

Lecture 1 - Introduction and Chemistry Basics

Monday, 23 February 2015 9:01 AM

- All matter is made up of atoms
- Atoms are made up of subatomic particles - protons, neutrons and electrons
- Protons and Neutrons form the nucleus
- Electrons are outside the nucleus
- Protons: +1
- Neutrons: 0
- Electrons: -1
- Mass of atom is mostly due to protons and neutrons - electrons have almost no effect on mass --> **Number of protons + number of neutrons gives us the mass number of an atom**
- Number of protons in nucleus determines what element the atom is
- Elements all have equal numbers of protons and electrons

- Periodic table ordered by increasing atomic number
- An element with an atomic number of 4 will have 4 protons and 4 electrons
- Isotopes - mass number changes, e.g. C-13 replaces the mass number 12 with 13
- Changing number of neutrons creates an **isotope**

- **Amu** - atomic mass units
- The relative atomic mass of an element is calculated by using the atomic mass of the isotopes (nuclide mass) and their fractional abundance (how common are they)
- We use weighted average so if your element is 20% 16 amu, and 80 % 17 amu, you do the following:

 $(0.2 \times 16) + (0.8 \times 17) = 16.8 \text{ amu}$

- Sample question: $(0.7870 \times 23.985045) + (0.1013 \times 24.985840) + (0.1117 \times 25.982591)$
 $= 24.309551 = 24.31$ (round to 2dp because it is the lowest dp value in our question)

- **Atoms** are particles that make up all substances
- **Molecules** are atoms that have bonded
- **Compounds** are pure substances consisting of atoms of more than one element. They have a fixed composition
- **Mixtures** are not pure substances and contain a combination of atoms, molecules and compounds
- Compounds are represented by a chemical formula