2.6 Compounds

2 10/

1. Highlight the correct **bold** words in the sentences below.

   A compound is a substance made up of atoms of **one / two / three** or more elements. The atoms are **strongly / weakly** joined together. The properties of a compound are **similar / different** to the properties of the elements whose atoms are in it. Some elements and compounds exist as molecules. A molecule is a particle made up of **one / two** or more atoms joined together **strongly / weakly.**

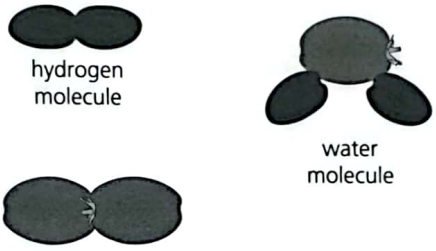
TWS 2. Water is a compound. It is made up of atoms of two elements, hydrogen and oxygen.

   Complete the table below.

Substance	Element or compound?	State at 20 °C	One property or use of the substance
hydrogen	element		
oxygen		gas	helps other substances to burn
water			

TWS

3. A student uses grapes and tomatoes to model molecules.



   a. Write the definition of a model in science.

   .....

   b. List some strengths and limitations of the model.

   Strengths:

   .....

   .....

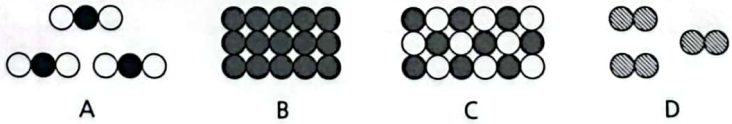
   Weaknesses:

   .....

   .....

Extension

TWS The diagrams represent elements and compounds. Each circle represents one atom.



   a. Give the letters of the **two** diagrams that show compounds.

   b. Give the letters of the **two** diagrams that show molecules.

   c. Give the letter of **one** diagram that shows a compound in the solid state.

TWS **d.** Give the letter of **one** diagram that shows an element that exists as molecules.

2.9 What's in a mixture? and

1. Write ***T*** next to the statements that are true. Write ***F*** next to the statements that are false.

Then write corrected versions of the **three** false statements.

a. The different substances in a mixture are joined together.

b. You cannot change the amounts of substances in a mixture.

c. It is often easy to separate the substances in a mixture.

d. In a mixture, the substances do not keep their own properties.

e. Mixtures can contain elements only, or compounds only, or both.

Corrected versions of false statements:

.....

.....

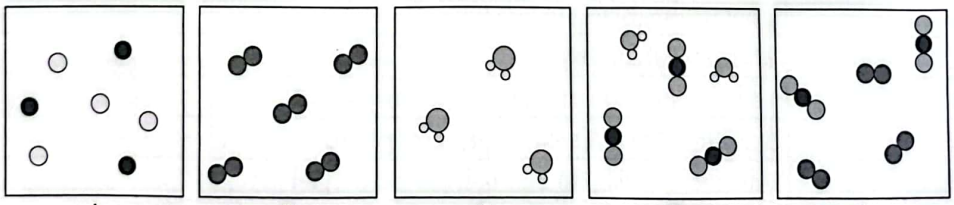
.....

2. For each mixture, write a tick ✓ in the correct box in the table.

Write **one** tick in each row.

Mixture	Mixture of elements only	Mixture of compounds only	Mixture of element(s) and compound
nitrogen and oxygen			
sodium chloride (salt) dissolved in water			
chlorine dissolved in water			
nitrogen, oxygen, and carbon dioxide			

TWS **3.** In the diagrams below, each circle represents one atom. Circles with the same shading are atoms of the same element. Circles with different shading are atoms of different elements.



Give the letter of:

a. An element .....

b. A compound .....

c. A mixture of elements .....

d. A mixture of compounds .....

TWS **e.** A mixture of an element and a compound .....

Extension

A mixture includes substances with these formulae:

NaCl H_2O O_2 CO_2 KI Mg

Is the mixture a mixture of elements, a mixture of compounds, or a mixture of elements and compounds?

