

Matter, Mass, Volume

mat - anything with mass & volume

mas - quantity of substance contained, usually measured in grams or kilograms

v - amount of space occupied, usually measured in millilitres, litres, or cubic centimetres

Density

ratio of mass to volume, m/v

State of Matter & Fluid

solid - fixed mass, volume, and shape

liquid/fluid - fixed mass and volume

gas/fluid - fixed mass and container has fixed volume

fluid - matter that can flow (ex: liquid, gas), no fixed shapes, takes on the shape of the container

Physical Property

p - type of characteristics that can be observed or measured w/out changing its identity of

Qualitative

not measurable

malleable - able to be flattened into sheets

ductile - able to be stretched into wires

crystalline structure - shape of appearance of crystals

Quantitative

measurable

solubility - ability to dissolve in water

conductivity - ability to conduct electricity tor heat

density - ratio of mass to volume

viscosity - resistance to flow

Chemical Property

ability to react chemically with other substances to form new substances

can only establish when composition of matter is altered (ex: reactivity)

Pure substances

homogenous - uniform appearance

has a unique set of properties

cannot turn into simpler substances by physical means

can be further classified as element or compound

Elements & Compounds

e - simplest pure substance, cannot be broken down or separated into simpler substances

reason - it's already simple since each elements is made of 1 kind of atom

have different names in different languages

chemical symbols consist of 1 or 2 letters, 1st is capitalized

c - composed of 2 or more elements in a specific way, can be changed into simpler substances by chemical means

Mixture

made of 2 or more substances, physically put together

can be separated into simpler substances by physical means

Metals

properties - hard, shiny, malleable, ductile, good conductors of heat and electricity

left of the staircase of Periodic Table

Non-Metals

properties - gas or brittle solid at room temperature, not malleable or ductile, dull, poor conductors of heat and electricity

right of the staircase

Metalloids

elements that shares some properties of metals and non-metals

properties - brittle solid, can be dull or shiny, may conduct electricity, poor conductor of heat

Hydrogen & Oxygen

H - makes up 90% of the atoms in the universe

O - produced by plants as a by-product of photosynthesis, combined w/ sugar in our cells to release energy

Iron, Silver, Mercury, Mercury Vapour

Fe - an important material in structures, mixed w/ carbon makes steel, can rust when exposed to water & oxygen

Ag - better than other metal at conducting heat & electricity and reflecting light

Hg - a poisonous metal as liquid at room temperature

Chlorine, Silicon, Semiconductor

Cl - forms table salt when combined w/ sodium

Si - 2nd most common element, after oxygen in earth's crust, widely used as a semiconductor in manufacturing computer chips and hardware

s - a poor conductor of electricity at low temperature but a good c at high temperature

Physical Change

occurs when no new substances form, but there may be a change in appearance



Chemical Change & Precipitate

occurs when substances combine (react) to form new substances

evidence: colour change, heat, light, or sound produced, bubbles of gas, precipitate

p - solid produced in mixing 2 solutions

Reactants & Products

r - substances that are going to react

p - new substances that are produced

Chemistry

study of matter and its change

includes: facts & observations about matter, summarize patterns of behaviour in matter, theories that explain the patterns of behaviour in matter

Models

help to visualize objects or processes that cannot be seen directly

Theory

provides a scientific explanation based on the results of experimentation

Particle Model of Matter

all matter is made of small particles that are too small to be seen with eye and even a microscope

there are spaces between the particles, the amount of spaces varies w/ the state of matter (greatest in gas, least in solid)

the particles are always moving, collides w/ each other & the container in liquid & gas

particles are attracted to one another, strength depends on the type of particles

Thermal Energy, Heat, Collision, Temperature

te - the total kinetic energy of all the particles in a substance

h - thermal energy that is transferred from 1 body to another

Thermal Energy, Heat, Collision, Temperature (cont)

c - particles transferring kinetic energy

t - the average kinetic energy of the particle in a substance

particles in hot objects have more kinetic energy and move faster

Kinetic Molecular Theory

explains how changes in the kinetic energy of the particles can result in changes in state

energy makes particles move, more energy the particles have from heating, the faster they move and farther apart they get

Thermal Expansion, Thermal Contraction

increase in volume of a substance when its temperature is raised

the decreased in volume of a substance when its temperature is lowered

Change of State by Heating

particles in solids are tightly packed together = cannot move freely (fixed in position), holds a definite shape, can and do vibrate constantly

as heat is added, kinetic energy of the par increase and begin to collide w/ each other = more spaces is created between the particles

if enough heat is added, the solid will melt

par in liquid are close (in contact w/each other) but have enough space to slide past, don't hold a shape instead take on the shape of its container

as heat is added to a liquid, kinetic energy of pars increase, collide more = more space created

some par gain enough energy to break free, w/ enough heat, the liquid will boil

pars in gas are highly energetic, can move freely and quickly in all directions, spread out to fill their container, gas is mostly empty space as pars are far apart

Temperature which Change of State Occurs

melting point - temperature where solid melts to liquid (ex: 0 celcius for water)

boiling point - temperature where liquid boils to gas (100 celcius for water), substances condense at the same temp at which they boil

freezing point - temperature where liquid freezes to solid, same temperature as melting point, substances freeze at the same temp at which they melt

Chemical Bonds (Chemical & Physical)

c - new substances are produced in the process of breaking existing chemical bonds and forming new bonds

chemical bonds - forces that hold 2 or more atoms together

a change in composition occurs, changes are difficult to reverse

p - bonds hold atoms together (in molecules and ions), do not change, easier to reverse

Energy Change, Exothermic, Endothermic

ec - energy is either released to the environment or absorbed from the environment due to energy change in matter chemical change

energy change in a chemical change might or might not be noticeable

ex - release of energy in the form of heat and light

en - absorption of energy

Corrosion (Chemical Change)

the process where metals are broken down

rusting - corrosion of iron, rust is produced in a chemical reaction between iron and water containing dissolved oxygen gas = structural failure