Enthalpy Questions (Using Hess' Law) Name_____

#1: Calculate the enthalpy for this reaction:

$2C(s) + H_2(g) \rightarrow C_2H_2(g)$ $\Delta H° =$ _____ kJ

Given the following thermochemical equations:

$C_2H_2(g) + \frac{5}{2}O_2(g) \rightarrow 2CO_2(g) + H_2O(\ell)$ $\Delta H° = -1299.5$ kJ

$C(s) + O_2(g) \rightarrow CO_2(g)$ $\Delta H° = -393.5$ kJ

$H_2(g) + \frac{1}{2}O_2(g) \rightarrow H_2O(\ell)$ $\Delta H° = -285.8$ kJ

#2: Calculate the enthalpy of the following chemical reaction:

$CS_2(\ell) + 3O_2(g) \rightarrow CO_2(g) + 2SO_2(g)$ $\Delta H° =$ _____ kJ

Given:

$C(s) + O_2(g) \rightarrow CO_2(g)$ $\Delta H = -393.5$ kJ/mol
$S(s) + O_2(g) \rightarrow SO_2(g)$ $\Delta H = -296.8$ kJ/mol
$C(s) + 2S(s) \rightarrow CS_2(\ell)$ $\Delta H = +87.9$ kJ/mol

#3: Given the following data:

$SrO(s) + CO_2(g) \rightarrow SrCO_3(s)$ $\Delta H = -234$ kJ

$2SrO(s) \rightarrow 2Sr(s) + O_2(g)$ $\Delta H = +1184$ kJ

$2SrCO_3(s) \rightarrow 2Sr(s) + 2C(s, gr) + 3O_2(g)$ $\Delta H = +2440$ kJ

Find the ΔH of the following reaction:

$C(s, gr) + O_2(g) \rightarrow CO_2(g)$ $\Delta H° =$ _____ kJ

#4: Given the following information:

$2NO(g) + O_2(g) \rightarrow 2NO_2(g)$	$\Delta H = -116$ kJ
$2N_2(g) + 5O_2(g) + 2H_2O(\ell) \rightarrow 4HNO_3(aq)$	$\Delta H = -256$ kJ
$N_2(g) + O_2(g) \rightarrow 2NO(g)$	$\Delta H = +183$ kJ

Calculate the enthalpy change for the reaction below:

$3NO_2(g) + H_2O(\ell) \rightarrow 2HNO_3(aq) + NO(g)$ $\Delta H° =$ _____ kJ

#5: Calculate ΔH for this reaction: $CH_4(g) + NH_3(g) \rightarrow HCN(g) + 3H_2(g)$ $\Delta H° =$ _____ kJ

Given:

$N_2(g) + 3\ H_2(g) \rightarrow 2\ NH_3(g)$	$\Delta H = -91.8$ kJ
$C(s) + 2\ H_2(g) \rightarrow CH_4(g)$	$\Delta H = -74.9$ kJ
$H_2(g) + 2\ C(s) + N_2(g) \rightarrow 2\ HCN(g)$	$\Delta H = +270.3$ kJ

#6: Determine the heat of reaction for the oxidation of iron:

$2Fe(s) + \frac{3}{2}O_2(g) \rightarrow Fe_2O_3(s)$ $\Delta H° =$ _____ kJ

Given the thermochemical equations:

$2Fe(s) + 6H_2O(\ell) \rightarrow 2Fe(OH)_3(s) + 3H_2(g)$	$\Delta H = +322$ kJ
$Fe_2O_3(s) + 3H_2O(\ell) \rightarrow 2Fe(OH)_3(s)$	$\Delta H = +289$ kJ
$2H_2(g) + O_2(g) \rightarrow 2H_2O(\ell)$	$\Delta H = -572$ kJ