Atoms and Reactions

Atoms are made up of Protons, Neutrons and Electrons

Atoms are the stuff all elements and compounds are made of. They're made up of 3 types of subatomic particle – protons, neutrons and electrons.

The mass and charge of these subatomic particles are tiny, so relative mass and relative charge are used instead.

<table>
<thead>
<tr>
<th>Subatomic Particle</th>
<th>Relative Mass</th>
<th>Relative Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proton</td>
<td>1</td>
<td>+1</td>
</tr>
<tr>
<td>Neutron</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Electron</td>
<td>1/2000</td>
<td>-1</td>
</tr>
</tbody>
</table>

Nuclear Symbols show Numbers of Subatomic Particles

You can figure out the number of protons, neutrons and electrons from the Nuclear Symbol.

Mass (Nucleon) Number. This tells you the total number of protons and neutrons in the nucleus.

Atomic (Proton) Number
1) This is the number of protons in the nucleus – it identifies the element.
2) All atoms of the same element have the same number of protons.

1) For neutral atoms, which have no overall charge, the number of electrons is the same as the number of protons.
2) The number of neutrons is just mass number minus atomic number.

Ions have Different Numbers of Protons and Electrons

Negative ions have more electrons than protons, and positive ions have fewer electrons than protons.

Isotopes are Atoms of the Sane Element with Different Numbers of Neutrons

Isotopes of an element are atoms with the same number of protons but different numbers of neutrons.

1) It’s the number and arrangement of electrons that decides the chemical properties of an element. Isotopes have the same configurations of electrons, so they’ve got the same chemical properties.
2) Isotopes of an element do have slightly different physical properties though, such as different densities, rates of diffusion, etc. This is because physical properties tend to depend more on the mass of the atom.

Exam Questions

Q1) Hydrogen, Deuterium and Tritium are all isotopes of each other.
   a) Identify one similarity and one difference between these isotopes [2 Marks]
   b) Deuterium can be written as ²H. Determine the number of protons neutrons and electrons in a neutral deuterium atom. [1 Mark]
   c) Write a nuclear symbol for tritium, given that it has 2 neutrons. [1 Mark]