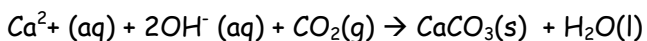
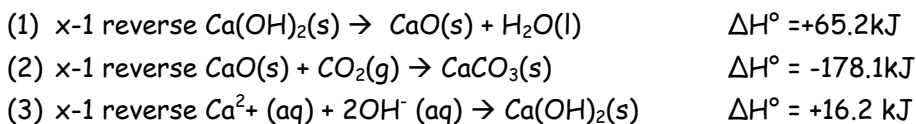


Answers to Chapter 5 Review Questions Pg. 343

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

30.



$$\Delta H^\circ = 65.2 \text{ kJ} - 178.1 \text{ kJ} + 16.2 \text{ kJ} = -96.7 \text{ kJ}$$

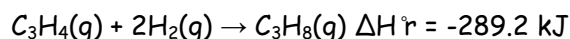
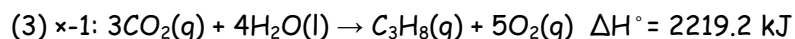
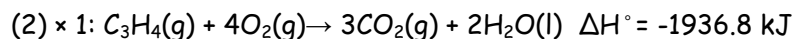
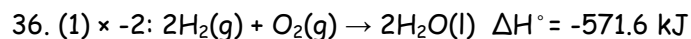
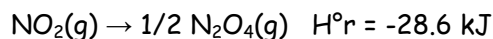


b.  $n_{\text{Cu}} = 37.9 \text{ g} \times 1 \text{ mol} / 63.546 \text{ g} = 0.596418 \text{ mol}$

$Q = 302.9 \text{ kJ/mol} \times 0.596418 \text{ mol} = 180.655 \text{ kJ}$

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

33. The equation has been reversed and the sign of  $H^\circ_r$  should now be negative, as shown. The given value of  $H^\circ_r$  was for 1 mol of  $\text{N}_2\text{O}_4(\text{g})$ . Since there is now 1/2 mol  $\text{N}_2\text{O}_4(\text{g})$ ,  $H^\circ_r$  must also be divided by 2. Therefore, the given equation is not correct. The correct equation is:



37.  $\Delta H^\circ_r = [\sum(n\Delta H^\circ_f \text{ products})] - [\sum(n\Delta H^\circ_f \text{ reactants})]$

$$-159.6 \text{ kJ} = [(1 \text{ mol})(\Delta H^\circ_f \text{ Ni(CO)}_4(\text{g}))] - [(1 \text{ mol})(\Delta H^\circ_f \text{ Ni}) + (4 \text{ mol})(\Delta H^\circ_f \text{ CO}(\text{g}))]$$

$$-159.6 \text{ kJ} = [(1 \text{ mol})(\Delta H^\circ_f \text{ Ni(CO)}_4(\text{g}))] - [(1 \text{ mol})(0 \text{ kJ/mol}) + (4 \text{ mol})(-110.5 \text{ kJ/mol})]$$

$$\Delta H^\circ_f \text{ Ni(CO)}_4(\text{g}) = -159.6 \text{ kJ} - 442.0 \text{ kJ} = -601.6 \text{ kJ}$$

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

38.  $\Delta H^\circ_r = [\sum(n\Delta H^\circ_f \text{ products})] - [\sum(n\Delta H^\circ_f \text{ reactants})]$

$$= [(1 \text{ mol})(\Delta H^\circ_f \text{ C}_4\text{H}_6(\text{g})) + (2 \text{ mol})(\Delta H^\circ_f \text{ H}_2\text{O}(\text{g})) + (1 \text{ mol})(\Delta H^\circ_f \text{ H}_2(\text{g}))] - [(2 \text{ mol})(\Delta H^\circ_f \text{ C}_2\text{H}_5\text{OH}(\text{l}))]$$

$$= [(1 \text{ mol})(-391.1 \text{ kJ/mol}) + (2 \text{ mol})(-241.8 \text{ kJ/mol}) + (1 \text{ mol})(0 \text{ kJ/mol})] - [(2 \text{ mol})(-277.6 \text{ kJ/mol})]$$

$$= -319.5 \text{ kJ}$$

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