

Chapter 44 Even Answers

2. (a) 7.89 cm for ^{12}C , 8.21 cm for ^{13}C (b) See solution
4. (a) 29.5 fm (b) 5.18 fm (c) λ is much smaller than d_{\min}
6. 25.6 MeV
8. $A = 30$
10. 6.16×10^{15} N toward the other ball
12. (a) 48 (b) 6
(c) 44 (d) 4
14. (a) 29.2 MHz (b) 42.6 MHz (c) 2.13 kHz
16. See solution
18. 0.210 MeV greater for ^{23}Na
20. (a) 84.1 MeV (b) 342 MeV
(c) The nuclear force is so strong that the binding energy greatly exceeds the minimum energy needed to overcome electrostatic repulsion.
22. (a) To compensate for an overestimate by the volume term.
(b) $R/3$ for spherical volume, $R/6$ for cubical volume; spherical shapes are more tightly bound.
24. (a) 491 MeV (b) 179%, -53.0%, -24.6%, -1.37%
26. 0.200 mCi
28. 86.4 h
30. $\frac{R_0 T_{1/2}}{\ln 2} (2^{-t_1/T_{1/2}} - 2^{-t_2/T_{1/2}})$
32. (a) $^{65}_{28}\text{Ni}^*$ (b) $^{211}_{82}\text{Pb}$ (c) $^{55}_{27}\text{Co}$
(d) $^0_{-1}\text{e}$ (e) ^1_1H (or p)
34. 9.96×10^3 yr
36. (a) cannot occur (b) cannot occur (c) can occur

38. (a) 4.00×10^9 yr (b) 0.0199 for ^{235}U to ^{207}Pb , 4.60 for ^{232}Th to ^{208}Pb
40. (a) 148 Bq/m^3 (b) $7.05 \times 10^7 \text{ atoms/m}^3$ (c) 2.17×10^{-17}
42. -2.64 MeV
44. (a) $^{21}_{10}\text{Ne}$ (b) $^{144}_{54}\text{Xe}$ (c) $X = {}^0_1\text{e}^+$, $X' = {}^0_0\nu$
46. (a) $^{13}_6\text{C}$ (b) $^{10}_5\text{B}$
48. 165 MeV
50. 1.88 MeV
52. (a) cannot occur (b) can occur
(c) K_e can range from zero to 156 keV in the reaction of (b).
54. (a) See solution (b) $4.17 \times 10^{-3} \text{ min}^{-1}$, 2.77 h
(c) $4.02 \times 10^3 \text{ counts/min}$ (d) $9.65 \times 10^6 \text{ atoms}$
56. (a) $3.91 \times 10^9 \text{ yr}$ (b) no
58. (a) $^{141}_{59}\text{Pr}$ (b) 2.32 MeV (c) 97.2%
60. (a) 61.8 Bq (b) 40.3 d
62. $5.94 \times 10^9 \text{ yr}$
64. (a) 5.69 MeV (b) 3.27 MeV, exothermic
66. (a) 12.3 mg (b) 0.166 W
68. (a) All states can be reached by electron capture.
The 2.44 MeV state cannot be reached by β^+ decay. (b) $^{93}_{42}\text{Mo}$
70. (a) See solution (b) 1.53 MeV