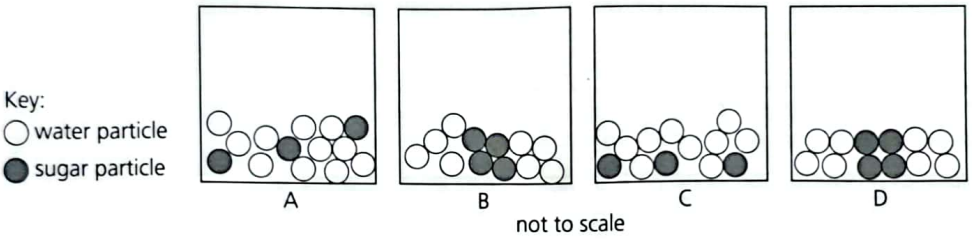
2.10 What's in a solution? 2nd and

1. Draw lines to match each word with its meaning.

Word	Meaning
solute	The process of adding a solid to a liquid so that you can no longer see separate pieces of solid.
solvent	A substance that dissolves in a liquid to make a solution.
solution	Able to dissolve.
dissolving	A mixture made when a substance dissolves in a liquid.
soluble	The liquid that a substance dissolves in.
insoluble	When a substance cannot mix with a liquid to make a solution.

2. Give the letter of the diagram below that best represents sugar dissolved in water.

Give a reason for your choice.



Reason: A sugar particals are randomly position and mixed with a liquid

TWS **3.** James has 250 g of water. He adds 10 g of salt and stirs until it dissolves.

Calculate the mass of solution he makes.

TWS

.....

Extension

A group of students adds 1 spatula measure of solid copper sulfate to water. They stir until the copper sulfate dissolves.

The students talk about their ideas.

Kamol: The solution is a mixture.

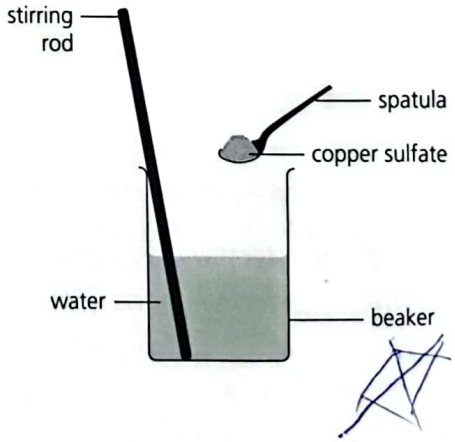
Lawan: The solution is a mixture of an element and a compound.

Mongkut: The mass of the solution is the mass of copper sulfate plus the mass of water.

Niran: Copper sulfate is insoluble in water.

Pakpao: Copper sulfate is the solvent.

Ratana: We could add another spatula measure of solid copper sulfate to the water and stir. If the solid disappears it has dissolved.



a. Draw a table with two columns. Make the right column wider than the left column.

b. Write the names of the students in the left column.

c. In the right column, write whether each student's idea is correct or incorrect.

Write corrected versions of the incorrect statements.

2.11 Comparing elements, mixtures, and compounds

1. Highlight the correct **bold** words.

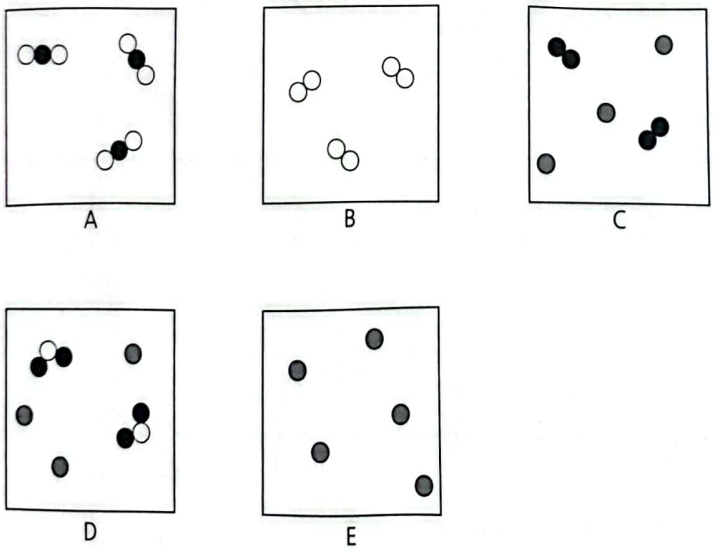
Sodium has one type of atom, so it is **an element / a compound**. Sodium **can / cannot** be split into other substances. Chlorine is shown in the periodic table. It is **an element / a compound**. A teacher heats sodium in a Bunsen flame. He places the burning sodium in chlorine gas. This makes sodium chloride, which is **a compound / a mixture.** Sodium chloride has **similar / different** properties to the elements whose atoms are in it.

