Answer on Question #55845 - Chemistry - General chemistry

Question:

What would be the three equations that cancel correctly for Hess Law for the following reaction for Magnesium oxide that you would have Mg(s) + 1/2 O2(g) = MgO(s) ? Would the change in heat be a negative or a positive? what would be the final net reaction? I am confused would you then have four equations

Answer:

For MgO the enthalpy formation is -601.83 kJ/mol. Since the corresponding values for Mg(s) and O2(g) are zero the heat for this reaction is defined:

$\Delta H = \Delta H(MgO) - \Delta H(O2) - \Delta H(Mg) = -601.83$ kJ/mol – 0 – 0 = -601.83 kJ/mol

This is exothermic process and that releases heat.

For instance, these three reactions are:

$MgO(s) + 2Na(s) \rightarrow Na_2O(s) + Mg(s)$

$MgO(s) + H_2O(l) \rightarrow Mg(OH)_2(s)$

$Mg(OH)_2(s) + 2HCl(g) \rightarrow MgCl_2(s) + 2H_2O$

The final net reaction is found using the mentioned above reactions:

$MgO = Mg(OH)_2 – H_2O$

$Mg(OH)_2 = MgCl_2(s) + 2H_2O – 2HCl$

$MgO = MgCl_2(s) + 2H_2O – 2HCl – H_2O$

$MgCl_2(s) + 2H_2O – 2HCl – H_2O + 2Na(s) = Na_2O(s) + Mg(s)$

$MgCl_2(s) + H_2O + 2Na(s) = Na_2O(s) + Mg(s) + 2HCl$

Thus, the final net reaction:

$MgCl_2(s) + H_2O(l) + 2Na(s) = Na_2O(s) + Mg(s) + 2HCl(g)$

The enthalpy change for this process is determined:

Taking into account that:

$\Delta H(MgCl_2)_{(s)} = - 641.8$ kJ/mol

$\Delta H(H_2O)_{(s)} = -285.8$ kJ/mol

$\Delta H(Na_2O)_{(s)} = -414.2$ kJ/mol

$\Delta H(HCl)_g = -92.30$ kJ/mol

The total heat equals:

$\Delta H = \Delta H(Na_2O) + \Delta H(Mg) + 2\ \Delta H(HCl) - \Delta H(MgCl_2) - \Delta H(H_2O) - 2\ \Delta H(Na) = -414.2 + 0 + (-184.6) +641.8 +285.8 – 0 = + 328.8$ kJ/mol