Chemical Reaction	w	ΔH	ΔS	ΔG
$CH_4(g) + 2\ O_2(g) \rightarrow CO_2(g) + 2\ H_2O(l)$ Combustion reaction; predict large heat and spontaneous	positive less gass	neg	Neg,	neg
$2\ H_2(g) + O_2(g) \rightarrow 2\ H_2O(g)$ Spontaneous combustion reaction, large heat	- Δn RT Δn neg, so w +	Neg	Neg (due to moles gas, heat given off)	neg
$C_2H_5OH(l) + 3\ O_2(g) \rightarrow 2\ CO_2(g) + 3\ H_2O(l)$ Same combustion reaction, but now water is liquid. Still spontaneous and exothermic	Positive	Neg	Neg (less moles of gas)	neg
$CCl_4\ (l) \rightarrow C(s) + 2\ Cl_2(g)$ Non-spontaneous (given)	negative	Must be positive (since ΔS is positive and ΔG is positive	Positive	positive
$Ba(OH)_2 \bullet (H_2O)_8\ (s) + 2NH_4NO_3\ (s) \rightarrow Ba(NO_3)_2(s) + 2NH_3(g) + 10\ H_2O(l)$ Spontaneous (given); endothermic	Negative	positive	Positive (must be to overcome endothermic and make spontaneous, plus moles of gas)	negative
$2\ O_3(g) \rightarrow 3\ O_2(g)$ Spontaneous and slightly exothermic (given)	negative	negative	positive	negative
$H_2O(s) \rightarrow H_2O\ (l)$ Spontaneous above 0C, so spontaneous at 298K Endothermic	0	positive	positive	negative
$CO_2(g) \rightarrow CO_2(s)$ Gas becomes solid (deposition); know not spontaneous at room temperature. Exothermic.	Positive	Negative	Negative	positive
$NH_3(g) + HCl(g) \rightarrow NH_4Cl(s)$ Spontaneous (given)	Positive	Negative (must be to give neg ΔG)	negative	negative
$2H_2O_2(l) \rightarrow 2H_2O(l) + O_2(g)$ Decomposition of hydrogen peroxide Spontaneous, exothermic	Negative	negative	positive	negative