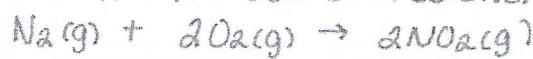


## Hess's Law : Calculating Enthalpy Changes

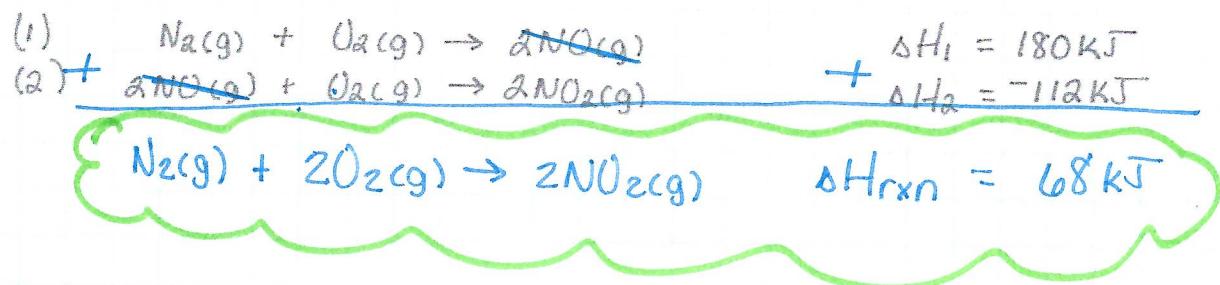
Hess's Law: If you can add 2 or more thermochemical equations to produce a final equation for a reaction, then the sum of the enthalpy changes for the individual reactions is the enthalpy change for the final reaction.

### Examples

- Calculate  $\Delta H_{rxn}$  for this overall reaction :



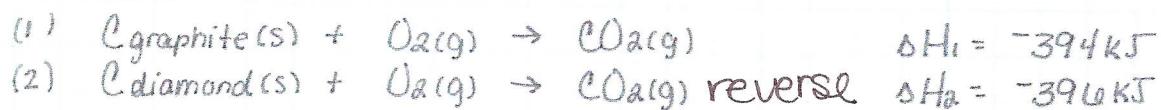
given the steps below :



- Calculate  $\Delta H_{rxn}$  for this reaction :

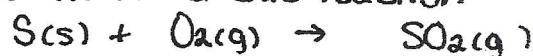


given the steps below :

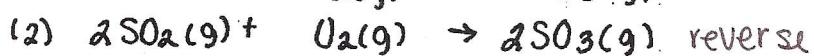


If you need, you can reverse a reaction, but you have to change the sign of  $\Delta H_{rxn}$

3. Calculate  $\Delta H_{rxn}$  for this reaction:



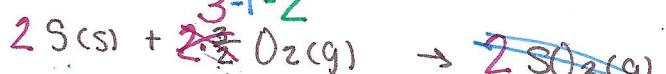
given:



$$\Delta H_1 = -395.2 \text{ kJ}$$

$$\Delta H_2 = -198.2 \text{ kJ}$$

$$3-1=2$$



$$2(\Delta H_1 = -395.2 \text{ kJ})$$

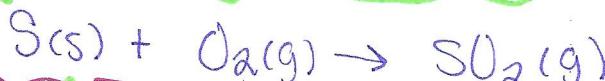


$$\Delta H_2 = +198.2 \text{ kJ}$$



$$\Delta H_{rxn} = -592.2 \text{ kJ}$$

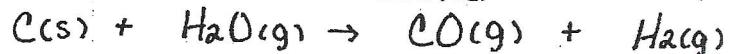
2



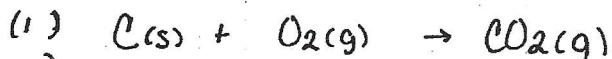
$$\Delta H_{rxn} = -296.1 \text{ kJ}$$

You can multiply any step by any number to solve the problem.

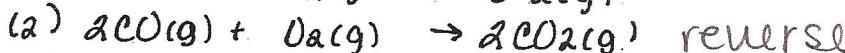
4. Calculate  $\Delta H_{rxn}$  for this reaction:



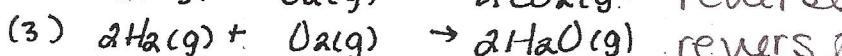
given:



$$\Delta H_1 = -393.5 \text{ kJ}$$



$$\Delta H_2 = -566.0 \text{ kJ}$$



$$\Delta H_3 = -483.6 \text{ kJ}$$



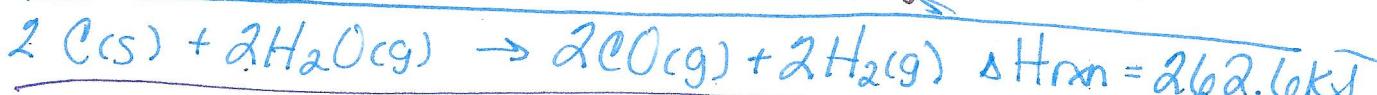
$$2(\Delta H_1 = -393.5 \text{ kJ})$$



$$\Delta H_2 = +566.0 \text{ kJ}$$



$$\Delta H_3 = +483.6 \text{ kJ}$$



2



$$\Delta H_{rxn} = 131.3 \text{ kJ}$$