

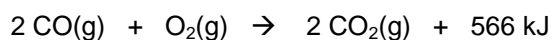
Name: _____
Hour: _____ Date: _____

Chemistry: *Energy and Stoichiometry*

Directions: Solve each of the following problems. Show your work, including proper units, to earn full credit.

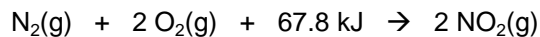
1. The combustion of propane (C_3H_8) produces 248 kJ of energy per mole of propane burned. How much heat energy will be released when 1 000 dm^3 of propane are burned at STP?

2. Carbon monoxide burns in air to produce carbon dioxide according to the following balanced equation:



How many grams of carbon monoxide are needed to yield 185 kJ of energy?

3. Nitrogen gas combines with oxygen gas according to the following balanced equation:



Assuming that you have excess nitrogen, how much heat energy must be added to 540 g of oxygen in order to use up all of that oxygen?

4. Ethyl alcohol burns according to the following balanced equation:



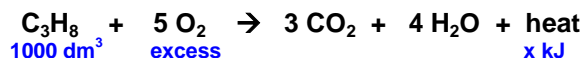
How many molecules of water are produced if 5 000 kJ of heat energy are released?

Answers: 1. 11 071 kJ 2. 18.3 g CO 3. 572 kJ 4. 6.62×10^{24} molecules H_2O

Chemistry: *Energy and Stoichiometry*

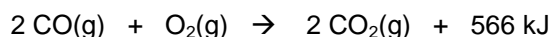
Directions: Solve each of the following problems. Show your work, including proper units, to earn full credit.

1. The combustion of propane (C_3H_8) produces 248 kJ of energy per mole of propane burned. How much heat energy will be released when 1 000 dm^3 of propane are burned at STP?

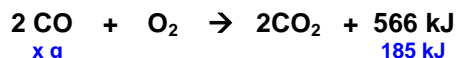


$$x \text{ kJ} = 1000 \text{ dm}^3 \text{ C}_3\text{H}_8 \left(\frac{1 \text{ mol C}_3\text{H}_8}{22.4 \text{ L C}_3\text{H}_8} \right) \left(\frac{248 \text{ kJ}}{1 \text{ mol C}_3\text{H}_8} \right) = 11,071 \text{ kJ}$$

2. Carbon monoxide burns in air to produce carbon dioxide according to the following balanced equation:

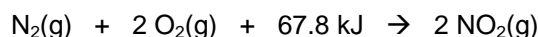


How many grams of carbon monoxide are needed to yield 185 kJ of energy?

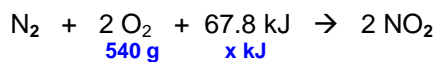


$$x \text{ g CO} = 185 \text{ kJ} \left(\frac{2 \text{ mol CO}}{566 \text{ kJ}} \right) \left(\frac{28 \text{ g CO}}{1 \text{ mol CO}} \right) = 18.3 \text{ g CO}$$

3. Nitrogen gas combines with oxygen gas according to the following balanced equation:



Assuming that you have excess nitrogen, how much heat energy must be added to 540 g of oxygen in order to use up all of that oxygen?

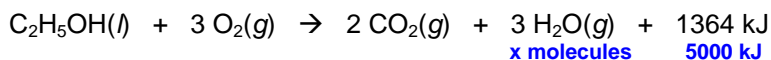


$$x \text{ kJ} = 540 \text{ g O}_2 \left(\frac{1 \text{ mol O}_2}{32 \text{ g O}_2} \right) \left(\frac{67.8 \text{ kJ}}{2 \text{ mol O}_2} \right) = 572 \text{ kJ}$$

4. Ethyl alcohol burns according to the following balanced equation:



How many molecules of water are produced if 5 000 kJ of heat energy are released?



$$x \text{ molecules H}_2\text{O} = 5000 \text{ kJ} \left(\frac{3 \text{ mol H}_2\text{O}}{1364 \text{ kJ}} \right) \left(\frac{6.02 \times 10^{23} \text{ molecules H}_2\text{O}}{1 \text{ mol H}_2\text{O}} \right) = 6.62 \times 10^{24} \text{ molecules H}_2\text{O}$$

Answers:

1. 11 071 kJ

2. 18.3 g CO

3. 572 kJ

4. 6.62×10^{24} molecules H_2O