LO: Students will be able to use Hess's law to determine heat of reactions.

DOL: Students will successfully answer at least 4/5 Hess's Law questions.

The heat of a reaction can often be calculated using the heats of formation of the reactants as compared to those of the products.

If the total enthalpy of the reactants is greater than that of the products, the reaction is exothermic.

If the total enthalpy of the products is greater than that of the reactants, the reaction is endothermic.

DO NOT write this table down

CO = -110.5

$CH_4(g)$	-74.8	HCl(g)	-92.3
$CO_2(g)$	**-393.5**	$H_2O(g)$	**-241.8**
NaCl(s)	-411.0	$SO_2(g)$	**-296.1**
$H_2O(l)$	**-285.8**	**$NH_4Cl(s)$**	**-315.4**
$H_2S(g)$	**-20.1**	NO(g)	**+90.4**
$H_2SO_4(l)$	**-811.3**	$NO_2(g)$	**+33.9**
$MgSO_4(s)$	**-1278.2**	**$SnCl_4(l)$**	**-545.2**
MnO(s)	**-384.9**	**SnO(s)**	**-286.2**
$MnO_2(s)$	**-519.7**	**$SnO_2(s)$**	**-580.7**
NaCl(s)	**-411.0**	**$SO_2(g)$**	**-296.1**
NaF(s)	**-569.0**	**$SO_3(g)$**	**-395.2**
NaOH(s)	**-426.7**	**ZnO(s)**	**-348.0**
$NH_3(g)$	**-46.2**	**ZnS(s)**	**-202.9**

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a) $NaOH(s) + HCl(g) \longrightarrow NaCl(s) + H_2O(g)$

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b) $2\ CO(g) + O_2(g) \dashrightarrow 2\ CO_2(g)$

c) $CH_4(g) + 2\ O_2(g) \dashrightarrow CO_2(g) + 2\ H_2O(l)$

d) $2\ H_2S(g) + 3\ O_2(g) \rightarrow 2\ H_2O(l) + 2\ SO_2(g)$

e) $2\ NO(g) + O_2(g) \rightarrow 2\ NO_2(g)$

Hess's Law Practice:

Calculate ΔH for the reaction $C_2H_4\ (g) + H_2\ (g) \rightarrow C_2H_6\ (g)$, from the following data.

$C_2H_4\ (g) + 3\ O_2\ (g) \rightarrow 2\ CO_2\ (g) + 2\ H_2O\ (l)$ $\Delta H = -1411.\ kJ/mole$

$C_2H_6\ (g) + 7/2\ O_2\ (g) \rightarrow 2\ CO_2\ (g) + 3\ H_2O\ (l)$ $\Delta H = -1560.\ kJ/mole$

$H_2\ (g) + 1/2\ O_2\ (g) \rightarrow H_2O\ (l)$ $\Delta H = -285.8\ kJ/mole$

Calculate H for the reaction

$4\ NH_3\ (g) + 5\ O_2\ (g) \rightarrow 4\ NO\ (g) + 6\ H_2O\ (g)$

from the following data.

$N_2\ (g) + O_2\ (g) \rightarrow 2\ NO\ (g)$ H = -180.5 kJ
$N_2\ (g) + 3\ H_2\ (g) \rightarrow 2\ NH_3\ (g)$ H = -91.8 kJ
$2\ H_2\ (g) + O_2\ (g) \rightarrow 2\ H_2O\ (g)$ H = -483.6 kJ

May 11-7:36 AM