

Hess's Law

Reaction) H (kJ)	Reaction) H (kJ)
$\text{H}_{2(\text{g})} + \frac{1}{2}\text{O}_{2(\text{g})} \rightarrow \text{H}_2\text{O}_{(\text{l})}$	-285.8	$\frac{1}{2}\text{N}_{2(\text{g})} + \text{O}_{2(\text{g})} \rightarrow \text{NO}_{2(\text{g})}$	33.1
$\text{H}_2\text{O}_{(\text{l})} \rightarrow \text{H}_2\text{O}_{(\text{g})}$	40.7	$\text{N}_{2(\text{g})} + 2\text{O}_{2(\text{g})} \rightarrow \text{N}_2\text{O}_{4(\text{g})}$	9.1
$\text{H}_2\text{O}_{(\text{s})} \rightarrow \text{H}_2\text{O}_{(\text{l})}$	6.00	$\text{Sn}_{(\text{s})} + \text{Cl}_{2(\text{g})} \rightarrow \text{SnCl}_{2(\text{l})}$	-325.1
$\text{C}_{(\text{graphite})} + \text{O}_{2(\text{g})} \rightarrow \text{CO}_{2(\text{g})}$	-393.5	$\text{SnCl}_{2(\text{s})} + \text{Cl}_{2(\text{g})} \rightarrow \text{SnCl}_{4(\text{l})}$	-186.2
$\text{SiO}_{2(\text{s})} + 2\text{C}_{(\text{s})} \rightarrow \text{Si}_{(\text{s})} + 2\text{CO}_{(\text{g})}$	689.9	$\text{S}_{(\text{s})} + \frac{3}{2}\text{O}_{2(\text{g})} \rightarrow \text{SO}_{3(\text{g})}$	-395.7
$\text{Si}_{(\text{s})} + 2\text{Cl}_{2(\text{g})} \rightarrow \text{SiCl}_{4(\text{g})}$	-657.0	$\text{Mg}_{(\text{s})} + \frac{1}{2}\text{O}_{2(\text{g})} \rightarrow \text{MgO}_{(\text{s})}$	-601.7
$\text{SiCl}_{4(\text{g})} + 2\text{Mg}_{(\text{s})} \rightarrow 2\text{MgCl}_{2(\text{s})} + \text{Si}_{(\text{s})}$	-625.6	$\text{Mg}_{(\text{s})} + \text{S}_{(\text{s})} \rightarrow \text{MgS}_{(\text{s})}$	-598.0
$\text{C}_{(\text{s})} + \text{O}_{2(\text{g})} \rightarrow \text{CO}_{2(\text{g})}$	-393.5	$\text{S}_{(\text{s})} + \text{O}_{2(\text{g})} \rightarrow \text{SO}_{2(\text{g})}$	-296.8
$\text{C}_2\text{H}_{2(\text{g})} + \frac{5}{2}\text{O}_{2(\text{g})} \rightarrow 2\text{CO}_{2(\text{g})} + \text{H}_2\text{O}_{(\text{l})}$	-1,299.5		

For each of the following problems write the net reaction and calculate) H.

1. Changing 1.00 mole of silica, SiO_2 , that has been extracted from sand into the pure silicon that is needed to make computer chips.

2. How much energy is required to turn 10 moles of steam into elemental hydrogen and oxygen?

3. Dinitrogen tetraoxide is synthesized from nitrogen dioxide (only)?

4. Tin (IV) chloride liquid is made from solid tin and chlorine gas? [Note you have to skip $\text{SnCl}_{2(\text{l})} \rightarrow \text{SnCl}_{2(\text{s})}$]

5. How much heat is released when 100g of steam is frozen into ice?

6. Magnesium metal is combined with sulfur dioxide gas to make magnesium sulfide and magnesium oxide.

7. In automobile catalytic converters, SO_2 is converted into SO_3 and facilitates the reduction of both NO and NO_2 to N_2 . Calculate) H for combining sulfur dioxide with oxygen gas to make sulfur trioxide.

8. Solid carbon is combined with hydrogen gas to form dicarbon dihydride.