

# ATOMS and particles

## PARTICLES

A particle is the smallest unit of a substance, but could be either an atom or a molecule

any particle with more than one ATOM bonded together

$O_2$  = element & molecule

the smallest unit of any element that can exist on its own

any particle with more than one ELEMENT bonded together

here a sphere is used to mean just one atom, but we also show whole molecules as a sphere too, such as if we wanted to show lots of  $C_6H_{10}O_5$  it would be

# ATOMS and particles

## ELEMENTS

There are 92 naturally occurring elements which combine to form all materials in the universe

**nucleus**  
protons + neutrons

**electron**

**shell**

first shell has a maximum of 2 electrons

second shell has a maximum of 8 electrons

third shell also has maximum of 8 electrons

**ATOMIC NUMBER**  
number of protons which is unique to each element

then it gets a little more complicated...

**PARTICLE MASS CHARGE**

proton	1	+1
neutron	1	0
electron	1/2000	-1

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## COMPOUNDS

A molecule with more than one type of atom, i.e. more than one element, bonded together

methane  $CH_4$

carbon dioxide  $CO_2$

water  $H_2O$

sodium chloride  $NaCl$

glucose  $C_6H_{12}O_6$

# ATOMS and particles

## STATES of MATTER

● = particle of matter

**SOLID**

- regular
- touching
- vibrate in fixed positions

**LIQUID**

- irregular
- touching
- slide over each other

**GAS**

- irregular
- not touching
- random motion

Processes: melting, freezing, evaporation, condensing, sublimation, deposition

water  $H_2O$

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## MIXTURES

Particles of different substances that are not chemically bonded together, thus not a compound

**GAS**  
e.g. air  
particles of different gases bump into one another and do not chemically interact

**LIQUID**  
e.g. seawater  
one substance dissolved into another substance, e.g. NaCl (salt) dissolved into water

**SOLID**  
e.g. steel  
different sized particles spread evenly through a metal to change its properties

**COLLOID**  
blood is a mixture of solid cells in a liquid solution called plasma

**CAKE**  
when baking we call it a mixture, but a chemical reaction happens so it is not!

# ATOMS and particles

## BEHAVIOUR

Particles in liquids and gases randomly move to spread out evenly within a container

**DIFFUSION**  
when a sugar cube dissolves in water, the sugar particles are pulled apart by the water particles  
random motion then spreads these particles out evenly through the water

**PRESSURE**  
forcing air particles into a balloon creates pressure  
air particles on the outside push back to create equilibrium

particles move from an area of HIGH CONCENTRATION (lots of particles) into an area of LOW CONCENTRATION (few/no particles) i.e. spread out