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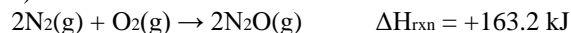
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$$\Delta H^\circ = \Sigma \Delta H_f^\circ \text{ products} - \Sigma \Delta H_f^\circ \text{ reactants}$$

[1]

a) Calculate the amount of heat transferred when 10.00 g of N₂O(g) is formed by the following reaction:



18.54 kJ

b) Draw an energy diagram for this process.

[2] Predict the value for ΔH_f° for the following scenarios and explain why:

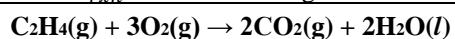
a) Br₂(g)

b) Br₂(l)

c) I₂(g)

d) I₂(s)

[3] Calculate the $\Delta H_{\text{rxn}}^\circ$ for the following reaction:



$$\Delta H_f^\circ \text{ C}_2\text{H}_4(\text{g}) = 226.6 \text{ kJ/mol}$$

$$\Delta H_f^\circ \text{ CO}_2(\text{g}) = -393.5 \text{ kJ/mol}$$

$$\Delta H_f^\circ \text{ H}_2\text{O}(\text{l}) = -285.8 \text{ kJ/mol}$$

-1584.2 kJ/mol

[4] A 5.00 g sample of liquid water at 25.0°C is heated by the addition of 84.0 J of energy. Determine the final temperature of the water in °C? (The specific heat capacity of the liquid is 4.18 J/g°C).

29.0°C

[6] Propane is a hydrocarbon that is commonly used as a fuel for cooking. Propane's formula is C_3H_8 .

a) Write a balanced equation for the complete combustion of propane gas.

b) Calculate the volume of air at 30°C and 1.00 atm that is needed to burn completely 10.0 g of propane. Assume that air is 21.0% O_2 by volume.

134 L air

c) The heat of combustion ($\Delta H_{\text{combustion}}^\circ$) is -2,220.1 kJ/mol. Calculate the heat of formation, ΔH_f° , of propane given that ΔH_f° of $H_2O(l)$ is -285.3 kJ/mol and ΔH_f° of $CO_2(g)$ is -393.5 kJ/mol.

-101.6 kJ/mol

d) Assuming that all of the heat evolved burning 10.0 g propane is transferred to 8.00 kg of water (specific heat = $4.184 \text{ J/g}^\circ\text{C}$), calculate the increase in temperature of the water.

15.0°C is ΔT