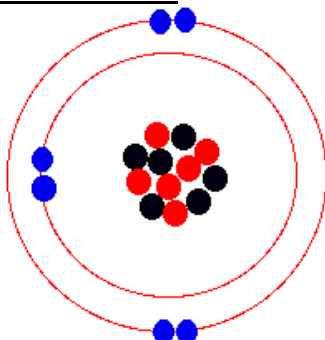
4 (the bigger number minus the smaller number).

14) What are isotopes?

Atoms that have the same atomic number but a different mass number. This is because they contain the same number of protons but a different number of neutrons.

15) Name an isotope of the following element and describe it as shown:

Carbon-12:



-6 protons.

-6 electrons.

-6 neutrons.

	C	H
Grams	12	4
Mass number	12	1
Grams	$\frac{12}{12}$	$\frac{4}{1}$
Mass number	$\frac{12}{12}$	$\frac{4}{1}$
	1	4
	$\frac{1}{1}$	$\frac{4}{1}$
	1	4

Chemical formula= CH₄.

Chapter 5: Chemical Formulae and Equations

1) Balance the following chemical equations and write the word equations of each:



Aluminium + Copper (II) Oxide $\rightarrow$ Aluminium Oxide + Copper.



Magnesium Oxide + Nitric Acid $\rightarrow$ Magnesium Nitrate + Water.

2) What are the state symbols for the following (3):

a) Solid:

(s).

b) Liquid:

(l).

c) Gas:

(g).

d) Aqueous:

(aq).

3) Add state symbols to the following equation:



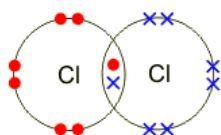
4) What is meant by molecular formula and what is it for butane?

This gives the actual number of each type of atom present in a compound. The molecular formula of butane is C₄H₁₀.

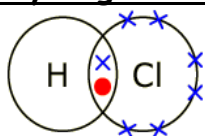
5) What is meant by empirical formula and what is it for butane?

This gives the simplest ratio of atoms in a compound. The empirical formula of butane is C₂H₅.

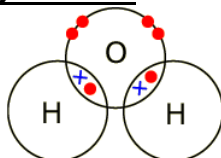
6) A substance contains 92.31% carbon and 7.69% hydrogen. It has r.f.m. of 78. Find the Empirical formula and the molecular formula.



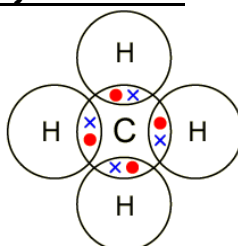
c) Hydrogen chloride:



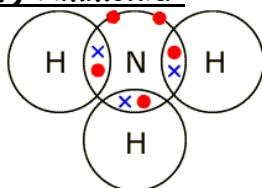
d) Water:



e) Methane:



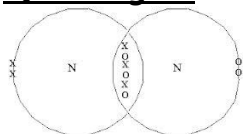
f) Ammonia:



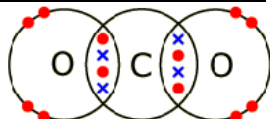
g) Oxygen:



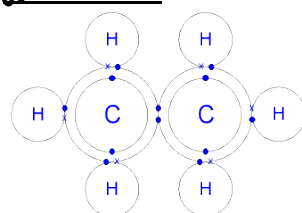
h) Nitrogen:



i) Carbon Dioxide:



j) Ethane:



k) Ethene:

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- Hissing sound.
- Bubbles of gas.
- Gets smaller and smaller, eventually disappears.

5) What are the observations when you add sodium to water? (5)

- Moves around the surface of the water.
- Hissing sound.
- Bubbles of gas.
- Melts into a shiny ball.
- Gets smaller and smaller, eventually disappears.

6) What are the observations when you add potassium to water? (5)

- Moves around the surface of the water.
- Hissing sound.
- Bubbles of gas.
- Melts into a shiny ball.
- Burns with a lilac coloured flame.
- Gets smaller and smaller, eventually disappears.

7) What is the order of reactivity of the three elements from least to most reactive?

Lithium, then sodium and then potassium.

