

Name:
Science Class:
Teacher:
Hand in day:

Y8 Science

Term 3: Homework Booklet

Chemistry

	Hand in Date	Parents Signature
Types of Reaction and Chemical Change		
Homework 1		
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Types of Reaction and Chemical Change Homework 1:

Comprehension Task

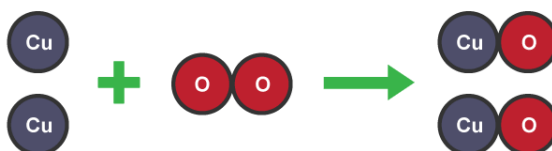
Atoms are rearranged in a chemical reaction. The substances that react together are called the reactants, and those that are formed in the reaction are called the products

No atoms are created or destroyed in a chemical reaction. This means that the total mass of the reactants is the same as the total mass of the products. We say that **mass is conserved** in a chemical reaction.

A word equation shows the names of each substance involved in a reaction.



In this reaction, copper and oxygen are the reactants, and copper oxide is the product.



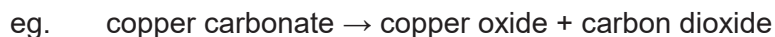
There are many different types of reaction, but most of them show a change in heat energy. Combustion is another name for burning. It is an example of an exothermic reaction, a reaction that releases energy to the surroundings. This is mostly thermal energy, but light energy and sound energy are also released. Note that some other reactions are endothermic reactions – they take in energy from their surroundings.

Combustion is an example of a type of reaction called oxidation. In an oxidation reaction, a substance gains oxygen. Metals and non-metals can take part in oxidation reactions.



Some compounds break down when heated, forming two or more products from one reactant. This type of reaction is called thermal decomposition.

Many metal carbonates can take part in thermal decomposition reactions. For example, copper carbonate breaks down easily when it is heated:



Copper carbonate is green and copper oxide is black. You can see a colour change from green to black during the reaction. The carbon dioxide produced can be detected using limewater, which turns milky when carbon dioxide is bubbled into it.

A catalyst is a substance that:

- speeds up reactions
- is not used up during the reaction (its mass is the same at the start and end of the reaction)
- is chemically unchanged after the reaction has finished

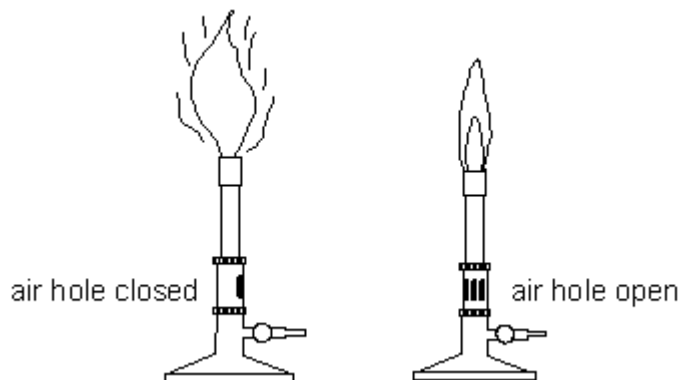
Only a very small amount of catalyst is needed to increase the rate of the reaction between large amounts of reactants. Different catalysts are needed to catalyse different reactions.

Questions

1. What happens to the atoms in a chemical reaction?
2. What happens to the mass in a chemical reaction?
3. Most reactions show a change in what sort of energy?
4. What reaction is another name for burning?
5. What does an exothermic reaction release to the surroundings?
6. What does a substance gain in an oxidation reaction?
7. Sulfur is a non-metal that reacts with oxygen like carbon.
Write a word equation for the reaction of sulfur with oxygen.
8. When copper carbonate is heated, it breaks down. What type of reaction is this?
9. What is the test (and the result) for carbon dioxide gas?
10. What does a catalyst do in a chemical reaction?

Types of Reaction and Chemical Change Homework 2:

The diagrams show two Bunsen burners. One burner has the air hole closed, and the other has the air hole open.



- (a) Explain why opening the air hole of a Bunsen burner makes the flame hotter.

.....
.....

1 mark

- (b) Natural gas is methane, CH₄. It is burned in a Bunsen burner.

Complete the word equation for the chemical reaction in the clear blue flame.

methane + → +

2 marks

- (c) Write out the word equation for when methane is burned in a Bunsen burner but with insufficient oxygen causing carbon monoxide and water to be formed.

.....

