7. How many kilojoules of energy will be needed to decompose 10.8 grams of N_2O_5 gas? $2N_2O_5\ (g) + 110\ kJ \rightarrow 4NO_2(g) + O_2(g)$ **(SOLO-Teacher√)**

Teacher

$$10.8g\ N_2O_5 \left| \frac{1\ mole\ N_2O_5}{108.02g\ N_2O_5} \right| \frac{110\ kJ}{2\ mole\ N_2O_5} = 5.50\ kJ$$

5.5 kJ

8. $C_2H_4\ (g) + 3O_2\ (g) \rightarrow 2CO_2\ (g) + 2H_2O + 1.41 \times 10^3\ kJ$ **(PAIR)**

a. Is this reaction exothermic or endothermic? exo

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

$$8.00g\ O_2 \left| \frac{1\ mole\ O_2}{32.00g\ O_2} \right| \frac{-1.41 \times 10^3\ kJ}{3\ mole\ O_2} = -117.50\ kJ$$

$-118\ kJ$

c. If 3.28×10^3kJ of heat is given off, how many molecules of carbon dioxide are formed?

$$-3.28 \times 10^3\ kJ \left| \frac{2\ mole\ CO_2}{-1.41 \times 10^3\ kJ} \right| \frac{6.02 \times 10^{23}\ molecules\ CO_2}{1\ mole\ CO_2} = 2.80 \times 10^{24}\ molecules\ CO_2$$

9. $2H_2(g) + O_2(g) \rightarrow 2H_2O(g)\quad \Delta H = -483.6\ kJ$ **(SOLO-Teacher√)**

Teacher

a. Is the formation of water exothermic or endothermic? exo

b. Calculate the grams of $H_2O(g)$ produced if 805 kJ of heat is transferred by the reaction.

$$-805\ kJ \left| \frac{2\ mole\ H_2O}{-483.6\ kJ} \right| \frac{18.02g\ H_2O}{1\ mole\ H_2O} = 599.99 = 600.0g\ H_2O$$

c. Calculate the amount of heat transferred when 5.00 g of $H_2(g)$ react according to the above equation.

$$5.00g\ H_2 \left| \frac{1\ mole\ H_2}{2.02g\ H_2} \right| \frac{-483.6\ kJ}{2\ mole\ H_2} = -598.51\ kJ$$

$-599\ kJ$

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)**

$$2NO + O_2 \rightarrow 2NO_2 + 113.04\,kJ$$

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√)**

$$2Mg + O_2 \rightarrow 2MgO + 1204\,kJ$$

Teacher

3. Given the equation $3CO\ (g) + Fe_2O_3\ (s) \rightarrow 2Fe\ (s) + 3CO_2\ (g) + 24.7$ kJ, how much heat is released when 7.0 mol of CO react? **(PAIR)**

$$7.0\ mole\ CO \left| \frac{-24.7\,kJ}{3\ mole\ CO} \right. = -57.63\,kJ$$

$$\boxed{-58\,kJ}$$

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

$C_2H_4\ (g) + 3O_2\ (g) \rightarrow 2CO_2\ (g) + 2H_2O\ (l) + 1.41 \times 10^3$ kJ

$$0.25\ mole\ O_2 \left| \frac{-1.41 \times 10^3\,kJ}{3\ mole\ O_2} \right. = -117.5\,kJ$$

$$\boxed{-120\,kJ}$$

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 H_2O_2 decomposes according to the following equation?

$2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g) + 200$kJ **(PAIR)**

$$34.0\,g\ H_2O_2 \left| \frac{1\ mole\ H_2O_2}{34.02\,g\ H_2O_2} \right| \frac{-200.\,kJ}{2\ mole\ H_2O_2} = -99.94\,kJ$$

$$\boxed{-99.9\,kJ}$$

6. Phosphorous burns in air to produce dense white clouds of P_4O_{10} gas. When this gas is dissolved in rain water, phosphoric acid is produced. How much energy is released when14.2 g of P_4O_{10} reacts?

$P_4O_{10}(g) + 6H_2O(l) \rightarrow 4\ H_3PO_4(aq)$ $\Delta H = -424$ kJ **(PAIR)**

$$14.2\,g\ P_4O_{10} \left| \frac{1\ mole\ P_4O_{10}}{283.88\,g\ P_4O_{10}} \right| \frac{-424\,kJ}{1\ mole\ P_4O_{10}} = -21.21\,k$$

$$(=-21.2\,kJ)$$