Chapter 12: The Group 7 Elements- Chlorine, Bromine and Iodine

1) What are the physical states at room temperature and the colours of the following elements?

a) Chlorine:

- Gas at room temperature.
- Pale green gas.

b) Bromine:

- Liquid at room temperature.
- Red-brown liquid.
- Evaporates to form a brown gas.

c) Iodine:

- Solid at room temperature.
- Black solid.
- Sublimes when heated, to form a purple gas.

2) Do chlorine, bromine and iodine react in similar ways with iron?

Yes.

3) What happens when they react with iron?

The hot iron wool glows brightly, brown smoke forms and a brown solid is left behind.

4) What is the substance called when they react with iron?

Marble chips because they are very easy to handle and the reaction is not too fast, so the carbon dioxide is produced at a rate that makes it easy to collect.

19) What two ways can the carbon dioxide be collected and why?

-Over water, because it is not very soluble in water so very little carbon dioxide will be lost.

-It can be collected by downward delivery in air, as it is more dense than air.

20) How is carbon dioxide also produced?

When most metal carbonates are heated.

21) What is the breakdown by heating called?

Thermal decomposition.

22) Name 4 metal carbonates which can be thermally decomposed to make carbon dioxide.

Copper(II) carbonate, magnesium carbonate, calcium carbonate and zinc carbonate.

23) For each metal carbonate give the observations and the chemical equation for the reaction:

a) Copper (II) carbonate:

-Goes from green to black.



b) Magnesium carbonate:

-Stays white.



c) Calcium carbonate:

-Stays white.



d) Zinc carbonate:

-White to yellow when hot and white again when cold.



24) Name two properties of carbon dioxide and the uses that go with it. (2)

-Although carbon dioxide is not very soluble in water at normal atmospheric pressure, it becomes much more soluble when put under pressure. Use of this is made to make "fizzy" (carbonated) drinks such as coca-cola.

-Carbon dioxide does not support combustion and is denser than air, so it "sits" on top of a burning fuel and prevents oxygen from getting in. Therefore it is used in fire extinguishers.

25) How does acid rain form? (4)

a) Litmus:

- When pH is 5 or less litmus turns red.
- When pH is between 5 and 8 litmus turns purple.
- When pH is 8 or more litmus turns blue.

b) Methyl orange:

- When pH is 3 or less methyl orange turns red.
- When pH is between 3 and 5 methyl orange turns orange.
- When pH is 5 or more methyl orange turns yellow.

c) Phenolphthalein:

- When pH is between 0 and 10 phenolphthalein is colourless.
- When pH is 10 or more phenolphthalein is red.

7) What is the use of the universal indicator?

To measure the approximate pH value of a substance.

8) Describe colours in universal indicator.

When a substance is neutral it goes green. When it is a weak acid it goes yellow/orange and when it is a strong acid it goes orange/red. When it is a weak alkali it goes blue/indigo and when it is a strong alkali it goes indigo/violet.

9) In what two forms is universal indicator?

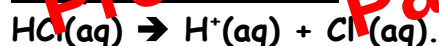
One in solution in ethanol and the other is paper that has been soaked in the indicator solution and dried. This is called pH paper.

10) What is an acid?

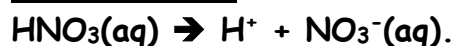
A substance that dissolves in water to produce hydrogen ions (H^+).

11) What is the ionisation reaction in water of the following acids:

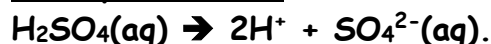
a) Hydrochloric acid:



b) Nitric acid:



c) Sulphuric acid:



12) What ways can you replace the hydrogen ions in an acid by a metal ion? (3)

You can react them with a metal, a base (metal oxide or metal hydroxide) and a metal carbonate.

13) Which metals will react directly with dilute acids?

Those above hydrogen.

14) When acids react with metals what do they form?

A salt and hydrogen.

15) When acids react with bases (metal hydroxides or oxides) what do they form?

A salt and water.

faster the rate of reaction is. Decreasing the concentration will have the opposite effect.

