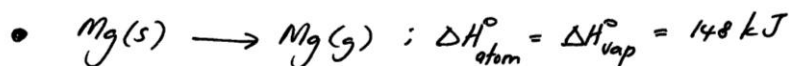
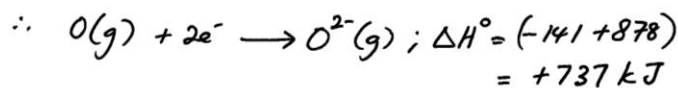
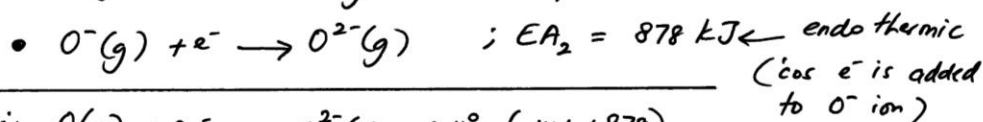
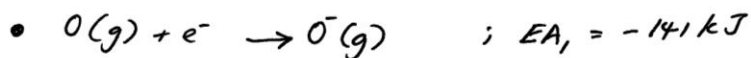
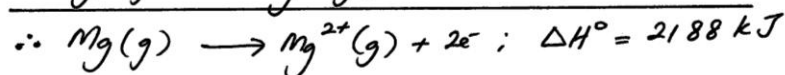
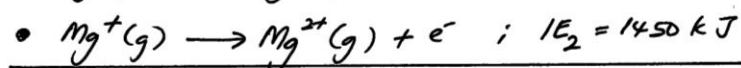
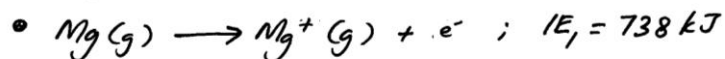


LATTICE ENERGY, $\Delta H_{\text{lattice}}^{\circ}$

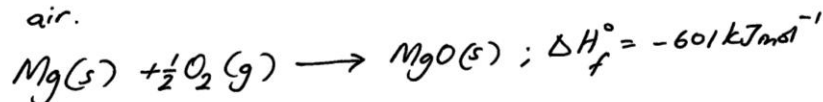
IMPORTANCE OF LATTICE ENERGY

$$\Delta H_{\text{lattice}}^{\circ} \text{ of MgO} = 3932 \text{ kJ mol}^{-1}$$

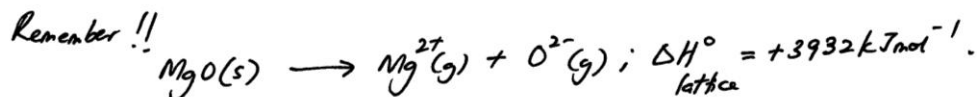
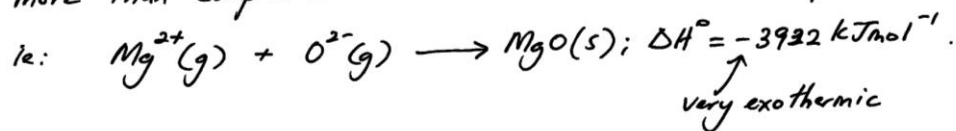
Why ionic solid MgO with its $2+$ ions, even exist? After all, much more energy is needed to form Mg^{2+} ions than Mg^{+} ions.



* Nevertheless, as a result of the ions $\text{Mg}^{2+} \times \text{O}^{2-}$ (ie. $+2$ and -2 charges), solid MgO readily forms whenever Mg burns in air.

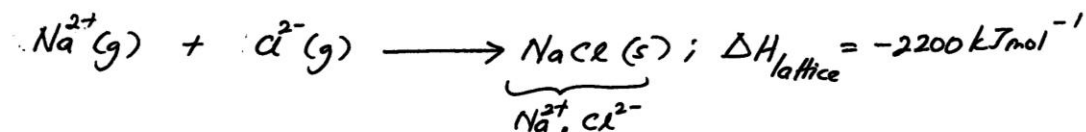


** Clearly, the enormous lattice energy ($\Delta H_{\text{lattice}}^{\circ}$ of MgO = 3932 kJ mol^{-1}) more than compensates for these endothermic steps.

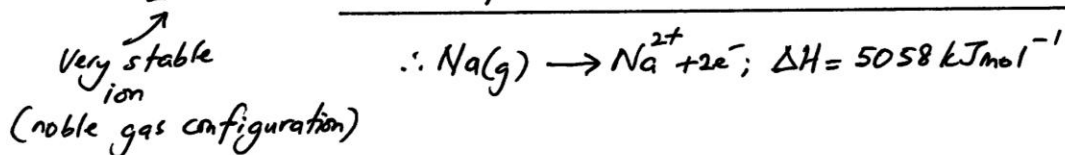
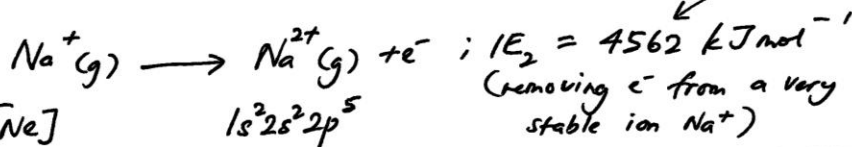
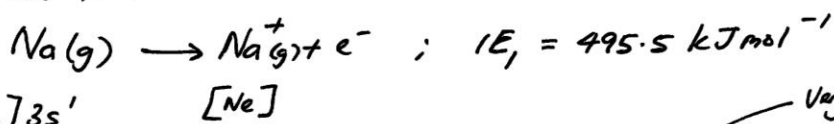


Why $\text{Na}^{2+}\text{Cl}^{2-}$ does not exist? The attraction between these ions are greater - can form more stable compound, but why it cannot be formed?

$$E \propto \frac{q_1 q_2}{r} : E_{\text{attraction}} \text{ (of } \text{Na}^{2+}\text{Cl}^{2-}) = 4 \times E_{\text{attraction}} \text{ (of } \text{Na}^+\text{Cl}^-)$$



Compare to:



* We do not know the EA_2 (2nd electron affinity) of Cl, but from Example 1, suggests that the value will be large and positive (endothermic: e^- added to negatively charged ion, Cl^-)

\therefore So we can see why $\text{Na}^{2+}\text{Cl}^{2-}$ cannot be formed.

Forming Na^{2+} requires 4562 kJ mol^{-1} energy, which is much more than the 2200 kJ mol^{-1} energy released in the formation of the Na^+Cl^- lattice.