(g) $Ba + Ni(NO_3)_2 \rightarrow Ba(NO_3)_2 + Ni$
(h) $Al + I_2 \rightarrow AlI_2$
(i) $AgNO_3 + Na_2CrO_4 \rightarrow Ag_2CrO_4 + NaNO_3$

26. (a) Temperature
(b) Concentration
(c) Concentration
(d) Catalyst
(e) Surface area
(f) Oxygen (Possibly temperature too, because the flame temperature likely increases. However, the mixture is given extra oxygen so that the iron in the steel will also oxidize, which is a concentration effect.)
27. Alpha, beta, and gamma
28. Isotopes are atoms of the same element that differ in the number of neutrons they possess.
29. (a) ${}^{1}_{1}p$

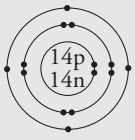
(b) ${}^{1}_{-0}n$

(c) ${}^{0}_{-1}\beta$, ${}^{0}_{-1}e$

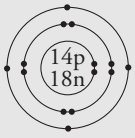
(d) ${}^{0}_{0}\gamma$

(e) ${}^{4}_{2}\alpha$, ${}^{4}_{2}\mathrm{He}$

30. (a) Both possess eight protons and eight electrons.
(b) Oxygen-16 has eight neutrons, and oxygen-17 has nine neutrons.
31. A beta particle is released from the nucleus of an atom through a process in which a neutron decays into other particles including a proton and an electron. The electron escapes from the nucleus as a beta particle. The newly formed proton remains in the nucleus, which increases the atomic number of the nucleus by one, creating a new element.
32.
(a) silicon-28



(b) silicon-32



(c) beryllium-7

(d) beryllium-10

33.

Isotope	Mass Number	Atomic Number	Number of Neutrons
helium-3	3	2	1
helium-4	4	2	2
nitrogen-14	14	7	7
nitrogen-15	15	7	8
oxygen-18	18	8	10
neon-20	20	10	10

34. In a fusion nuclear reaction, small atomic nuclei combine together to form larger ones, typically with the release of energy. In a fission nuclear reaction, more massive atomic nuclei fragment to form less massive nuclei.
35. Currently, fission nuclear reactions are used in the generation of electricity and in nuclear weapons.

Understanding Key Ideas

36. (a) Nickel
(b) Nitrogen
(c) Helium, krypton
(d) Helium, oxygen, chlorine, nitrogen, and krypton
(e) Nickel, tin, sodium, gold
37. (a) $4Na + O_2 \rightarrow 2Na_2O$
(b) $Mg + CuCl_2 \rightarrow Cu + MgCl_2$
(c) $CaCO_3 \rightarrow CaO + CO_2$
(d) $CrCl_3 + 3KOH \rightarrow 3KCl + Cr(OH)_3$
(e) $2NaCH_3COO + Mn(NO_3)_2 \rightarrow Mn(CH_3COO)_2 + 2NaNO_3$
38. Hydrocarbons are compounds that contain both carbon and hydrogen but not other elements.
(a) Hydrocarbon
(b) Not a hydrocarbon due to the presence of oxygen
(c) Hydrocarbon
(d) Not a hydrocarbon due to the presence of calcium and oxygen
(e) Not a hydrocarbon due to the presence of oxygen and the absence of carbon
39. (a) $2NaF \rightarrow 2Na + F_2$
(b) $6Li + N_2 \rightarrow 2Li_3N$
(c) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$
(d) $K_2CrO_4 + 2AgNO_3 \rightarrow 2KNO_3 + Ag_2CrO_4$