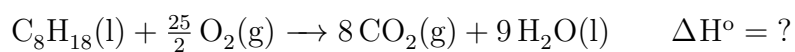


WORKSHEET 2 - QUESTION 1

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$$Q = ?$$

$$m = 10.0 \text{ L} \Rightarrow 10\,000 \text{ mL} \Rightarrow 10\,000 \text{ g}$$

$$c = 4.184 \frac{\text{J}}{\text{g}^\circ\text{C}}$$

$$\Delta T = (35.447 - 20.000) ^\circ\text{C} = 15.447 ^\circ\text{C}$$

$$Q = mc\Delta T$$

$$Q = 10\,000 \text{ g} \times 4.184 \frac{\text{J}}{\text{g}^\circ\text{C}} \times 15.447 ^\circ\text{C}$$

$$Q = 646302 \text{ J}$$

$$Q = 646.302 \text{ kJ}$$

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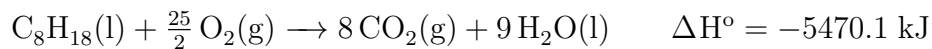
$$\frac{646.302 \text{ kJ}}{13.50 \text{ g C}_8\text{H}_{18}} \times \frac{114.26 \text{ g C}_8\text{H}_{18}}{1 \text{ mol C}_8\text{H}_{18}} = \frac{5470.1 \text{ kJ}}{1 \text{ mol C}_8\text{H}_{18}}$$

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$$\Delta\text{H} = -Q$$

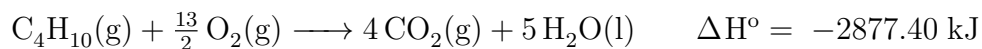
$$\Delta\text{H} = -5470.1 \text{ kJ}/1 \text{ mol C}_8\text{H}_{18}$$

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WORKSHEET 2 - QUESTION 2

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$$Q = -\Delta H$$

$$Q = 2877.40 \text{ kJ/mol C}_4\text{H}_{10}$$

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$$12.5 \text{ kg C}_4\text{H}_{10} \times \frac{1000 \text{ g C}_4\text{H}_{10}}{1 \text{ kg C}_4\text{H}_{10}} \times \frac{1 \text{ mol C}_4\text{H}_{10}}{58.14 \text{ g C}_4\text{H}_{10}} \times \frac{2877.40 \text{ kJ}}{1 \text{ mol C}_4\text{H}_{10}} \times \frac{1000 \text{ J}}{1 \text{ kJ}} = 618636051 \text{ J}$$

---

$$Q = 618636051 \text{ J}$$

$$m = ?$$

$$c = 4.184 \frac{\text{J}}{\text{g}^\circ\text{C}}$$

$$\Delta T = (27.50 - 25.00) ^\circ\text{C} = 2.50 ^\circ\text{C}$$

$$m = \frac{Q}{c\Delta T}$$

$$m = \frac{618636051 \text{ J}}{4.184 \frac{\text{J}}{\text{g}^\circ\text{C}} \times 2.50 ^\circ\text{C}}$$

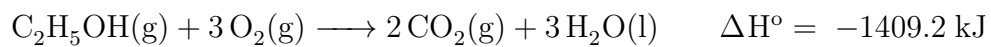
$$m = 5.9143 \times 10^7 \text{ g}$$

$$m = 59143 \text{ kg} \leftarrow \text{mass of water warmed}$$

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WORKSHEET 2 - QUESTION 3

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$$Q = -\Delta H$$

$$Q = 1409.2 \text{ kJ/mol C}_2\text{H}_5\text{OH}$$

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$$5.00 \text{ g C}_2\text{H}_5\text{OH} \times \frac{1 \text{ mol C}_2\text{H}_5\text{OH}}{46.08 \text{ g C}_2\text{H}_5\text{OH}} \times \frac{1409.2 \text{ kJ}}{1 \text{ mol C}_2\text{H}_5\text{OH}} \times \frac{1000 \text{ J}}{1 \text{ kJ}} = 152908 \text{ J}$$

---

$$Q = 152908 \text{ J}$$

$$m = 4.0 \text{ L} \Rightarrow 4\,000 \text{ mL} \Rightarrow 4\,000 \text{ g}$$

$$c = 4.184 \frac{\text{J}}{\text{g}^\circ\text{C}}$$

$$\Delta T = ?$$

$$\Delta T = \frac{Q}{mc}$$

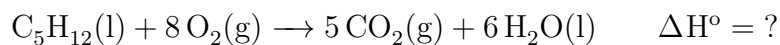
$$\Delta T = \frac{152908 \text{ J}}{4\,000 \text{ g} \times 4.184 \frac{\text{J}}{\text{g}^\circ\text{C}}}$$

$$\Delta T = 9.136 \text{ }^\circ\text{C}$$

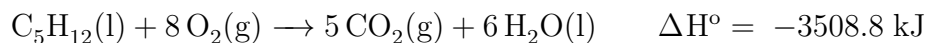
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WORKSHEET 2 - QUESTION 4

