Introduction to Chemistry

Chemistry: the study of matter and its interactions

Matter: anything that has mass and takes up space

Physical vs. Chemical Properties

<https://www.youtube.com/watch?v=U5lwgmYr36U>

A **property** is a characteristic that can be used to classify and identify matter.

In science, properties can be grouped as either **physical** or **chemical**.

A physical property is something we can observe about a substance without changing what it is. This helps us to identify what a substance might be. A physical property can be either qualitative (where we use our five senses) or quantitative (where we measure the property using numbers).

What qualitative properties are unsafe to test?

* Taste (don’t want to ingest something dangerous)
* Smell (don’t want to inhale chemicals)
* Touch (don’t touch chemicals; use tongs, scoopula, tweezers, etc.)

Some typical physical properties include those in the table below. Complete the following table using Table 1 on page 14 of the textbook:

|  |  |  |
| --- | --- | --- |
| **Property** | **Describing the property** | **Sense used** |
| **Colour** | It is blue, red, green... | Sight |
| **Texture** | It is fine, coarse, smooth, gritty... | Touch |
| **Odour** | It is odourless, spicy, burnt... | Smell (WAFT!) |
| **Lustre** | It is shiny, dull... | Sight |
| **Clarity** | It is clear, cloudy, opaque | Sight |
| **State** | It is solid, liquid, gas | Sight |

The three must-haves when making observations for the lab are state, colour and clarity. \*\*\*HIGHLIGHT

Some other physical properties are also found on page 14 in the textbook (the bolded words). Read about them and complete the table below (the rest we will do as a class):

|  |  |  |
| --- | --- | --- |
| **Property** | **Definition** | **Example** |
| **Density** | Ratio of mass to volume (D=m/v) | Ice is less dense than water so it floats |
| **Hardness** | Reistance of a solid to being scratched or dented | Diamonds are one of the hardest substance on earth |
| **Melting point** | Temperature at which a solid melts | Ice melts at 0 degrees Celsius |
| **Boiling point** | Temperature at which a liquid begins to boil | Water boils at 100 degrees Celsius |
| **Solubility** | Ability of a substance to dissolve in a solvent | Salt dissolves in water to make salt water |
| **Viscosity** | How easily a liquid flows | Ketchup is thicker, or more viscous, than water |
| **Conductivity** | Ability of a substance to conduct heat or electricity | Metals are good conductors (like copper for wires), while glass is not (which is why it’s in windows) |
| **Malleability** | Ability of a substance to be bent into a shape | Aluminum does this well, but sulfur doesn’t |
| **Ductility** | Ability of a substance to be pulled into a long wire | Copper does this well, but salt doesn’t |
| **Size** | How big an object is |  |
| **Temperature** | How hot/cold something is |  |
| **Mass** | How heavy something is |  |

A chemical property describes the behaviour of a substance as it becomes something new.

Define **combustibility** and **light sensitivity** using page 15 in the textbook, then we will complete the rest as a class:

|  |  |  |
| --- | --- | --- |
| **Property** | **Definition** | **Example** |
| Combustibility | How easily something burns and catches fire | Methane is flammable and will burn |
| Light sensitivity | When light hits something, it turns into something new | Hydrogen peroxide is used as a disinfectant. It is stored in a dark bottle because in the light, it turns into water and oxygen gas |
| Reacts with water | Something new forms when it interacts with water | https://www.youtube.com/watch?v=m55kgyApYrY |
| Reacts with acid | Something new forms with it interacts with acid | Hydrochloric acid will dissolve metal and make it bubble |
| Reacts with air | Something new forms when it interacts with a ir | Copper will react with the air over time to make copper oxide, a green colour |