



High School Science Virtual Learning

College Chemistry

Hess's Law

April 17, 2020



High School College Chemistry

Lesson: April 17, 2020

Objective/Learning Target:

Students will be able to use Hess's Law to calculate the enthalpy of a reaction using standard enthalpies and bond energies.



Let's Get Started:

1. What is the equation for work?
2. At a constant pressure what is enthalpy (ΔH) equal to?



Let's Get Started: Answer Key

1. What is the equation for work? $W = -P\Delta V$

$W =$ Work, $P =$ Pressure, $\Delta V =$ Change in volume

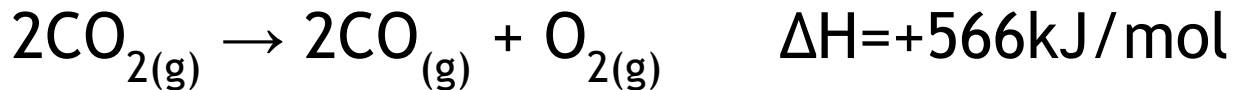
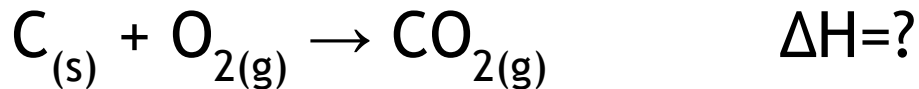
2. At a constant pressure what is enthalpy (ΔH) equal to?

Heat, q

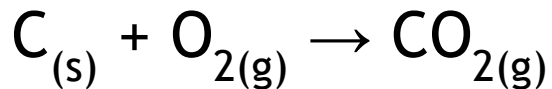
Lesson Activity:

Directions:

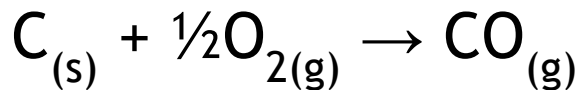
1. Watch this [video](#).
2. What is the enthalpy of the first reaction below, given the enthalpies of the other reactions?



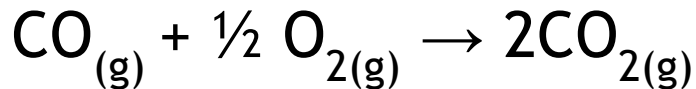
Answer



$$\Delta H=?$$



$$\Delta H=-111\text{kJ/mol}$$



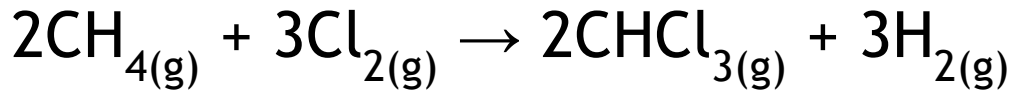
$$\Delta H=-283\text{kJ/mol}$$

$$\Delta H=-394 \text{ kJ}$$

Lesson Activity:

Directions:

1. Watch this [video](#) and [video 2](#).
2. What is the standard enthalpy of the following reaction?
Use this [table of standard enthalpies](#) for reference.



Answer:

$$\Delta H_{\text{rxn}} = \sum n_{\text{products}} \Delta H_{\text{products}} - \sum n_{\text{reactants}} \Delta H_{\text{reactants}}$$

$$[2(-103.14\text{kJ}) + 3(0\text{kJ})] - [2(-74.6\text{kJ}) + 3(0\text{kJ})]$$

$$[-206.28 \text{ kJ} + 0\text{kJ}] - [-149.2 \text{ kJ} + 0\text{kJ}]$$

$$[-206.28 \text{ kJ}] - [-149.2 \text{ kJ}]$$

$$=-57.08 \text{ kJ}$$



Lesson Activity:

Directions:

1. Watch this [video](#).

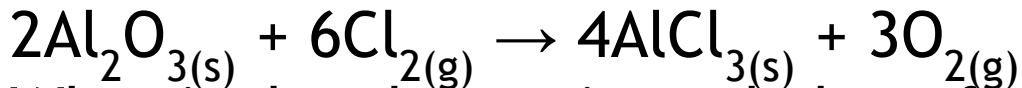


Practice

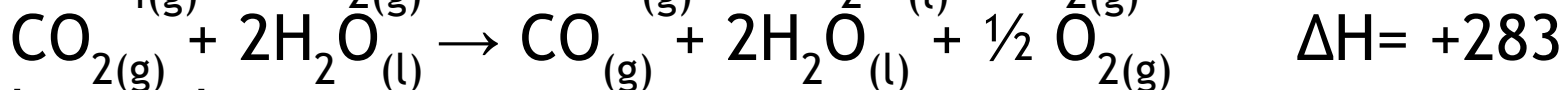
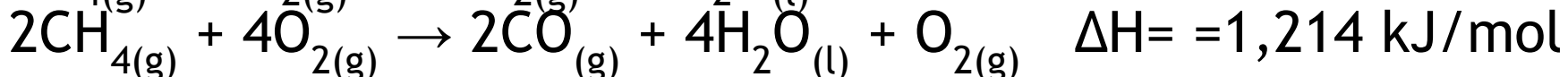
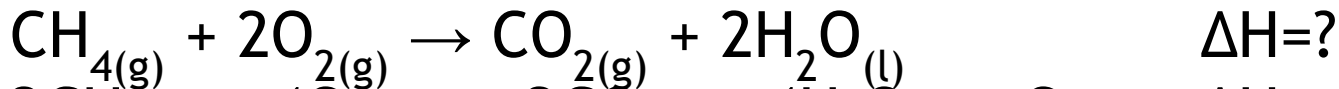
Complete the following questions using the information you learned during the lesson activity.

Questions:

1. What is the change in enthalpy of the following reaction based on standard enthalpies found [here](#).



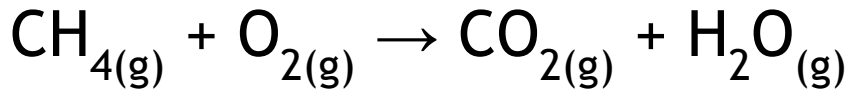
2. What is the change in enthalpy of the next reaction based off the other reactions given?



kJ/mol

Questions:

3. Use the bond energy table found partway down [this page](#) to calculate the change in enthalpy for the reaction below.





Once you have completed the practice questions check with the **answer** key.

1. **535.2 kJ/mol**
2. **-890 kJ/mol**
3. **-682 kJ/mol**

More Practice:

Follow the links below to do more practice.

1. This [worksheet](#) covers Hess's Law.
2. This [worksheet](#) includes practice with the standard enthalpy of formation.



Additional Practice:
Click on the link below for additional practice.

[Practice with Answers](#)