2. Complete the table to show some differences between compounds and mixtures.

	Mixtures of elements	Compounds
Can it easily be separated into its elements?		
How do its properties compare to those of its elements?		
Are its elements joined together?		
Can you change the amounts of each element in 100 g of the mixture or compound?		

TWS 3. The diagrams show particles in elements, mixtures, and compounds.

All the atoms of the same colour are atoms of the same element.



a. Write the letter that shows atoms of one element. .....

b. Write the letter that shows molecules of one element. .....

c. Write the letter that shows molecules of one compound. .....

d. Write the letter that shows a mixture of two elements. .....

TWS e. Write the letter that shows a mixture of an element and a compound. .....

Extension

Write a paragraph to compare mixtures of elements and compounds. In the paragraph, describe how mixtures of elements and compounds are similar, and how they are different.

5.1 Acids and alkalis 2nd

SIG **1.** In the table, write the names of three acidic substances and two alkaline substances.

Acidic substances	Alkaline substances

SIG

TWS **2.** Some laboratory acids and alkalis are corrosive.

a. Circle the hazard symbol below that means corrosive.

b. List two things you can do to reduce risks from this hazard.

.....

.....

3. A student has some phenolphthalein indicator. She tests it in some solutions.

Her results are in the table.

Solution	Colour
hydrochloric acid	colourless
baking soda solution	pink
unknown solution	colourless

Is the unknown solution acidic or alkaline? .....

Give a reason for your decision.

TWS .....

Extension

TWS A student collects petals from six different types of flower. Describe how they could find out which petals make good indicators. In your answer:

- describe what they should do

TWS • explain how they would know which petals are suitable.

5.2 The pH scale 2nd

1. Write ***T*** next to the statements that are true. Write ***F*** next to the statements that are false.

Then write corrected versions of the **three** statements that are false.

a. A neutral solution has a pH of 7.0.

b. An alkaline solution has a pH less than 7.0.

c. The more acidic a solution, the higher its pH.

d. If you dip red litmus paper into an alkaline solution, the paper becomes blue.

e. You can use litmus paper to find out the pH of a solution.

f. The higher the pH of a solution, the more alkaline it is.

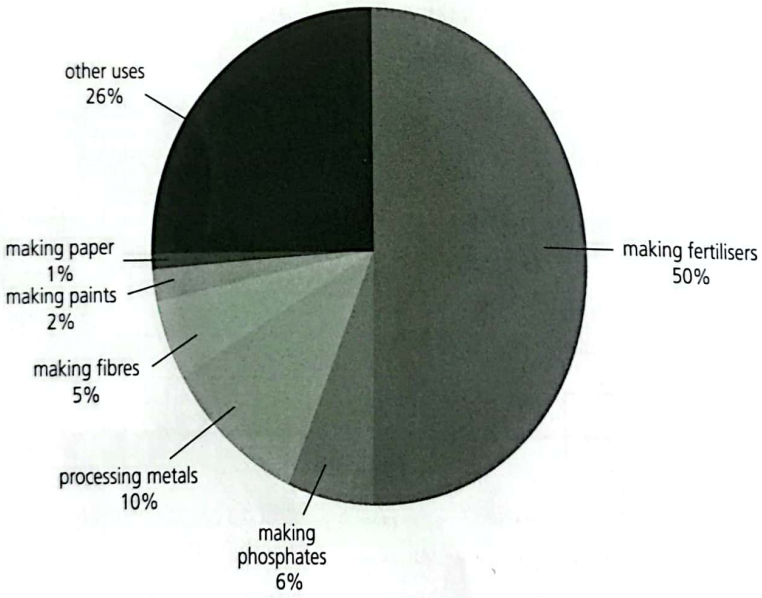
Corrected versions of false statements:

.....

.....

.....

SIC **2.** The pie chart shows the worldwide uses of sulfuric acid.



- Name the major use of sulfuric acid.....

SIC
- Give the percentage of sulfuric acid that is used to make paints.....

Extension

A teacher dissolves 40 g of solid sodium hydroxide in water. She adds water to make 1000 cm^3 of solution. This is solution A.

The teacher makes another solution by dissolving 20 g of sodium hydroxide in water. She adds wa to make 1000 cm^3 of solution. This is solution B.

Which is the more concentrated solution, A or B? Explain your decision.

5.3 Neutralisation reactions

2-01

1. Write ***T*** next to the statements that are true. Write ***F*** next to the statements that are false. Then write corrected versions of the **three** false statements.

   a. In a neutralisation reaction, an acid reacts with an alkali.

   b. If you add water to an acid, its concentration increases.

   c. Alex has an alkali of pH 12. He adds acid. The pH increases.

   d. If your soil is too acidic for a certain crop, add alkali to the soil to decrease its pH.

   e. Blessing has an acid of pH 2. She adds alkali. The pH increases.

   f. If your soil is too alkali for a certain crop, add acid to the soil to decrease its pH.

   Corrected versions of false statements:

   .....

   .....

   .....

2. Circle the correct **bold** words and numbers.

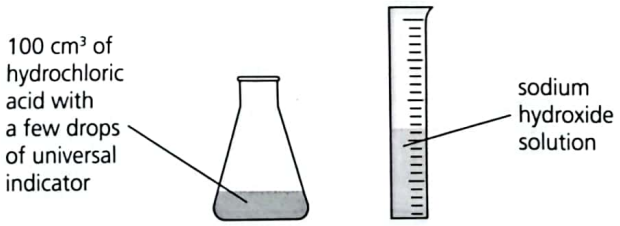
   Som has some sodium hydroxide solution. He adds universal indicator. The colour of the mixture is **green / purple / red**. This shows that sodium hydroxide solution is **acidic / alkaline / neutral**.

   Som adds a little hydrochloric acid to the sodium hydroxide solution. The pH **decreases / increases**. He adds more hydrochloric acid. Eventually the solution is neutral. Its pH is **1 / 7 /14**. The acid has **neutralised / oxidised** the sodium hydroxide solution.

   Som adds even more acid. The pH **decreases / increases**. The mixture is acidic. Its colour is **green / purple / red**.

Extension

TWS A student has the apparatus and solutions shown here. The two solutions have the same concentration. The student pours the sodium hydroxide into the acid. The indicator changes colour. Give the letter of the one correct results table.



A.

volume of alkali (cm³)	indicator colour	pH
0	green	7
100	red	1

B.

volume of alkali (cm³)	indicator colour	pH
0	red	1
100	blue	14

C.

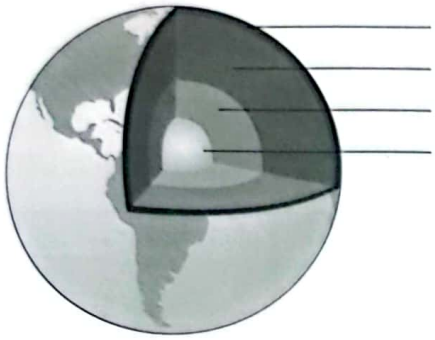
volume of alkali (cm³)	indicator colour	pH
0	red	1
100	green	7

TWS

6.1 Models of the Earth and

Science in context

1. Label the diagram of the Earth by writing one or two words in each box.



2. For sentences **a** to **g** below:

   Write **C** next to the sentences that are true for the Earth's crust.
   Write **M** next to the sentences that are true for the mantle.
   Write **O** next to the sentences that are true for the outer core.
   Write **I** next to the sentences that are true for the inner core.

   You will need to write more than one letter next to some sentences.

   a. This is at the centre of the Earth. .....
   b. This part of the Earth is solid. .....
   c. This part of the Earth is liquid. .....
   d. This part of the Earth is made up mainly of iron and nickel. .....
   e. This part of the Earth can flow. .....
   f. This part of the Earth is made up of different types of rock. .....
   g. This part of the Earth has the smallest thickness. .....

3. Write down three pieces of evidence that support the idea that the Earth is not flat, but that it is a sphere.

   1. .....
   2. .....
   3. .....

Extension

A scientist named Inge Lehmann discovered the inner core in 1936.

Use the Internet to find out about the life and work of Inge Lehmann.

Make a poster or write about what you have found out. You could include information about:

- where she lived
- her school and universities
- how she found out about the inner core
- things that have been named after her
- how long she lived.

