Answers to problems numbers 46, 51 and 52 in page 295.

46. a. total:
$$H^+(aq) + Cl^-(aq) + Na^+(aq) + OH^-(aq) \rightarrow Na^+(aq) + Cl^-(aq) + H_2O(l);$$

net: $H^+(aq) + OH^-(aq) \rightarrow H_2O(l)$

b. total:
$$Mg(s) + 2H^{+}(aq) + 2Cl^{-}(aq) \longrightarrow Mg^{2+}(aq) + 2Cl^{-}(aq) + H_{2}(g);$$

net: $Mg(s) + 2H^{+}(aq) \longrightarrow Mg^{2+}(aq) + H_{2}(g)$

c. total:
$$Cd^{2+}(aq) + 2Cl^{-}(aq) + 2Na^{+}(aq) + CO_{3}^{2-}(aq) \rightarrow 2Na^{+}(aq) + 2Cl^{-}(aq) + CdCO_{3}(s)$$
; net: $Cd^{2+}(aq) + CO_{3}^{2-}(aq) \rightarrow CdCO_{3}(s)$

d. total:
$$Mg(s) + Zn^{2+}(aq) + 2NO_3^-(aq) \longrightarrow Zn(s) + Mg^{2+}(aq) + 2NO_3^-(aq);$$

net: $Mg(s) + Zn^{2+}(aq) \longrightarrow Zn(s) + Mg^{2+}(aq)$

1. a.
$$CaH_2(s) + 2H_2O(l) \longrightarrow Ca(OH)_2(aq) + 2H_2(g)$$

b.
$$CH_3CH_2CCH(g) + 2Br_2(l) \longrightarrow CH_3CH_2CBr_2CHBr_2(l)$$

c.
$$Pb^{2+}(aq) + 2OH^{-}(aq) \longrightarrow Pb(OH)_{2}(s)$$

d.
$$3NO_2(g) + H_2O(l) \longrightarrow 2HNO_3(aq) + NO(g)$$

2. a.
$$H_2 + I_2 \rightarrow 2HI$$
; synthesis

d.
$$Cu + Cl_2 \longrightarrow CuCl_2$$
; synthesis

3. a.
$$H_2O(g) + C(s) \longrightarrow CO(g) + H_2(g)$$

b. NH₄NO₃(aq)
$$\xrightarrow{heat}$$
 N₂O(g) + 2H₂O(l)

c.
$$2NO(g) + O_2(g) \longrightarrow 2NO_2(g)$$

4. a.
$$CO(g) + 2H_2(g) \longrightarrow CH_3OH(l)$$

b.
$$2CH_3OH + 3O_2 \longrightarrow 2CO_2 + 4H_2O$$