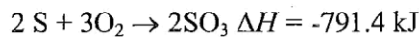


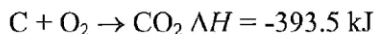
Stoichiometry, Enthalpy, and Heat

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



$$6.44 \text{ g S} \times \frac{1 \text{ mol S}}{32 \text{ g S}} \times \frac{-791.4 \text{ kJ}}{2 \text{ mol S}} = \boxed{-79.6 \text{ kJ}}$$

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



$$4.72 \text{ g C} \times \frac{1 \text{ mol C}}{12 \text{ g C}} \times \frac{-393.5 \text{ kJ}}{1 \text{ mol C}} = \boxed{-154.7 \text{ kJ}}$$

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



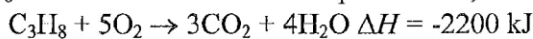
$$38.2 \text{ g Br}_2 \times \frac{1 \text{ mol Br}_2}{159.8 \text{ g Br}_2} \times \frac{+72.80 \text{ kJ}}{1 \text{ mol Br}_2} = \boxed{+17.4 \text{ kJ}}$$

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



$$1.48 \text{ g Cl}_2 \times \frac{1 \text{ mol Cl}_2}{70.9 \text{ g Cl}_2} \times \frac{-886 \text{ kJ}}{5 \text{ mol Cl}_2} = \boxed{-3.70 \text{ kJ}}$$

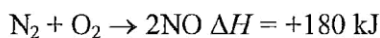
5. What mass of propane, C₃H₈ must be burned in order to produce 76,000 kJ of energy?



$$-76,000 \text{ kJ} \times \frac{1 \text{ mol C}_3\text{H}_8}{-2200 \text{ kJ}} \times \frac{44 \text{ g C}_3\text{H}_8}{1 \text{ mol C}_3\text{H}_8} = \boxed{1520 \text{ g C}_3\text{H}_8}$$

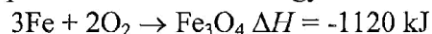
↑ $q = -76,000 \text{ kJ}$
(heat released or produced, exothermic)

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



$$13.7 \text{ g N}_2 \times \frac{1 \text{ mol N}_2}{28 \text{ g N}_2} \times \frac{+180 \text{ kJ}}{1 \text{ mol N}_2} = \boxed{+88.1 \text{ kJ}}$$

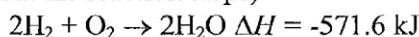
7. What mass of iron must react to produce 3600 kJ of energy?



$$-3600 \text{ kJ} \times \frac{3 \text{ mol Fe}}{-1120 \text{ kJ}} \times \frac{55.847 \text{ g Fe}}{1 \text{ mol Fe}} = \boxed{539 \text{ g Fe}}$$

$q = -3600 \text{ kJ}$

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)



Two reactants given

= limiting reagent problem

$12.0 \text{ g H}_2 \times \frac{1 \text{ mol O}_2}{2 \text{ g H}_2} \times \frac{32 \text{ g O}_2}{1 \text{ mol O}_2} = 192 \text{ g O}_2$ required to react w/ 12.0 g H_2 . Only 76.0 g O_2 available. O₂ is limiting

$$76.0 \text{ g O}_2 \times \frac{1 \text{ mol O}_2}{32 \text{ g O}_2} \times \frac{-571.6 \text{ kJ}}{1 \text{ mol O}_2} = \boxed{-1358 \text{ kJ}}$$