AP Chemistry Daily Videos: 6.9 Hess's Law

Daily Video #1

1. What does Hess's Law look at? (Discuss steps in your answer.)

2. At 1:00, show how the single reaction of $C_{graphite}$ (s) □ $C_{diamond}$ (s) can take place in two steps and result in the same $\Delta H_{rxn.}$

3. What happens to the ΔH_{rxn} if a chemical reaction is reversed? (Provide an example.)

4. What happens to the ΔH_{rxn} if you multiply a chemical reaction by a favor? (Provide an example.)

5. Pause the video at 2:45, attempt the problem, then evaluate how you did and identify any errors.

$N_2(g) + O_2(g) \rightarrow 2NO(g)$ $\quad \Delta H_1 = 180 \frac{kJ}{mol}$

$2NO_2(g) \rightarrow 2NO(g) + O_2(g)$ $\quad \Delta H_2 = -112 \frac{kJ}{mol}$

Pause the video and try this problem on your own first.

Given the information above, what is the overall enthalpy change for the reaction given below?

$N_2(g) + 2O_2(g) \rightarrow 2NO_2(g)$

6. Key takeaways?

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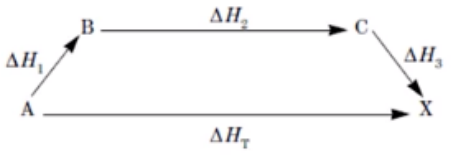
Daily Video #2

1. Attempt this problem before watching. Look closely at the arrows and try to come up with your own answer before looking at the MC options.

The enthalpy change for the reaction A → X is ΔH_T. This reaction can be broken down into a series of steps as shown in the diagram:



A relationship that must exist among the various enthalpy changes is

A $\Delta H_T - \Delta H_1 - \Delta H_2 - \Delta H_3 = 0$

B $\Delta H_T + \Delta H_1 + \Delta H_2 + \Delta H_3 = 0$

C $\Delta H_3 - (\Delta H_1 + \Delta H_2) = \Delta H_T$

D $\Delta H_2 - (\Delta H_3 + \Delta H_1) = \Delta H_T$

E $\Delta H_T + \Delta H_2 = \Delta H_1 + \Delta H_3$

2. Pause the video at 2:00, attempt the problem, then evaluate how you did and identify any errors.

$\frac{1}{2}\ H_2(g) + \frac{1}{2}\ I_2(s) \rightarrow HI(g) \quad \Delta H = 26\ kJ/mol_{rxn}$

$\frac{1}{2}\ H_2(g) + \frac{1}{2}\ I_2(g) \rightarrow HI(g) \quad \Delta H = -5.0\ kJ/mol_{rxn}$

Based on the information above, what is the enthalpy change for the sublimation of iodine, represented below?

$I_2(s) \rightarrow I_2(g)$

A 15 kJ/mol_{rxn}

B 21 kJ/mol_{rxn}

C 31 kJ/mol_{rxn}

D 42 kJ/mol_{rxn}

E 62 kJ/mol_{rxn}

STOP *Pause the v*

3. Pause the video at 3:55, attempt the problem, then evaluate how you did and identify any errors.

$K(s) + 1/2Cl_2(g) \rightarrow KCl(s) \quad \Delta H°_f = -437\ kJ/mol$

The elements K and Cl react directly to form the compound KCl according to the equation above. Refer to the information above and the table below to answer the questions that follow.

	Process	$\Delta H°$ (kJ/mol_{rxn})
1)	$K(s) \rightarrow K(g)$	*v*
2)	$K(g) \rightarrow K^+(g) + e^-$	*w*
3)	$Cl_2(g) \rightarrow 2Cl(g)$	*x*
4)	$Cl(g) + e^- \rightarrow Cl^-(g)$	*y*
5)	$K^+(g) + Cl^-(g) \rightarrow KCl(s)$	*z*

a) Which of the reactions on the table can be manipulated or combined to form the reaction given above?

b) Write an algebraic expression equivalent to $\Delta H°$ using the variables on the table.