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Answer the following questions. Show all work and report answers with units.

1. How much heat will be released when 6.44 g of sulfur reacts with excess O₂ according to the following equation?

$$2 S + 3O_2 \rightarrow 2SO_3$$
 $\Delta H = -791.4 \text{ kJ}$

2. How much heat will be released when 4.72 g of carbon reacts with excess O₂ according to the following equation?

$$C + O_2 \rightarrow CO_2$$
 $\Delta H = -393.5 \text{ kJ}$

3. How much heat will be absorbed when 38.2 g of bromine reacts with excess H₂ according to the following equation?

$$H_2 + Br_2 \rightarrow 2HBr$$
 $\Delta H = +72.80 \text{ kJ}$

4. How much heat will be released when 1.48 g of chlorine reacts with excess phosphorus according to the following equation.

$$2P + 5Cl_2 \rightarrow 2PCl_5$$
 $\Delta H = -886 \text{ kJ}$

5. What mass of propane, C₃H₈ must be burned in order to produce 76,000 kJ of energy?

$$C_3H_8 + 5O_2 \rightarrow 3CO_2 + 4H_2O$$
 $\triangle H = -2200 \text{ kJ}$

6. How much heat will be absorbed when 13.7 g of nitrogen reacts with excess O₂ according to the following equation?

$$N_2 + O_2 \rightarrow 2NO$$
 $\Delta H = +180 \text{ kJ}$

7. What mass of iron must react to produce 3600 kJ of energy?

$$3\text{Fe} + 2\text{O}_2 \rightarrow \text{Fe}_3\text{O}_4$$
 $\Delta H = -1120 \text{ kJ}^{-\frac{1}{2}}$

8. How much heat will be released when 12.0 g of H₂ reacts with 76.0 g of O₂ according to the following equation? (when one reactant runs out the reaction stops)

$$2H_2 + O_2 \rightarrow 2H_2O$$
 $\Delta H = -571.6 \text{ kJ}$