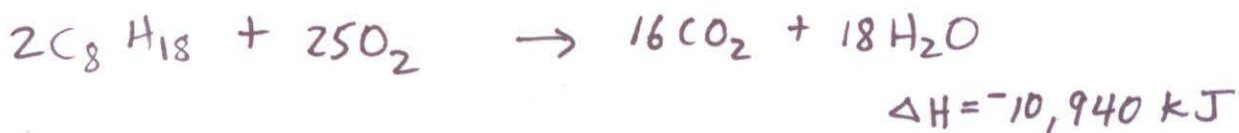


Homework Problem from Dr. Snyder, Mon., 10/21/2019

Isooctane (C_8H_{18}) is one of the many hydrocarbons that make up gasoline.

- Write a complete balanced thermochemical equation for the combustion of isooctane if 10,940 kJ/mol of heat is produced in the combustion of 2 moles of isooctane
- Calculate the amount of heat involved when 1.00 L of C_8H_{18} undergoes combustion with 1000.0 g of oxygen gas. (density $C_8H_{18} = 0.69$ g/mL)
- Is this an endothermic or exothermic reaction?



$$1.00 \text{ L} \left(\frac{1000 \text{ mL}}{1 \text{ L}} \right) \left(\frac{0.69 \text{ g}}{\text{mL}} \right) = 690 \text{ g } C_8H_{18} \left(\frac{1 \text{ mol}}{114.23 \text{ g}} \right) = 6.04 \text{ mol } C_8H_{18}$$

$$1000.0 \text{ g } O_2 \left(\frac{1 \text{ mol}}{31.999 \text{ g}} \right) = 31.25 \text{ mol } O_2$$

O_2 is limiting reactant (runs out first).

$$31.25 \text{ mol } O_2 \left(\frac{-10,940 \text{ kJ}}{25 \text{ mol } O_2} \right) = -13,675 \text{ kJ} = -14 \times 10^3 \text{ kJ released}$$

Exothermic