

SI Worksheet

4/14/22

Agenda:

Worksheet

1. Suppose 40.00 J of energy is transferred by heat to a system, while the system does 10.00 J of work. Later, heat transfers 25.00 J out of the system, while 4.00 J is done by work on the system. What is the net change in the system's internal energy?

$$q = 40.00\text{J} - 25.00\text{J} = 15.00\text{J}$$

$$W = -10.00\text{J} + 4.00\text{J} = -6.00\text{J}$$

$$\Delta E = q + W$$

$$\Delta E = 15.00\text{J} + (-6.00\text{J}) = 9.00\text{J}$$

2. A piece of unknown metal weighs 348 g. When the metal piece absorbs 6.64 kJ of heat, its temperature increases from 22.4 °C to 43.6 °C. Determine the specific heat of this metal and use the table below to determine the identity of the unknown metal.

Substance	Specific Heat (J/g°C)
Helium	5.193
Oxygen	0.918
Aluminum	0.897
Lead	0.130

$$m = 348\text{g}$$

$$q = 6.64\text{kJ}$$

$$\Delta T = 43.6 - 22.4^\circ\text{C}$$

$$q = mc \times \Delta T$$

$$6640\text{J} = (348\text{g})c \times (21.2)$$

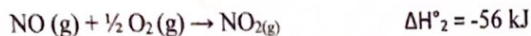
$$0.9000 = c$$

prob aluminum

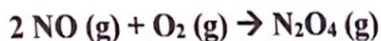
3. A 13.5 g sample of gold is heated, then placed in a calorimeter containing 60.0 g of water. Temperature of water increases from 19.00 °C to 20.00 °C. The specific heat of gold is 0.130 J/g°C. What was the initial temperature of the gold metal sample?

$$\begin{array}{l}
 \text{Au} \\
 m = 13.5 \text{ g} \\
 c = 0.130 \text{ J/g}^\circ\text{C} \\
 \Delta T = 20.00^\circ\text{C} - T_i \\
 \\
 \text{H}_2\text{O} \\
 m = 60.0 \text{ g} \\
 c = 4.184 \text{ J/g}^\circ\text{C} \\
 \Delta T = 1.00^\circ\text{C}
 \end{array}
 \qquad
 \begin{array}{l}
 q_{\text{H}_2\text{O}} = -q_{\text{Au}} \\
 (60.0)(4.184)(1.00) = -((13.5)(0.130)(20.00 - T_i)) \\
 143.04 = -20.00 - T_i \\
 163.04 = T_i
 \end{array}$$

4. Given:



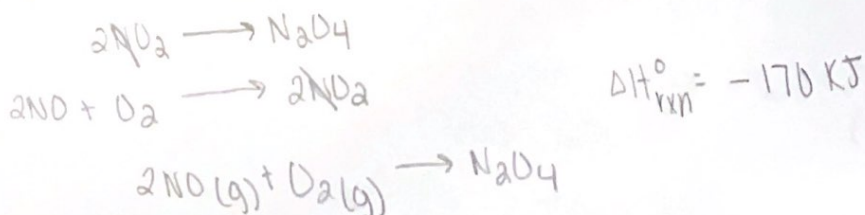
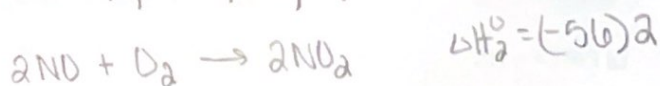
Calculate the standard enthalpy change for the following reaction:



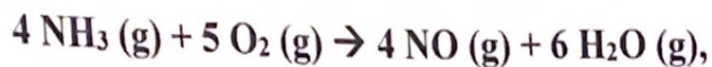
(1) reverse



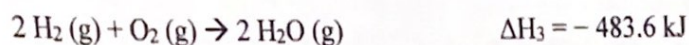
(2) multiply everything by 2



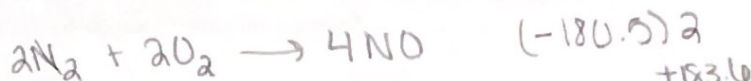
5. Calculate the $\Delta H^\circ_{\text{rxn}}$ for the reaction:



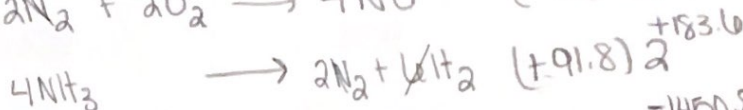
from the following data:



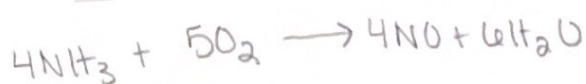
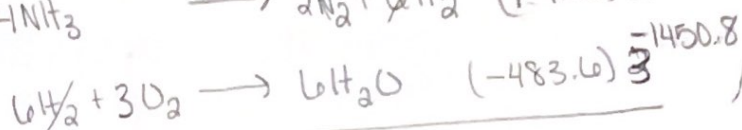
(1) multiply by 2



(2) reverse and $\times 2$



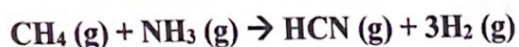
(3) multiply by 3



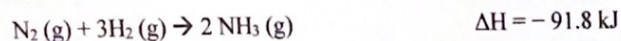
$$\Delta H_{\text{rxn}} = -1628.2 \text{ kJ}$$

6. If time...

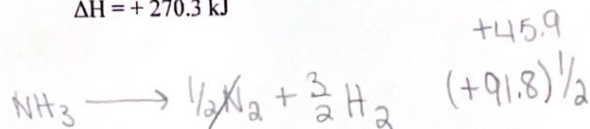
Calculate the $\Delta H^\circ_{\text{rxn}}$ for the reaction:



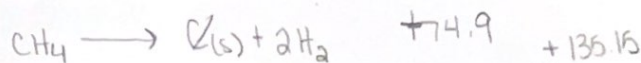
from the following data:



(1) reverse multiply by 1/2



(2) reverse



(3) multiply by 1/2

