

- ✓ **Property:** a characteristic of matter that is used to identify matter (the substance)
- ✓ There are 2 types of properties:
 - 1) **Physical property:** a characteristic of a substance that can be determined without changing the composition of that substance
 - 2) **Chemical property:** a characteristic of a substance that is determined when the composition of the substance is changed and one or more new substances are produced
- ✓ Physical and chemical properties can each be broken down further into qualitative properties and quantitative properties
 - **Qualitative property:** a property of a substance that is not measured and does not have a numerical value, such as colour, odour, and texture
 - **Quantitative property:** a property of a substance that is measured and has a numerical value, such as temperature, height, and mass

Physical Properties

- ✓ Some qualitative physical properties are:

○ Colour	○ Crystal shape	○ Hardness
○ Texture	○ Malleability	○ Brittleness
○ Taste	○ Ductility	
○ Odour	○ Optical clarity	
○ State	○ Luster	
- ✓ Some quantitative physical properties are:

○ Density	○ B o i l i n g	○ Heat conductivity
○ M e l t i n g	temperature	○ E l e c t r i c a l
temperature	○ Viscosity	conductivity
	○ Solubility	
- ✓ Matter can exist in 3 states: (a) solid, (b) liquid, and (c) gas
 - A vapour is a substance that is a solid or liquid at room temperature, but has been changed into a gas form by heating it

Properties applicable to substances in all states of matter

- ✓ **Optical clarity:** the ability to allow light through
 - **Transparent:** light passes through (thin blue glass is clear and transparent)
 - **Translucent:** some light passes through (frosted glass is translucent)
 - **Opaque:** no light passes through (a brick wall is opaque)
- ✓ **Colour:** the wavelength(s) of light reflected by a substance that our eyes detect
 - Colourless, red, orange, blue, white, green, etc.
 - Examples: bananas are yellow, apples are red or green or yellow
- ✓ **Odour:** the way a substance smells
 - Odourless, sweet, sour, burnt, aromatic, fragrant, nauseating, sharp, acrid, choking, etc.
 - Examples: perfume smells fragrant, vinegar smells sour
- ✓ **Density:** a measure of how much mass is contained in a given unit volume of a substance
 - Examples: density of water is 1.0g/cm^3 , density of gold is 19.3g/cm^3

Properties applicable to solids

- ✓ **Texture:** feel of a substance; how a substance feels to the touch
 - Crystalline, powdery, granular, fibrous, flaky, waxy, etc.
 - Examples: sugar is granular, hair is fibrous, sandpaper is rough
- ✓ **Luster:** shininess or dullness; the way a surface reflects light
 - Shiny, dull, metallic, greasy, glassy, etc.
 - Examples: many silver objects have a high luster, a rusty nail has a low luster
- ✓ **Hardness:** relative ability to scratch or be scratched by another substance; resistance of a material to pressure
 - Hard, soft, etc.
 - Examples: wax is low on the hardness scale, diamonds are high on the hardness scale
- ✓ **Brittleness:** breakability or flexibility
 - Brittle, flexible, etc.
 - Examples: Glass is brittle, modelling clay is flexible
- ✓ **Malleability:** ability of a substance to be hammered into a thinner sheet or molded
 - Malleable, not malleable, etc.
 - Examples: Silver is malleable, glass breaks easily
- ✓ **Ductility:** ability of a substance to be drawn (pulled) into a finer strand
 - Ductile, not ductile, etc.
 - Examples: Pieces of copper can be drawn into thin wires, carbon cannot be drawn into wires
- ✓ **Electrical conductivity:** ability of a substance to allow an electrical current to pass through it
 - High conductivity, low conductivity, etc.
 - Examples: copper wires have high conductivity, plastics have low conductivity

Properties applicable to liquids

- ✓ **Viscosity:** the ability of a substance to flow or pour readily; the degree to which a fluid resists flow
 - Runny, oily, thick, syrupy, etc.
 - Examples: molasses and corn syrup are viscous, water and vinegar have low viscosity

Chemical Properties

- ✓ Some chemical properties are:
 - Reactivity with water
 - Reactivity with air
 - Reactivity with pure oxygen
 - Reactivity with acids
 - Reactivity with other pure substances
 - Toxicity
 - Stability
 - Combustibility
- ✓ **Chemical change:** a change in the starting substance or substances and the production of one or more new substances
- ✓ There are 5 signs that a chemical change is occurring or has occurred:
 - 1) A change of colour – a new substance has formed that has a different colour than the original substance
 - 2) A change of odour – a new substance has formed that has a detectable odour
 - 3) Bubbles are visible that are not caused by heating – a new substance is produced in the form of a gas

- 4) A new solid is seen - a new substance that is produced does not dissolve in the mixture and shows up as a solid (solids formed this way are often powdery and are called precipitates - they separate from a solution)
- 5) A change in temperature or light - energy is released or absorbed during the chemical change, and is detected as a change in temperature or light