On nuclear physics

A.C. Norman
anorman@bishopheber.cheshire.sch.uk

Warm-up problems

1. Draw a diagram to show the basic structure of an atom, showing the relative masses and electric charges of protons, neutrons and electrons.

2. Which type of radioactive emission

   (a) is positively charged?

   (b) is not deflected by magnetic fields?

   (c) is the most penetrative?

   (d) is the most intensely ionizing?

   (e) cannot pass through cardboard?

   (f) does not cause a change in mass number or atomic number?

   (g) has the greatest mass?

Regular problems

3. Uranium-235 and uranium-238 are isotopes of uranium.

   (a) How are the two isotopes different?

   (b) Uranium has 92 protons. How many neutrons are there in uranium-235 and uranium-238?

   (c) How many electrons are there in an atom of uranium?

4. (a) The rate of radioactive decay can be increased by increasing the
   A temperature B pressure C light intensity D none of these

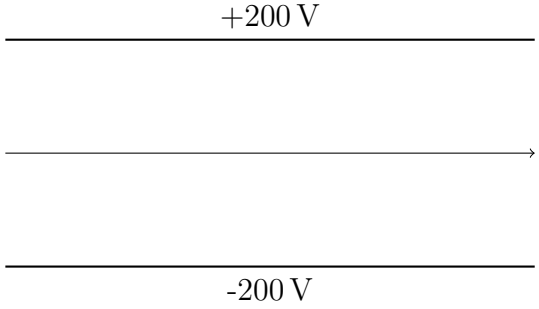
   (b) An alpha particle has a charge of
   A +1 B +2 C −1 D +4 E none of these

   (c) A beta particle is
   A a helium nucleus B an electron from the nucleus C electromagnetic radiation D none of these

5. (a) Write down two natural and two artificial source of background radiation.

   (b) Explain why radioactivity is harmful to living tissue.

6. The diagram below shows the path of three different types of radiation between two charged metal plates.



   (a) Sketch a copy of the diagram above, and label the three paths followed by the various radiations.

Extension problem

7. Paul says 'an ion is a bit like an isotope, it has one two few or one too many particles'. Explain whether Paul is right in thinking this, and how could you improve his understanding?