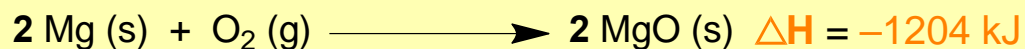


CONCEPT: HESS'S LAW

Rearrangement of Thermochemical Equations

- Recall, a *thermochemical equation* is a chemical equation that includes an *enthalpy of reaction*.
 - The thermochemical equation and its enthalpy of reaction (ΔH_{rxn}), are _____ proportional.
 - This means that any change to the original reaction will cause the same change in the ΔH_{rxn} .

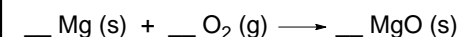
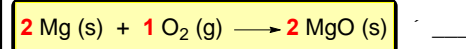
Original Reaction



Rearrangements

Multiplication

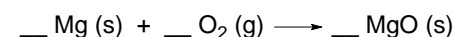
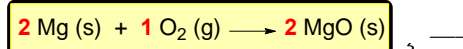
☐ Multiply reaction: Multiply ΔH_{rxn}



$$\Delta H_{\text{rxn}} = ______$$

Division

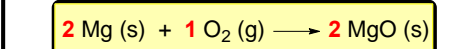
☐ Divide reaction: Divide ΔH_{rxn}



$$\Delta H_{\text{rxn}} = ______$$

Reverse

☐ Reversing: Reverse sign of ΔH_{rxn}

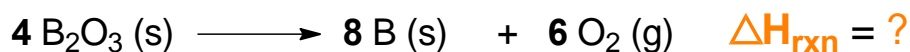


$$\Delta H_{\text{rxn}} = ______$$

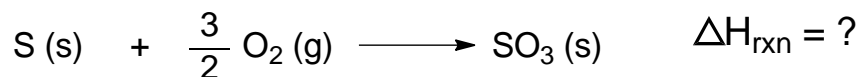
EXAMPLE: If the formation equation for boron trioxide is given as the following:



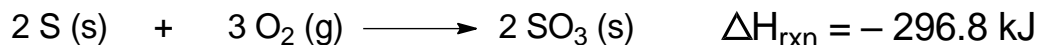
what will be the new enthalpy value when it is rearranged?



PRACTICE: Calculate the ΔH_{rxn} for the following thermochemical equation:



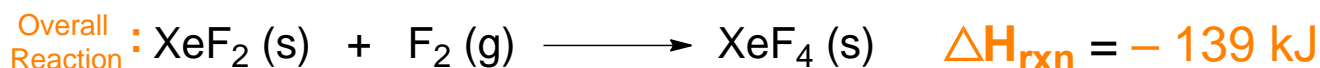
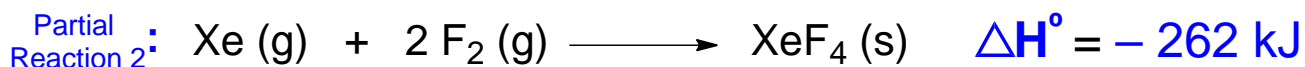
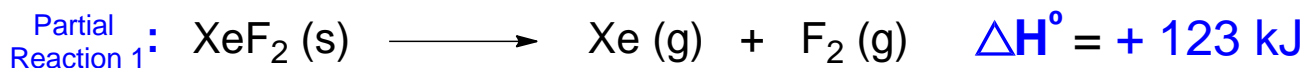
When given the following:



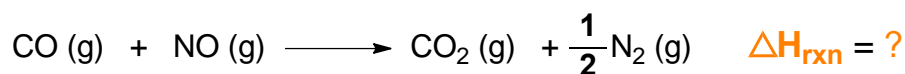
CONCEPT: HESS'S LAW

Applying Hess's Law

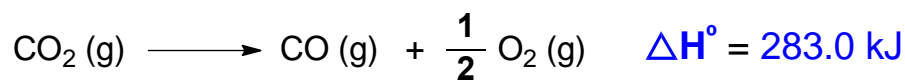
- Many reactions cannot be carried out in a single step, but instead require multiple steps to get the final product.
 - Hess's Law** states that the ΔH_{rxn} of an **overall reaction** is the sum of the ΔH° values of these multiple steps.



EXAMPLE: Calculate the ΔH_{rxn} for overall reaction



when given the following set of partial reactions:



STEP 1: Start with the first compound in the overall equation and **locate** it in the set of partial reactions.

- Compound from partial reaction must match (_____ , _____) with the one from the overall equation.
 - This may require you to reverse, multiply or divide the partial reaction, which will also affect ΔH° .

STEP 2: Keep moving onto the next compound in the overall equation until you **locate** all compounds in partial reactions.

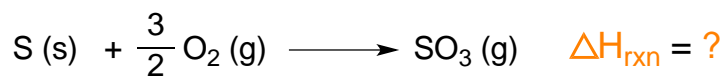
STEP 3: Combine the partial reactions and **cross out** reaction intermediates if present.

- Reaction Intermediates:** Compounds that look the same, with one as a reactant and the other a product.

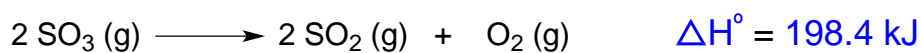
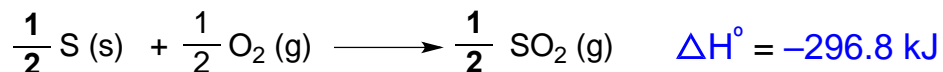
STEP 4: Add up all the ΔH° values to obtain ΔH_{rxn} of the overall reaction.

CONCEPT: HESS'S LAW

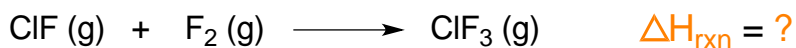
PRACTICE: Calculate the ΔH_{rxn} for



Given the following set of reactions:



PRACTICE: Calculate the ΔH_{rxn} for



Given the following reactions:

