

Examining Matter

Matter: Any substance that takes up space. Matter can be solid, liquid or gas.

Particle Theory of Matter

- Matter is made up of tiny particles.
- Every type of pure matter (not mixed with anything) is made of its own unique particles.
- The particles in matter are attracted to one another and stick together.
- The particles in matter are always moving (even in solids).
- When matter is warm, the particles move faster and when matter is cold, the particles move more slowly.

All matter is made of very tiny particles called **atoms**. When atoms of all the same type are joined together, they are called **elements**. Sometimes atoms of different elements are joined together to make **molecules**.

 **Atoms**



Elements – examples: oxygen (O), carbon (C), nitrogen (N), hydrogen (H)



Molecules – examples: CO₂ (carbon dioxide)

1. Work with a partner to write definitions in your own words for the terms **atom**, **element** and **molecule**.

Compounds: Molecules that are made of different elements that are stuck together.

2. With a partner or group, describe the differences between elements and compounds. Summarize these differences in the chart below.

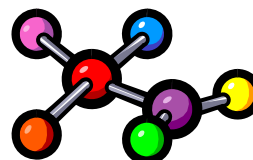
ELEMENTS	COMPOUNDS

Chemical Properties of Matter

The properties of a substance are the characteristics that make it unique. Matter has **chemical** and **physical** properties.

Chemical properties of matter include:

- the atoms or molecules that make up a substance
- how a substance reacts to temperature with other substances, such as water, oil, oxygen, acids and bases.



Examples:

- copper (a metallic solid) exposed to air turns green over time
- sulphur (a solid) combined with pure oxygen (a gas) forms sulphur dioxide (S_2O) (a colourless poisonous gas)
- hydrogen and sulphur combine to make hydrogen sulphide (H_2S), a poisonous gas in sour gas wells that smells like rotten eggs.

3. Use a variety of objects to illustrate the structure of atoms and molecules. Draw a diagram of a molecule in the space below.



Physical Properties of Matter



The chart below lists qualitative and quantitative physical properties of matter.

Examples of physical properties of matter			
Qualitative	Example	Quantitative	Example
Colour (shade, lustre)	Tin is silvery in colour and has a shiny lustre.	Melting temperature	Ice melts at 0°C.
Texture (how it feels)	Chlorine (household bleach) is slippery.	Boiling temperature	Water boils at 100°C.
Taste (salty, sweet, bitter)	Cocoa (raw chocolate) is bitter.	Density	Sand can be packed tightly or loosely in a bucket.
Smell (sweet, bitter, sour)	Sulphur smells like rotten eggs.	Viscosity	Oil gets thicker and flows more slowly when it is cold.
Malleability (how easily it can be reshaped)	Gold can be hammered into thin sheets and different shapes.	Heat conductivity	An iron pan gets hot when placed on a hot stove element.

4. Review [Safety in Science](#) before you begin the following activity. Obtain a sample of a safe, non-toxic solid or liquid substance used everyday at home, school or in the workplace. Complete the chart for the substance. Compare charts with classmates.

Substance: _____

Physical properties			
Qualitative		Quantitative	
Colour		Melting point	
Texture		Boiling point	
Taste		Density	
Smell		Viscosity	
Malleability		Heat conductivity	

List other information about the substance that you know or observed.

5. With a group, examine and investigate the following materials and complete the chart below.



Material	Is it a pure substance, solution or mechanical mixture?	How do you know this?
carbon		
table salt		
salt water		
fertilizer		
motor oil		
plastic		
fruit-flavoured drink		
iron		

6. With a group, examine and investigate the following materials and fill out the chart below.



Material	Is it a metal or non-metal?	How do you know this?
soda can		
table salt		
pencil		
gold chain		
frying pan		
plastic cup		
carrot		
magnet		