

Atoms & Isotopes (7.1)

#1. Copy down the 4 bullets that outline the **Bohr-Rutherford models**.

- The dense nucleus contains protons & neutrons
- Relatively tiny electrons orbit the nucleus.
- Electrons only occupy certain energy levels
- Most of the atom is empty space (!!)

Ground state = state in which all electrons are in their lowest possible energy levels.

Excited state = state in which one or more electrons are at higher levels than in the ground state.

#2. **Atomic mass, mass number and periodic table**

Atomic number = number of protons in nucleus of an atom

Mass number = number of nucleons (protons & neutrons) in the nucleus of an atom

Draw and label Figure 4 as well.



#3. **Isotope** = form of an element that has same atomic number (protons) but a different mass number. (Basically this is the same element but it is a form of the element with a different number of neutrons.)

Draw carbon-12 (Fig 5)

Draw carbon-14 (Fig. 5)

C-14 is a radioisotope of carbon. This is useful to us as it is used in 'carbon dating'. WE can determine the age of anything that was organic with this radioisotope (like dinosaur bones, old human bones...etc)

Radioisotope = an unstable isotope that spontaneously changes its nuclear structure and release energy in the form of radiation.

Radiation = energy released when the nucleus of an unstable isotope undergoes a change in structure.

A radioisotope will decay naturally and release radiation.

#4 Medical Treatments

Diagnostic scanning → technetium-99 is often used in scanning. The patient is given some technetium-99 (not harmful) and it decays radioactively in the body releasing energy. This energy can be used to create an image (much like x-rays are energy that produce an x-ray picture). Technetium-99 is used to find cancerous or diseased organs or can be used to see if there is kidney blockage.

Treatment → Iodine-131 is a radioisotope used to treat (kill off) overactive thyroid glands.

RNT = Radionuclide therapy = use of radioisotopes to treat patients.