Video worksheet on thermochemical equations.

1. Consider the thermochemical equation shown of the decomposition hydrogen peroxide.

$$2H_2O_2 \rightarrow 2H_2O + O_2 \Delta H = -196.98 \text{ kJ/mol}$$

Calculate the ΔH of each equation given below .

a. $H_2O_2 \rightarrow H_2O + \frac{1}{2}O_2 \quad \Delta H =$

b. $6H_2O_2 \rightarrow 6H_2O + 3O_2 \Delta H =$

c. $4H_2O + 2O_2 \rightarrow 4H_2O_2 \Delta H =$

2. Consider the equations given below of the decomposition of hydrogen peroxide and of the formation of liquid water.

i. $2H_2O_2(I) \rightarrow 2H_2O(I) + O_2(g) \Delta H = -197 \text{ kJ/mol}$

ii. $2H_2(g) + O_2(g) \rightarrow 2H_2O(I) \Delta H = -286 \text{ kJ/mol}$

Calculate the ΔH of the equations below .

a. H_2O_2 (I) \rightarrow H_2 (g)+ O_2 (g) $\Delta H =$

b. $H_2O_2(I) + H_2(g) \rightarrow 2H_2O(I) \Delta H =$

3. What is the amount of energy, in kJ, given out when 4.0 mol of methane gas (CH_4) undergoes complete combustion in excess oxygen according to the equation below?

$$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(I) \Delta H = -890 \text{ kJ/mol}$$

4. What is the amount of CO_2 , in grams, given out when 1550 kJ of energy is released during the combustion of methane in excess oxygen gas according to the equation below?

$$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(I) \Delta H = -890 \text{ kJ/mol}$$

5. What is the amount of energy, in kilojoules, released when 6.40 grams of oxygen reacts with excess methane according to the equation given below?

$$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(I) \Delta H = -890 \text{ kJ/mol}$$

6. What is the amount of carbon dioxide, in grams, produced if 3.60 X 10³ kJ of energy is released from the combustion of methane gas in excess oxygen?

 $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(I) \Delta H = -890 \text{ kJ/mol}$

7. . Consider the equation below of the formation of water.

$$2H_2(g) + O_2(g) \rightarrow 2H_2O(I) \Delta H = -286 \text{ kJ/mol}$$

Will the magnitude of the ΔH of the equation below be higher, lower or equal to 286 kJ/mol? Explain

$$2H_2(g) + O_2(g) \rightarrow 2H_2O(g) \Delta H = ?$$