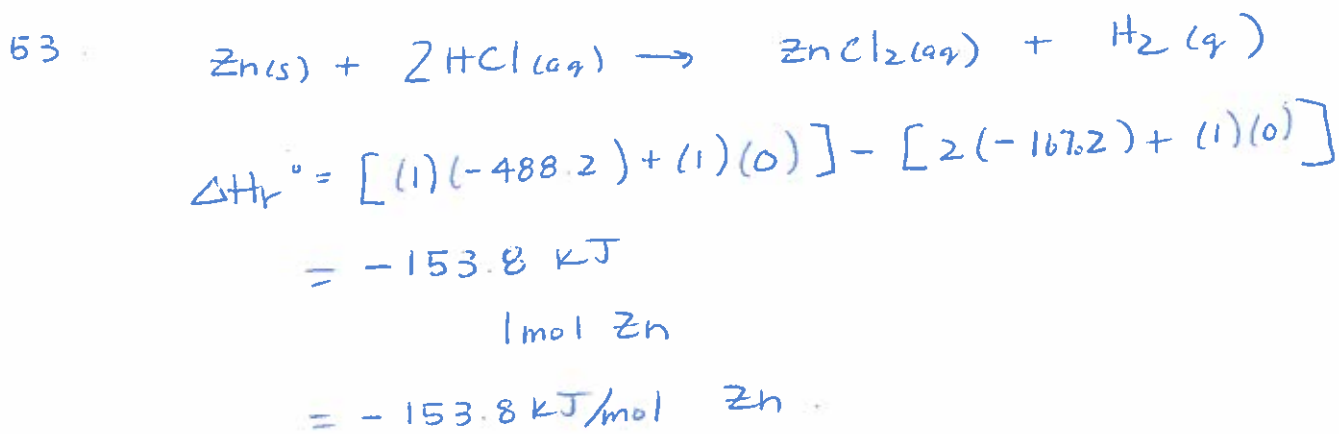


$$\begin{aligned} \Delta H_r^\circ &= \sum (n H_f^\circ \text{prod}) - \sum (n H_f^\circ \text{react}) \\ &= [2(-393.5) + 3(-241.8)] - [(1)(-277.6) + 3(0)] \\ &= -1234.8 \text{ kJ} \\ &= -1235 \text{ kJ/mol C}_2\text{H}_5\text{OH} \quad \therefore 1 \text{ mol} \end{aligned}$$

$$52. \Delta H_r^\circ = [(1)(-314.4)] - [(1)(45.9) + (1)(-92.3)] \\ = -176.2 \text{ kJ}$$



$$\begin{aligned} \text{b)} \quad \Delta H &= n \Delta H_r \\ -123 \text{ kJ} &= n (153.8 \text{ kJ/mol}) \\ n &= 0.7997 \text{ mol} \\ m &= 0.7997 \text{ mol} \times \frac{65.409 \text{ g}}{\text{mol}} \\ &= 52.3 \text{ g} \end{aligned}$$

$$54. \Delta H_r^\circ = [(4)(91.3) + (6)(-241.8)] - [(4)(-45.9) + (5)(0)] \\ = -90.2 \text{ kJ}$$



$$55. \quad -305.0 \text{ kJ} = [(1 \text{ mol}) \Delta H_f^\circ \text{CHCl}_3 + (3)(-92.3)] - [(1)(-74.6) + 3(0)]$$

$$-305.0 \text{ kJ} = (1 \text{ mol}) \Delta H_f^\circ \text{CHCl}_3 - 202.3 \text{ kJ}$$

$$\Delta H_f^\circ \text{CHCl}_3 = \frac{-305.0 \text{ kJ} + 202.3 \text{ kJ}}{1 \text{ mol}} \\ = -102.7 \text{ kJ/mol}$$

$$56. \quad -4816.7 \text{ kJ} = [(7)(-393.5) + 8(-285.8)] - [(1 \text{ mol}) \Delta H_f^\circ \text{C}_7\text{H}_{16} + 11(0)]$$

$$-4816.7 \text{ kJ} = -5040.9 \text{ kJ} - (1 \text{ mol}) \Delta H_f^\circ \text{C}_7\text{H}_{16}$$

$$\Delta H_f^\circ \text{C}_7\text{H}_{16} = -224.2 \text{ kJ/mol}$$

$$57. \quad \Delta H_r^\circ = [(1)(-881.6) + 2(-127.0)] - [(1)(-801.2) + 2(-101.8)] \\ = -130.8 \text{ kJ}$$

$$58. \quad -124.2 \text{ kJ} = [(1)(-103.8)] - [(1 \text{ mol}) \Delta H_f^\circ \text{C}_3\text{H}_6 + (1)(0)] \\ -124.2 \text{ kJ} = -103.8 \text{ kJ} - (1 \text{ mol}) \Delta H_f^\circ \text{C}_3\text{H}_6$$

$$\Delta H_f^\circ \text{C}_3\text{H}_6 = 20.4 \text{ kJ/mol}$$

$$59. \quad \Delta H_r = [(1)(-393.5) + (1)(-110.5) + 4(0) + 7(-285.8)] - [(1)(-198.7) + 5(0)] \\ = -2305.9 \text{ kJ}$$

$$\text{complete} - \text{incomplete} = 4163.2 \text{ kJ} - 2305.9 \text{ kJ} \\ = 1857.3 \text{ kJ} \quad \therefore 1 \text{ mol C}_6\text{H}_{14}$$

$$= 1857.3 \text{ kJ/mol C}_6\text{H}_{14}$$

$$60. \quad 43 \text{ kJ} = [(1) \Delta H_f^\circ \text{CH}_3\text{COOC}_2\text{H}_5 + (1)(-285.8)] - [(1)(-277.6) + (1)(-486.0)]$$

$$43 \text{ kJ} = \Delta H_f^\circ \text{CH}_3\text{COOC}_2\text{H}_5 (1 \text{ mol}) + 477.8 \text{ kJ}$$

$$\Delta H_f^\circ \text{CH}_3\text{COOC}_2\text{H}_5 = \frac{-434.8 \text{ kJ}}{\text{mol}}$$