Answers to review questions page 670
33. ${ }_{92}^{235} \mathrm{U} \longrightarrow{ }_{90}^{231} \mathrm{Th}+{ }_{2}^{4} \mathrm{He}$

$$
{ }_{90}^{231} \mathrm{Th} \longrightarrow{ }_{91}^{231} \mathrm{~Pa}+{ }_{-1}^{0} e
$$

$$
{ }_{91}^{231} \mathrm{~Pa} \longrightarrow{ }_{89}^{227} \mathrm{Ac}+{ }_{2}^{4} \mathrm{He}
$$

$$
{ }_{89}^{227} \mathrm{Ac} \longrightarrow{ }_{90}^{227} \mathrm{Th}+{ }_{-1}^{0} e
$$

$$
{ }_{90}^{227} \mathrm{Th} \longrightarrow{ }_{88}^{223} \mathrm{Ra}+{ }_{2}^{4} \mathrm{He}
$$

$$
{ }_{88}^{223} \mathrm{Ra} \longrightarrow{ }_{86}^{219} \mathrm{Rn}+{ }_{2}^{4} \mathrm{He}
$$

$$
{ }_{86}^{219} \mathrm{Rn} \longrightarrow{ }_{84}^{215} \mathrm{Po}+{ }_{2}^{4} \mathrm{He}
$$

$$
{ }_{84}^{215} \mathrm{Po} \longrightarrow{ }_{82}^{211} \mathrm{~Pb}+{ }_{2}^{4} \mathrm{He}
$$

$$
{ }_{82}^{211} \mathrm{~Pb} \longrightarrow{ }_{83}^{211} \mathrm{Bi}+{ }_{-1}^{0} e
$$

$$
{ }_{83}^{211} \mathrm{Bi} \longrightarrow{ }_{84}^{211} \mathrm{Po}+{ }_{-1}^{0} e
$$

$$
{ }_{84}^{211} \mathrm{Po} \longrightarrow{ }_{82}^{207} \mathrm{~Pb}+{ }_{2}^{4} \mathrm{He}
$$

34. a. ${ }_{94}^{239} \mathrm{Pu}$
b. ${ }_{6}^{13} \mathrm{C}$
c. ${ }_{0}^{1} n$
d. ${ }_{56}^{139} \mathrm{Ba}$
35. a. ${ }_{1}^{2} \mathrm{H}$
b. ${ }_{6}^{12} \mathrm{C}$
c. ${ }_{-1}^{0} e$
36. ${ }_{54}^{117} \mathrm{Xe} \longrightarrow{ }_{53}^{117} \mathrm{I}+{ }_{+1} e$