2 marks

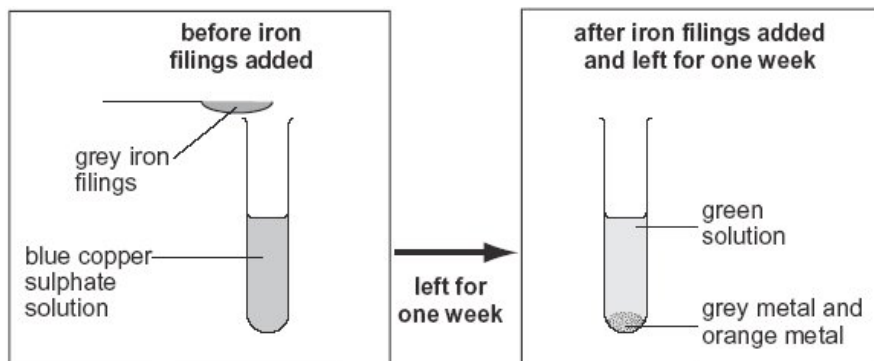
- (d) Carbon monoxide can sometimes be produced inside faulty gas boilers in homes. Why is this seen as a problem?

.....
.....
.....
.....

2 marks

This part of the question is a revision question relating to your last topic about metals and non-metals

Joanne added iron filings to copper sulphate solution. She observed the reaction after one week.



(e) What evidence in the diagrams shows that a chemical reaction has taken place?

.....
1 mark

(f) The reaction between iron and copper sulphate is a **displacement** reaction.

(i) Give the name of the orange metal visible after one week.

.....
1 mark

(ii) What is the name of the compound formed in this reaction?

.....
1 mark

(iii) Joanne poured the green solution into another test tube. She added some copper pieces to the solution.

Will a displacement reaction occur?

yes no

Explain your answer.

.....
.....
1 mark

(g) Part of the reactivity series of metals is shown below.

potassium	most reactive
lithium	↑
calcium	
aluminium	
zinc	
lead	least reactive

Use the information above.

Which **two** metals would react with aluminium nitrate in a displacement reaction?

Tick the **two** correct boxes.

calcium

potassium

zinc

lead

1 mark
maximum 5 marks

Types of Reaction and Chemical Change Homework 3:

The table below gives information about three fuels that can be used in cars.

- ✓ shows a substance is produced when the fuel burns.
X shows a substance is **not** produced when the fuel burns.

fuel	physical state	energy released, in kJ/kg	some of the substances produced when the fuel burns		
			carbon monoxide	sulphur dioxide	water
petrol	liquid	48 000	✓	✓	✓
hydrogen	gas	121 000	X	X	✓
ethanol (alcohol)	liquid	30 000	✓	X	✓

- (a) Which fuel, in the table, releases the **least** energy per kilogram (kg)?

.....

1 mark

- (b) Some scientists say that if hydrogen is burned as a fuel there will be less pollution.

From the information in the table, give **one** reason why there will be less pollution.

.....

.....

1 mark

- (c) Which of the three **fuels** in the table can be compressed into a small container?

.....

1 mark

(d) Which gas in the air is needed for fuels to burn? Tick the correct box.

- | | |
|----------------|--------------------------|
| carbon dioxide | <input type="checkbox"/> |
| nitrogen | <input type="checkbox"/> |
| oxygen | <input type="checkbox"/> |
| water vapour | <input type="checkbox"/> |

1 mark

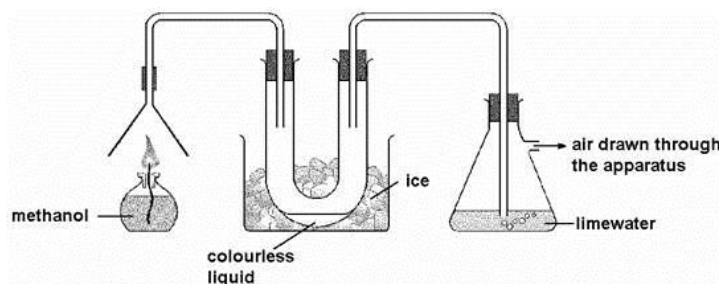
(e) Petrol and ethanol are both fuels. Petrol is made from oil. Scientists say that oil could run out in 100 years. In some countries people plant sugar cane and use it to make ethanol.

Sugar cane will **not** run out. Explain why.

.....
.....

1 mark
Maximum 5 marks

(f) George used the apparatus below to find out what substances are produced when methanol burns.



