

11 Particle physics – Part 1 —Answers

Answers

11.1 (a) 11 protons.

(b) $23 - 11 = 12$ neutrons.

11.2 They are atoms of the same element (same number of protons), but with different numbers of neutrons (so a different nucleon number).

11.3 (a) proton = uud .

(b) neutron = udd .

11.4 alpha, then beta, then gamma (gamma is the most penetrating).

11.5 Outside the body, alpha is stopped by the skin (or even a layer of air), so it does little harm. Swallowed, it is released right next to living cells, where it is very strongly ionising and so does a lot of damage.

11.6 Proton uud : $+\frac{2}{3} + \frac{2}{3} - \frac{1}{3} = +\frac{3}{3} = +1$. Neutron udd : $+\frac{2}{3} - \frac{1}{3} - \frac{1}{3} = 0$.