**Physics Topic 4: Atomic Structure**

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| **Definitions** | **Diagrams** |
| 1 | Proton | Positively charged particle found in the nucleus | **Bohr model of atom (the good one)** | (disproved by alpha particle scattering) |
| 2 | Neutron | Neutrally charged particle found in the nucleus |
| 3 | Electron | Negatively charged particle found on the outside of atoms at different distances from the nucleus |
| 4 | Nucleus | Centre of the atom 1/10 000 of the size of the atom but most of the mass of the atom |
| 5 | Atomic number | Number of protons in an atom. All atoms of a particular element have the same atomic number |
| 6 | Mass number | Total number of protons and neutrons in the atom |
| 7 | Ion | An atom with either more or less electrons than protons, giving it an overall positive or negative charge |
| 8 | Isotope | Atoms of the same element with different numbers of neutrons/ different mass numbers. | **Calculating Half-life from a graph**Halve the initial activity (80÷2=40)Draw a line across on the graph until you hit the curveDraw a line down (half-life = 2 days) | **Nuclear equations****Alpha decay**Mass number must balance on both sides**(**219 = 215 +4)$$\rightarrow $$Atomic number must balance too(86= 84+2)  Alphaparticle**Beta decay**$$\rightarrow $$Beta particle**Gamma decay** This causes no change in the mass or charge of the nucleus. |
| 9 | Decay | When an unstable nucleus releases radiation |
| 10 | Activity | The rate at which a radioactive isotope decays |
| 11 | Half life | The time it takes for the number of atoms in a sample to halve. OR the time it takes for the count rate (or activity) from a sample to halve. |
| 12 | Radioactive contamination | The unwanted presence of materials containing radioactive atoms on other materials. |
| 13 | Irradiation | The process of exposing an object to nuclear radiation. The irradiated object does not become radioactive. |
| 14 | Becquerel (Bq) | The unit of radioactivity 1Bq is 1 decay per second | **Mass number****Atomic number****Chemical symbol** |
| **Types of Radiation** |
| 1 | Alpha (α) | A helium nucleus (2 protons and 2 neutrons).Highly ionising, <5cm range in air, low penetration |
| 2 | Beta (β) | A high energy electron. Low ionisation, ~30cm range in air, medium penetration |
| 3 | Gamma (γ) | High energy electromagnetic wave. Very low ionisation, long range in air, very high penetration |