

7. How many kilojoules of energy will be needed to decompose 10.8 grams of  $\text{N}_2\text{O}_5$  gas?  $2\text{N}_2\text{O}_5(\text{g}) + 110 \text{ kJ} \rightarrow 4\text{NO}_2(\text{g}) + \text{O}_2(\text{g})$  (SOLO-Teacher✓)

Teacher

$$\frac{10.8 \text{ g N}_2\text{O}_5}{108.02 \text{ g N}_2\text{O}_5} \times \frac{1 \text{ mole N}_2\text{O}_5}{2 \text{ mole N}_2\text{O}_5} \times \frac{110 \text{ kJ}}{1} = 5.50 \text{ kJ}$$

5.5 kJ

8.  $\text{C}_2\text{H}_4(\text{g}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{CO}_2(\text{g}) + 2\text{H}_2\text{O} + 1.41 \times 10^3 \text{ kJ}$  (PAIR)

a. Is this reaction exothermic or endothermic?

exo

b. How much heat is released when 8.00g of oxygen reacts?

$$\frac{8.00 \text{ g O}_2}{32.00 \text{ g O}_2} \times \frac{1 \text{ mole O}_2}{3 \text{ mole O}_2} \times \frac{-1.41 \times 10^3 \text{ kJ}}{1} = -117.50 \text{ kJ}$$

-118 kJ

c. If  $3.28 \times 10^3 \text{ kJ}$  of heat is given off, how many molecules of carbon dioxide are formed?

$$\frac{-3.28 \times 10^3 \text{ kJ}}{-1.41 \times 10^3 \text{ kJ}} \times \frac{2 \text{ mole CO}_2}{1 \text{ mole CO}_2} \times \frac{6.02 \times 10^{23} \text{ molecules CO}_2}{1} = 2.80 \times 10^{24} \text{ molecules CO}_2$$

9.  $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g}) \quad \Delta H = -483.6 \text{ kJ}$  (SOLO-Teacher✓)

Teacher

a. Is the formation of water exothermic or endothermic?

exo

b. Calculate the grams of  $\text{H}_2\text{O}(\text{g})$  produced if 805 kJ of heat is transferred by the reaction.

$$\frac{-805 \text{ kJ}}{-483.6 \text{ kJ}} \times \frac{2 \text{ mole H}_2\text{O}}{1 \text{ mole H}_2\text{O}} \times \frac{18.02 \text{ g H}_2\text{O}}{1} = 599.99 \text{ g}$$

60.0 g H<sub>2</sub>O

c. Calculate the amount of heat transferred when 5.00 g of  $\text{H}_2(\text{g})$  react according to the above equation.

$$\frac{5.00 \text{ g H}_2}{2.02 \text{ g H}_2} \times \frac{1 \text{ mole H}_2}{2 \text{ mole H}_2} \times \frac{-483.6 \text{ kJ}}{1} = -598.51 \text{ kJ}$$

-599 kJ

Name: \_\_\_\_\_ Date: \_\_\_\_ Block: \_\_\_\_

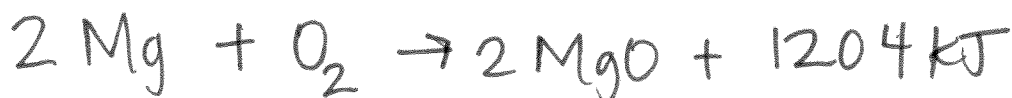
**Pair-Solo-Teacher ✓ : Thermochemical equation**

Work out the pair problems with your partner. Check your answer. If wrong, fix the problem/see teacher for help. Work out Solo-Teacher ✓ by yourself. Teacher must check the answers to these questions. You must have **four checks!**

1. When 2 moles of nitrogen monoxide burn in air to produce 2 moles of nitrogen dioxide, 113.04 kJ of heat is produced. The correct thermochemical equation for this reaction is: **(PAIR)**



2. When 2 mol of solid magnesium combines with 1 mole of oxygen gas, 2 mol of solid magnesium oxide is formed and 1204 kJ of heat is released. Write a thermochemical equation for this reaction. **(SOLO-Teacher ✓)**

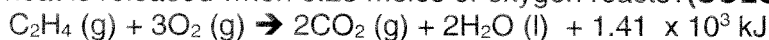


Teacher

3. Given the equation  $3\text{CO}(\text{g}) + \text{Fe}_2\text{O}_3(\text{s}) \rightarrow 2\text{Fe}(\text{s}) + 3\text{CO}_2(\text{g}) + 24.7\text{kJ}$ , how much heat is released when 7.0 mol of CO react? **(PAIR)**

$$\frac{7.0 \text{ mole CO} \mid -24.7\text{kJ}}{3 \text{ mole CO}} = \frac{-57.63\text{kJ}}{\boxed{-58\text{kJ}}}$$

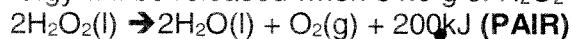
4. How much heat is released when 0.25 moles of oxygen reacts? **(SOLO-Teacher ✓)**



$$\frac{0.25 \text{ mole O}_2 \mid -1.41 \times 10^3\text{kJ}}{3 \text{ mole O}_2} = \frac{-117.5\text{kJ}}{\boxed{-120\text{kJ}}}$$

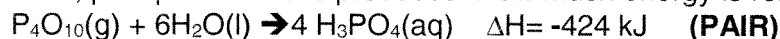
Teacher

5. When hydrogen peroxide is placed on a cut knee it decomposes to form water and oxygen gas. How much energy will be released when 34.0 g of  $\text{H}_2\text{O}_2$  decomposes according to the following equation?



$$\frac{34.0\text{g H}_2\text{O}_2 \mid 1 \text{ mole H}_2\text{O}_2 \mid -200.\text{kJ}}{34.02\text{g H}_2\text{O}_2 \mid 2 \text{ mole H}_2\text{O}_2} = \frac{-99.94\text{kJ}}{\boxed{-99.9\text{kJ}}}$$

6. Phosphorous burns in air to produce dense white clouds of  $\text{P}_4\text{O}_{10}$  gas. When this gas is dissolved in rain water, phosphoric acid is produced. How much energy is released when 14.2 g of  $\text{P}_4\text{O}_{10}$  reacts?



$$\frac{14.2\text{g P}_4\text{O}_{10} \mid 1 \text{ mole P}_4\text{O}_{10} \mid -424\text{kJ}}{283.88\text{g P}_4\text{O}_{10} \mid 1 \text{ mole P}_4\text{O}_{10}} = \frac{-21.21\text{kJ}}{\boxed{-21.2\text{kJ}}}$$