8.2 Drinking seawater 2nd

Science in context

1. Draw lines to match each part of seawater to the scientific word that describes it.

Part of seawater
salt
seawater
water

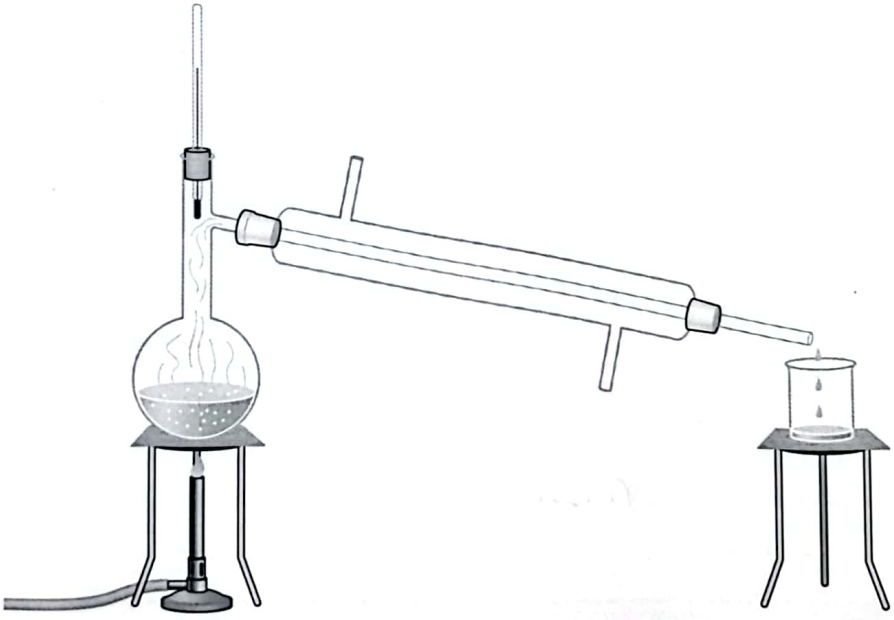
Scientific word
solvent
solute
solution

2. Use words from the box to complete the sentences below. Use each word once, more than once, or not at all.

seawater	evaporates	pure	condenses	freezes

Desalination is used to obtain ..... water from ..... . One method of desalination is distillation. Distillation involves heating ..... . Pure water ..... to make steam. The steam travels through a condenser, where it cools and ..... .

3. The diagram shows laboratory distillation apparatus. Label the apparatus using the words and phrases in the box.



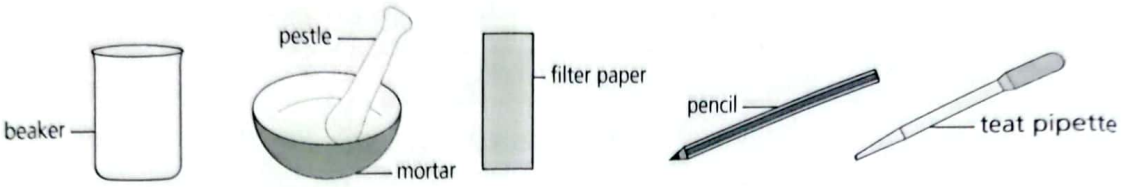
seawater	pure water	beaker	condenser
round-bottomed flask	tap water in	tap water out	

Extension

Suggest why tap water is not obtained by desalination in places where it rains a lot.

8.3 Chromatography

TWS **1.** Sarah has a piece of an unknown leaf. She wants to know if the leaf is from a spinach plant or a cassava plant. She has this apparatus.



The stages below describe what to do. They are in the wrong order. Write the letters in a sensible order. The first one has been done for you.

A. Pour solvent into the bottom of the beaker. Stand the paper in the beaker.

B. Use a pestle and mortar to crush three leaves – the unknown leaf, a spinach leaf, and a cassava leaf.

C. Wait as the solvent moves up the paper.

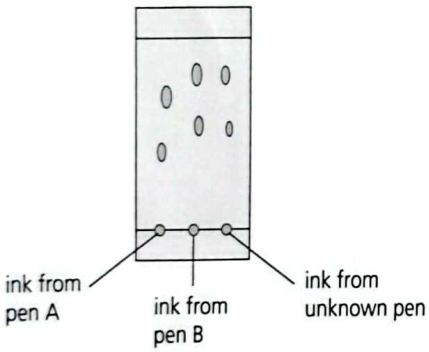
D. Draw a pencil line on the chromatography paper.

E. Take out the paper. Compare the patterns.

F. Put one spot of liquid from each leaf on the pencil line.

B					

2. The chromatogram shows ink from three pens.



TWS

a. Is the unknown pen the same as pen A or pen B?

.....

Explain your choice.

.....

.....

3. Describe three uses of chromatography.

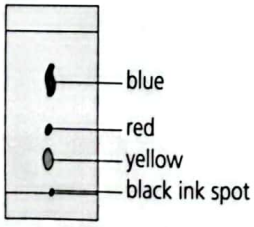
.....