As the methanol burned, two different gases were produced.

(i) One of these gases condensed in the U-tube to give a colourless liquid. Give the name of this liquid.

.....

1 mark

(ii) The other gas turned the lime water cloudy. Give the name of this gas.

.....

1 mark

(g) Methanol is sometimes used in antifreeze. It can be added to water in car windscreen wash-bottles to prevent the water from freezing in cold conditions.



(i) The label on the bottle of antifreeze has two hazard warning symbols.

What **two** precautions would you need to take when using this antifreeze?

1.

.....

2.

.....

1 mark

(ii) Water freezes at 0°C. The label on the bottle shows how the freezing point changes when different amounts of antifreeze are added to water.

Terry put a mixture containing 10% antifreeze into the wash-bottle of his car.

During the night the temperature dropped to -14°C.

The wash-bottle burst.

Explain why the wash-bottle burst.

.....

.....

.....

.....



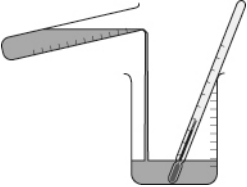
2 marks

Maximum 5 marks

Types of Reaction and Chemical Change Homework 4:

1 Decide if the descriptions **i** to **vi** represent exothermic or endothermic changes.

Colour the exothermic descriptions and diagrams red and colour the endothermic ones blue.

<p>i</p>  <p>Thermal decomposition</p>	<p>ii</p> <p>To decompose mercury oxide we need to continuously heat it with a roaring Bunsen flame.</p>	<p>iii</p> 
<p>iv</p> <p>A freezing mixture, with temperatures as low as $-12\text{ }^{\circ}\text{C}$, can be made by mixing barium hydroxide and ammonium chloride.</p>	<p>v</p>  <p>Addition of Acid to Alkali</p>	<p>vi</p> <p>When the cement in concrete sets it gets hot and this can cause cracks to appear in the building structure.</p>

2 Complete these sentences about changes that involve energy transfer.

- a When an exothermic reaction occurs the temperature of the surroundings _____
- b If the temperature _____ during a chemical reaction it is an endothermic process.
- c During _____ changes energy is given out into the surroundings.
- d The type of reactions that keep a house warm are called reactions.
- e Cooling pads used for treating sports injuries will work due to _____ reactions.

3 For each of the descriptions of reactions given in question 1, boxes **i** to **vi**, briefly explain how you decided if they represent an exothermic or endothermic change.

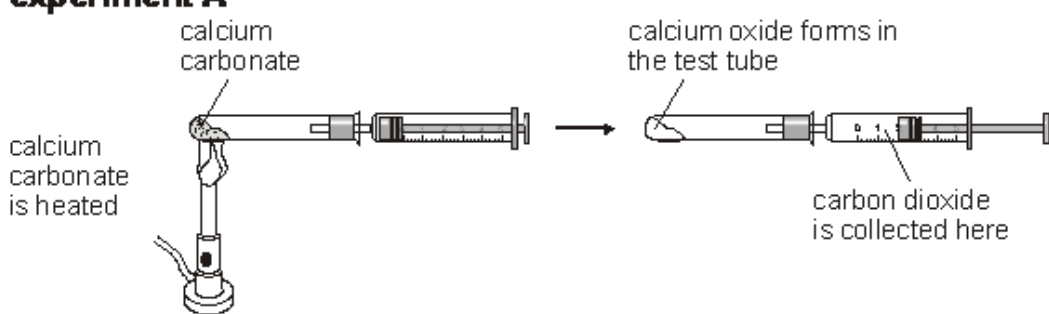
Types of Reaction and Chemical Change Homework 5:

A science teacher showed her class three experiments, A, B and C.

The experiments and the word equations for the reactions that took place are shown below.

