

Additional Topic 7 answers

Topic 7 Atomic, nuclear and particle physics

7.1 Discrete energy and radioactivity

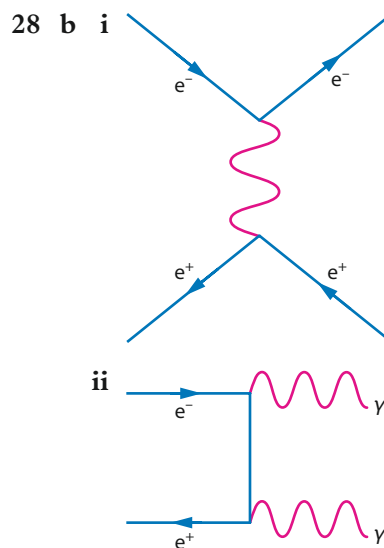
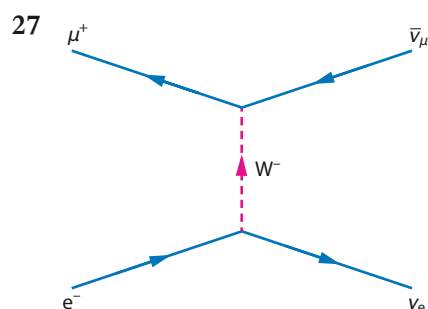
- 1 2, 12, 26, 107
- 2 ${}^3_1\text{H} \rightarrow {}^0_{-1}\text{e} + \bar{\nu}_e + {}^3_2\text{He}$
- 3 ${}^{14}_6\text{C} \rightarrow {}^0_{-1}\text{e} + \bar{\nu}_e + {}^{14}_7\text{N}$
- 4 ${}^A_Z\text{X} \rightarrow 2 {}^0_{-1}\text{e} + {}^4_2\alpha + {}^{A-4}_Z\text{X}$
- 5 ${}^{22}_{11}\text{Na} \rightarrow {}^0_{-1}\text{e} + \bar{\nu}_e + {}^{22}_{10}\text{Ne}$
- 6 8.0 h
- 8 5.8 MeV
- 10 $\frac{F_e}{F_g} = 4 \times 10^{42}$

7.2 Nuclear reactions

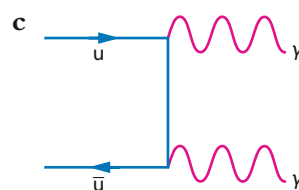
- 12 0.783 MeV
- 13 3.65 MeV
- 14 **a** seven electrons
b 208 MeV
- 15 8.9×10^9 yr

7.3 The structure of matter

- 20 it cannot; baryon number would not be conserved
- 21 $Q = 0, S = -1$
- 22 **c** and **d**



- 29 **a** 0
b violates momentum conservation



- 30 **a** $u \rightarrow d + e^+ + \nu_e$
b W^+
c positron and electron neutrino