

Properties of Matter

What is matter?

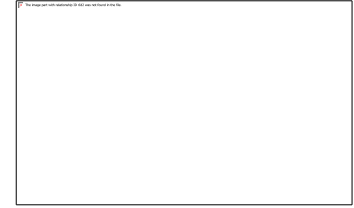
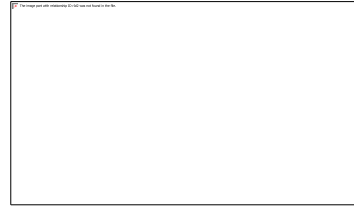
- Matter is anything that has mass and volume (is made of atoms and takes up space)
- Matter is made up of atoms
- Each atom is unique and has certain ways it behaves, looks, smells, etc..... These are known as its **properties**
- There are three main states of matter. Solid, liquid and gas

Physical Properties

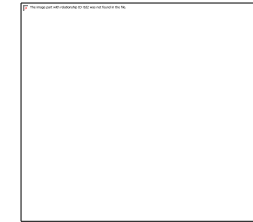
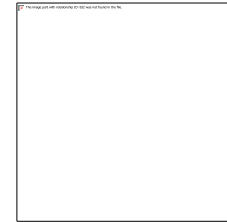
- Physical properties are characteristics that can be observed without changing the substance
- Described using our senses

Some Physical Properties are...

- Color
 - Red, black, colorless



- Shape
 - Square, round, irregular

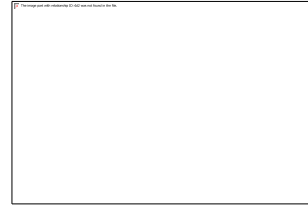


- Odor
 - What could we compare the smell too? Is it odorless?



More physical properties...

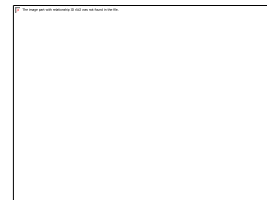
- Magnetism
 - Does it draw, pull, or repel objects or substances



- Hardness
 - Does it hold up to pressure? Is it easily scratched?



- Texture
 - What does the object feel like?

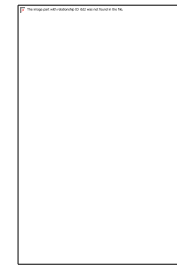


Even More Physical Properties...

- Luster
 - The ability to reflect light (dull, shiny)



- Malleability
 - The ability to be reshaped



- Mass
 - The amount of matter in an object

Characteristic Properties

- A **physical property** that **does NOT change based on amount** of substance
- These are properties that can be used to identify unknown substances

Characteristic Property- Density

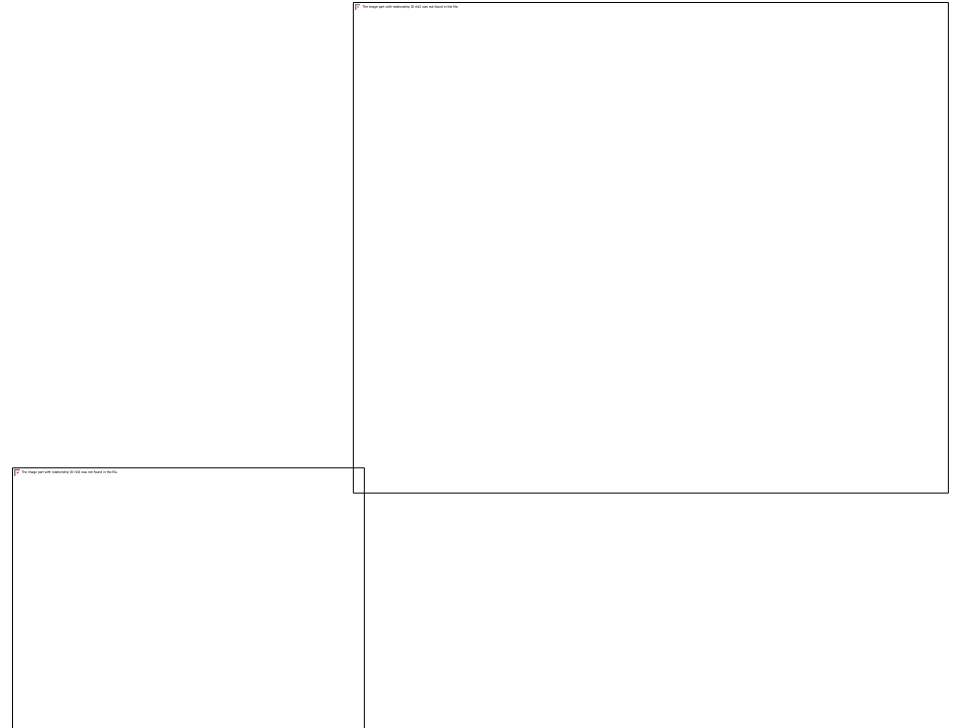
- Density- amount of mass per volume
 - i.e. amount of stuff in the space an object takes up
- Formula: $\text{density} = \frac{\text{mass}}{\text{volume}}$
- Units:
 - Grams per milliliter, $\frac{\text{g}}{\text{mL}}$ for **gasses and liquids**
 - Grams per centimeter cubed, $\frac{\text{g}}{\text{cm}^3}$ for **solids**

Characteristic Property- Boiling Point and Melting Point

- Temperature at which the substance changes states i.e. when it boils or melts
 - Boiling point- the temperature where liquid changes to gas
 - Melting point- the temperature where solid becomes liquid; same temperature where the substance will freeze
- Why isn't mass a characteristic property?

Physical Changes

- When a substance goes through a **physical change** the substance **stays the same before and after**
- Examples...
 - Tearing paper
 - Cutting hair
 - Crushing a can
 - Breaking glass
 - Melting ice



Chemical Properties

- Properties that can only be observed by changing the original substance into a new one
- These cannot be observed in normal circumstances

Some chemical properties are...

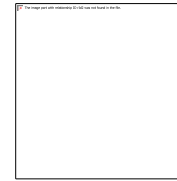
- Flammability

- How easily will a substance ignite?



- Oxidation

- When exposed to oxygen they chemically react to form things like rust or the brown on a cut apple



- pH

- How acidic or basic a substance is when dissolved in water



Chemical Changes

- A substance goes through a chemical change when a substance goes through a chemical reaction and becomes a new substance with new properties
- Examples...
 - Burning wood
 - Cooking an egg
 - A bike rusting