

- 8 (a)** Nucleus P and nucleus Q are isotopes of the same element.

Nucleus Q is unstable and emits a β^- particle to form nucleus R.

- (i) For nuclei P and Q, compare:

- the number of protons
-

- the number of neutrons.
-

[2]

- (ii) When nucleus Q decays to form nucleus R, the quark composition of a nucleon changes.

State the change to the quark composition of the nucleon.

..... [1]

- (iii) State the name of another particle that must be emitted from nucleus Q in addition to the β^- particle.

..... [1]

- (b)** A hadron consists of two charm quarks and one bottom quark.

Determine, in terms of the elementary charge e, the charge of the hadron.

charge = e [2]

[Total: 6]