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$$\begin{aligned}\Delta H^\circ &= [5\Delta H_{\text{CO}_2(\text{g})}^\circ + 6\Delta H_{\text{H}_2\text{O}(\text{l})}^\circ] - [\Delta H_{\text{C}_5\text{H}_{12}(\text{g})}^\circ + 8\Delta H_{\text{O}_2(\text{g})}^\circ] \\ \Delta H^\circ &= [5(-393.5 \text{ kJ}) + 6(-285.8 \text{ kJ})] - [(-173.5 \text{ kJ}) - 8(0)] \\ \Delta H^\circ &= -3508.8 \text{ kJ}\end{aligned}$$



$$Q = -\Delta H$$

$$Q = 3508.8 \text{ kJ/mol C}_5\text{H}_{12}$$

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$$50.0 \text{ g C}_5\text{H}_{12} \times \frac{1 \text{ mol C}_5\text{H}_{12}}{72.17 \text{ g C}_5\text{H}_{12}} \times \frac{3508.8 \text{ kJ}}{1 \text{ mol C}_5\text{H}_{12}} \times \frac{1000 \text{ J}}{1 \text{ kJ}} = 2430926.98 \text{ J}$$

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$$Q = 2430926.98 \text{ J}$$

$$m = 80.0 \text{ L} \Rightarrow 80\,000 \text{ mL} \Rightarrow 80\,000 \text{ g}$$

$$c = 4.184 \frac{\text{J}}{\text{g}^\circ\text{C}}$$

$$\Delta T = ?$$

$$\Delta T = \frac{Q}{mc}$$

$$\Delta T = \frac{2430926.98 \text{ J}}{80\,000 \text{ g} \times 4.184 \frac{\text{J}}{\text{g}^\circ\text{C}}}$$

$$\Delta T = 7.263 \text{ }^\circ\text{C}$$

$$T_f = \Delta T + T_i$$

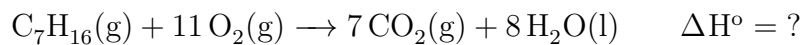
$$T_f = 7.263 \text{ }^\circ\text{C} + 25.000 \text{ }^\circ\text{C}$$

$$T_f = 32.263 \text{ }^\circ\text{C}$$

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WORKSHEET 2 - QUESTION 5

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$$Q = ?$$

$$m = 50.0 \text{ L} \Rightarrow 50\,000 \text{ mL} \Rightarrow 50\,000 \text{ g}$$

$$c = 4.184 \frac{\text{J}}{\text{g}^\circ\text{C}}$$

$$\Delta T = (31.187 - 22.000) ^\circ\text{C} = 9.187 ^\circ\text{C}$$

$$Q = mc\Delta T$$

$$Q = 50\,000 \text{ g} \times 4.184 \frac{\text{J}}{\text{g}^\circ\text{C}} \times 9.187 ^\circ\text{C}$$

$$Q = 1921920.4 \text{ J}$$

$$Q = 1921.92 \text{ kJ}$$

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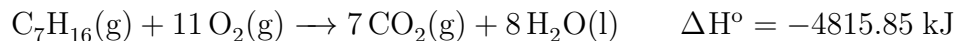
$$\frac{1921.92 \text{ kJ}}{40.0 \text{ g C}_7\text{H}_{16}} \times \frac{100.23 \text{ g C}_7\text{H}_{16}}{1 \text{ mol C}_7\text{H}_{16}} = \frac{4815.85 \text{ kJ}}{1 \text{ mol C}_7\text{H}_{16}}$$

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$$\Delta H = -Q$$

$$\Delta H = -4815.85 \text{ kJ}/1 \text{ mol C}_7\text{H}_{16}$$

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$$\Delta H^\circ = [7\Delta H_{\text{CO}_2(\text{g})}^\circ + 8\Delta H_{\text{H}_2\text{O}(\text{l})}^\circ] - [\Delta H_{\text{C}_7\text{H}_{16}(\text{g})}^\circ + 11 \Delta H_{\text{O}_2(\text{g})}^\circ]$$
$$-4815.85 \text{ kJ} = [7(-393.5 \text{ kJ}) + 8(-285.8 \text{ kJ})] - [\Delta H_{\text{C}_7\text{H}_{16}}^\circ + 11(0)]$$

$$\Delta H_{\text{C}_7\text{H}_{16}(\text{g})}^\circ = -5040.9 \text{ kJ} + 4815.85 \text{ kJ}$$

$$\Delta H_{\text{C}_7\text{H}_{16}(\text{g})}^\circ = -225.05 \text{ kJ}$$

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