.....

.....

Extension

Use words from the box to complete the sentences below. Use each word once, more than once, or not at all.



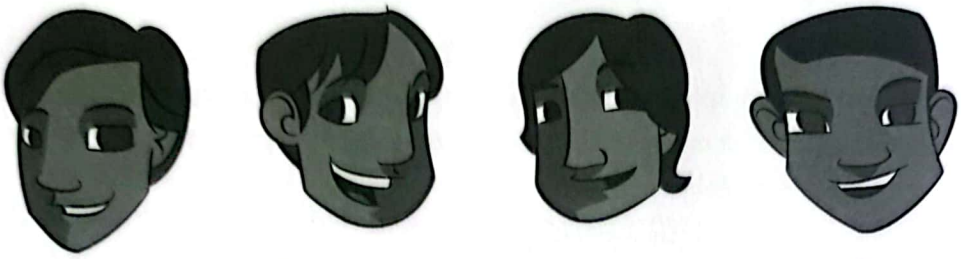
blue	chromatography
yellow	red
most	least
chromatogram	three
four	two

This is a ..... of black ink. It shows that the black ink is a mixture of ..... coloured inks. The ..... ink has moved furthest. This might be because this ink is ..... soluble in water. Or it might be that this ink sticks ..... strongly to the paper.

12.6 Making salts from acids and metals

2nd

1. Four students say what they think a salt is.



Amit A salt is a substance that flavours food.

Baharupa A salt is a compound made from an acid.

Chandaka A salt is a compound made from an acid and a metal.

Dasbala A salt is a compound made when a metal ion replaces the hydrogen ion in an acid.

Write down the name of the person who gives the best definition of a salt. .....

TWS **2.** A student plans to make zinc chloride from zinc and hydrochloric acid. She does a risk assessment. Draw lines to match each hazard and risk to show how to reduce the chance of injury from the risk.

Hazard and risk	How to reduce chance of injury
dilute hydrochloric acid – corrosive	wait for apparatus to cool before touching
hydrogen gas – forms explosive mixture with air	wear eye protection and do not touch
hot equipment and solutions – burns	keep away from flames
sharp edges of broken apparatus – cuts and damage to eyes	wear eye protection and inform teacher of breakages

TWS

3. The stages below describe how to make zinc chloride from a metal and an acid.

A. Add zinc to hydrochloric acid until some unreacted solid zinc remains.

B. Place the evaporating dish on a water bath.

C. Leave in a warm place for a few days.

D. Filter the mixture. Keep the solution.

E. Heat the water bath until half the water has evaporated from the solution.

F. Pour the solution into an evaporating basin.

Write the letters of the stages in the correct order. The first one has been done for you.

A					

Extension

Suggest the metal and acid you could use to make calcium sulfate crystals.

12.7 More about salts

1. Write ***T*** next to the sentences that are true. Write ***F*** next to the sentences that are false. Then write corrected versions of the **three** sentences that are false.
   - **a.** A salt is a compound made when a hydrogen ion replaces a metal ion in an acid.
   - **b.** Nitric acid makes nitrate salts.
   - **c.** Hydrochloric acid makes hydrochloride salts.
   - **d.** Sulfuric acid makes sulfide salts.
   - **e.** Chloride salts are formed when metals react with hydrochloric acid.
   - **f.** Sulfates are formed when metals react with sulfuric acid.

   Corrected versions of false statements:

   .....

   .....

   .....

2. Name the salts made when these pairs of substances react together.
   - **a.** Zinc and hydrochloric acid .....
   - **b.** Magnesium and sulfuric acid .....
   - **c.** Magnesium and hydrochloric acid .....
   - **d.** Iron and sulfuric acid .....
   - **e.** Magnesium and nitric acid .....
   - **f.** Zinc and nitric acid .....

3. When metals react with acids, hydrogen gas is produced, as well as a salt. Describe how to test for hydrogen gas. Write down what you need to do, and what you would observe if hydrogen gas is present.

   .....

   .....

4. Complete the word equations.
   - **a.** magnesium + hydrochloric acid ⟶ ..... + hydrogen
   - **b.** zinc oxide + hydrochloric acid ⟶ zinc chloride + ...
   - **c.** copper carbonate + nitric acid ⟶ copper ..... + carbon dioxide + water
   - **d.** nickel oxide + sulfuric acid ⟶ nickel ..... + ...
   - **e.** magnesium + ... ⟶ magnesium sulfate + ...