3) How does the surface area affect rate of reaction? (4)

The smaller the pieces of solid, the larger the surface area will be. This means that there will be more particles exposed, increasing the amount of collisions. The more collisions there are in a certain amount of time, the faster the rate of reaction is. Increasing the size of pieces of solid will have an opposite effect.

4) How does the temperature at which the reaction takes place affect the rate of reaction? (4)

Increasing the temperature increases the energy the particles have (kinetic energy). This means that they move more and therefore collide more with each other. The more collisions there are in a certain amount of time, the faster the rate of reaction is.

Decreasing the temperature will have the opposite effect.

5) What is a catalyst?

A substance that increases rate of reaction but stays unchanged.

6) How does adding a catalyst affect rate of reaction? (3)

The catalyst acts as a surface to which one type of the particles stick on to, so then the others have it easier to collide. The more collisions there are in a certain amount of time, the faster the rate of reaction is. It provides an alternative pathway with lower activation energy.

7) How can you recognize a catalyst? (5)

- Do the reaction.
- Weigh the catalyst.
- Do the reaction again, this time with the catalyst.
- If it speeds up the reaction filter it and then weigh it.
- If it hasn't changed colour or weight it is a catalyst.

Chapter 24: Equilibria

1) What are reversible reactions?

A reaction that can go in both a forward and a backward direction.

2) What is the symbol for an arrow that shows that the reaction is reversible?

$\rightleftharpoons$.

3) What are the observations when copper(II) sulphate is heated?

The blue crystals turn into a white powder and a clear, colourless liquid (water) collects at the top of the test tube.

4) What is the white powder?

Anhydrous copper(II) sulphate.

18) Name 4 things that ammonia is used for:

- To make nitric acid (HNO_3).
- To make nylon (for example parachutes).
- To make explosives.
- To make fertiliser.

Section F: Assessing Investigative/Experimental Skills

1) Name the following instruments:



Thermometer



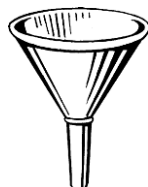
Stop watch



Glass pipette



Measuring cylinder



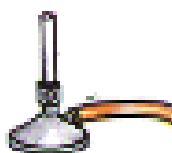
Funnel



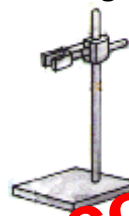
Gas syringe



Beaker



Bunsen



Clamp and Stand



Crucible



Dropper



Evaporating dish



Flat flask



Safety glasses



Test tube holder

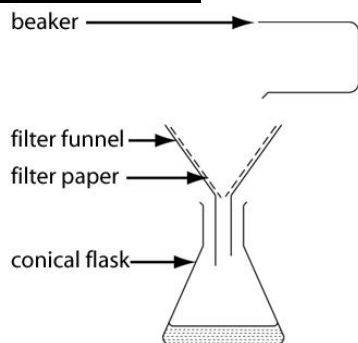


Conical flask

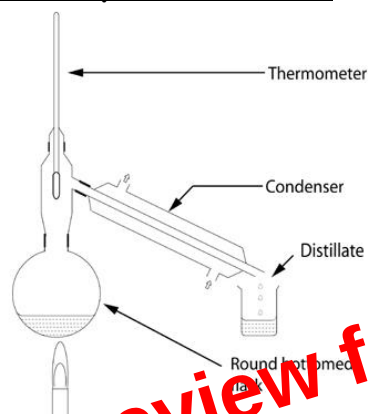
Mixtures contain more than one substance. They are just mixed together and not chemically combined. Elements have only one type of atom. Compounds are two or more elements which are chemically combined together.

39) Draw a diagram for the following processes:

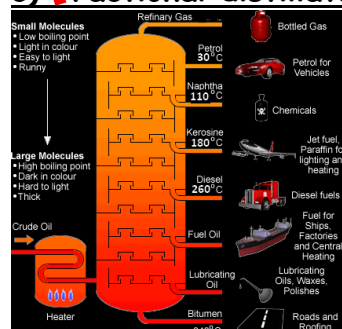
a) Filtration:



b) Simple distillation:



c) Fractional distillation:



d) Crystallisation:

