**Answers to Chapter 5 Review Questions Pg. 343**

1. b 2. c 3. b 4. c 6. e 7. a 8. d 10. d

30.

1. x-1 reverse Ca(OH)2(s) 🡪 CaO(s) + H2O(l) ∆H° =+65.2kJ
2. x-1 reverse CaO(s) + CO2(g) 🡪 CaCO3(s) ∆H° = -178.1kJ
3. x-1 reverse Ca2+ (aq) + 2OH- (aq) 🡪 Ca(OH)2(s) ∆H° = +16.2 kJ

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Ca2+ (aq) + 2OH- (aq) + CO2(g) 🡪 CaCO3(s) + H2O(l)

∆H° = 65.2 kJ – 178.1 kJ + 16.2 kJ = -96.7 kJ

32. a.Cu(NO3)2(s) + 302.9 kJ → Cu(s) + N2(g) + 3O2(g)

b. n Cu = 37.9 g x 1 mol/63.546 g = 0.596418 mol

Q = 302.9 kJ/mol x 0.0596418 mol = 180.655 kJ

The thermal energy required to produce the copper is 181 kJ.

33. The equation has been reversed and the sign of H°r should now be negative, as shown. The given value of H°r was for 1 mol of N2O4(g). Since there is now 1/2 mol N2O4(g), H°r must also be divided by 2. Therefore, the given equation is not correct. The correct equation is:

NO2(g) → 1/2 N2O4(g) H°r = -28.6 kJ

36. (1) × -2: 2H2(g) + O2(g) → 2H2O(l) ∆H ̊ = -571.6 kJ

(2) × 1: C3H4(g) + 4O2(g)→ 3CO2(g) + 2H2O(l) ∆H ̊ = -1936.8 kJ

(3) ×-1: 3CO2(g) + 4H2O(l) → C3H8(g) + 5O2(g) ∆H ̊ = 2219.2 kJ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

C3H4(g) + 2H2(g) → C3H8(g) ∆H ̊r = -289.2 kJ

37. ∆H ̊r = [∑(n∆H ̊fproducts)] - [∑(n∆H ̊freactants)]

-159.6 kJ = [(1 mol)(∆H ̊f Ni(CO)4(g))] - [ (1 mol)(∆H ̊f Ni) + (4 mol)(∆H ̊f CO(g))]

-159.6 kJ = [(1 mol)(∆H ̊f Ni(CO)4(g))] - [ (1 mol)(0 kJ/mol) + (4 mol)(-110.5 kJ/mol)]

∆H ̊f Ni(CO)4(g) = -159.6 kJ - 442.0 kJ = -601.6 kJ

The standard molar enthalpy of formation is -601.6 kJ/mol.

38. ∆H ̊r = [∑(n∆H ̊fproducts)] - [∑(n∆H ̊freactants)]

= [(1 mol)(∆H ̊f C4H6(g)) + (2 mol)(∆H ̊f H2O(g))+(1 mol)(∆H ̊fH2 (g))] - [(2 mol)(∆H ̊fC2H5OH(l))

= [(1 mol)(-391.1 kJ/mol) + (2 mol)(-241.8 kJ/mol)+ (1 mol)(0 kJ/mol)] - [(2 mol)(-277.6 kJ/mol)]

= –319.5 kJ

The standard enthalpy of reaction for the reaction as written is –319.5 kJ.