All the experiments were done in a fume cupboard.

experiment A



calcium carbonate is heated

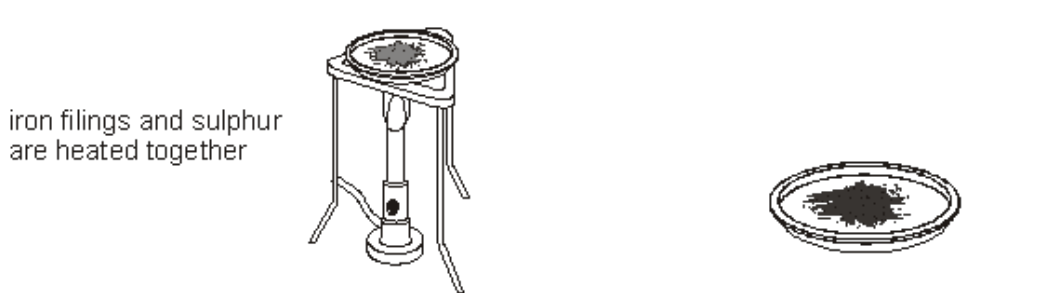
calcium carbonate

calcium oxide forms in the test tube

carbon dioxide is collected here

word equation calcium carbonate \longrightarrow calcium oxide + carbon dioxide

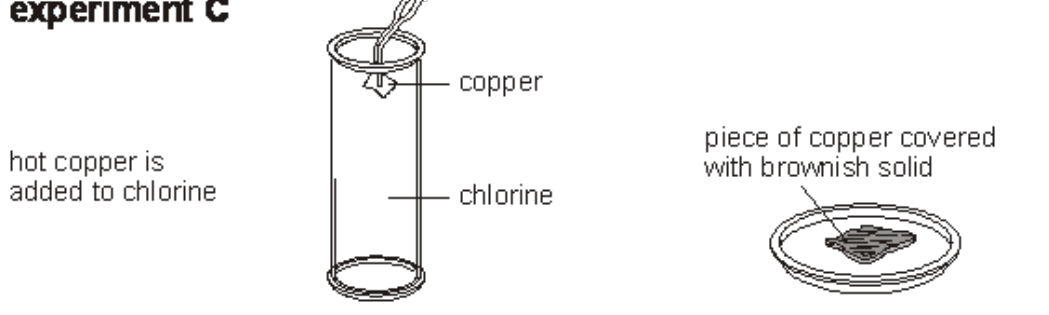
experiment B



iron filings and sulphur are heated together

word equation iron + sulphur \longrightarrow iron sulphide

experiment C



hot copper is added to chlorine

copper

chlorine

piece of copper covered with brownish solid

word equation copper + chlorine \longrightarrow _____

(a) From the substances in experiments A, B and C, above, give the name of:

(i) **one** metallic element;

.....

1 mark

(ii) **one** non-metallic element;

.....

1 mark

(iii) **two** compounds.

..... and

1 mark

(b) In experiment B, the iron filings weighed 2.0 g at the beginning of the experiment and the iron sulphide produced weighed 2.8 g.

Explain this increase in mass.

.....

.....

1 mark

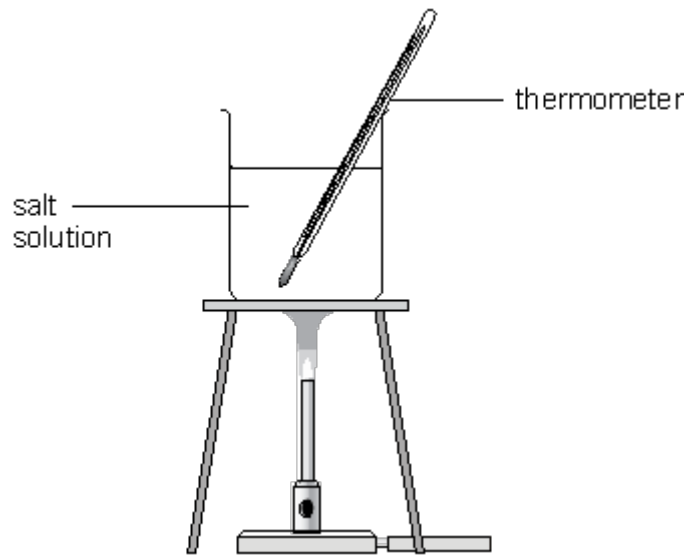
(c) Complete the word equation for the chemical reaction in experiment C.

copper + chlorine →

1 mark

maximum 5 marks

- (d) Neera and Tom dissolved different masses of salt in 500 cm³ of water. They measured the temperature at which each salt solution boiled.



They wrote down the variables that might affect the investigation.

temperature of the laboratory	mass of salt dissolved in water	starting temperature of the water
boiling point of salt solution	volume of water	type of salt used

- (i) What is the independent variable (the variable they changed) in their investigation?

.....
1 mark

- (ii) What is the dependent variable (the variable they measured) in their investigation?

.....
1 mark

- (iii) Which variable above would affect the experiment the least?

.....
1 mark