Answer on Question# 57952 - Chemistry - Inorganic Chemistry

1. From the following heats of reactions that are given: C(s) + O2 (g) --> CO2 (g) ΔH = -393.5 kJ 2H2 (g) + O2 (g)--> 2H2O (l) ΔH = -571.6 kJ 2C2H2 (g) + 5 O2 (g) --> 4CO2 (g) + 2H2O (l) ΔH = -2598.8 kJ Calculate the heat of the reaction of the following equation: 2C(s) + H2 (g) --> C2H2 (g)

2. Calculate the ΔHrxn for the following reaction: 2Al(s) + Fe2O3(s) --> 2Fe (s) + Al2O3(s) Given that: I. 2Al2O3 (s) --> 4Al (s) + 3O2(g) ΔH= + 3339.6kJ II. 4Fe(s) + 3O2(g) --> 2 Fe2O3(s) ΔH= -1644.4kJ

3. Nitrogen can exists as N2O, NH3, NO and NO2. In which compound is nitrogen in its lowest oxidation state?

Solution

1.

$C(s) + O_2 (g) \rightarrow CO_2 (g)$	$\Delta H_1 = -393.5$ kJ	×2
$2H_2 (g) + O_2 (g) \rightarrow 2H_2O(l)$	$\Delta H_2 = -571.6$ kJ	×0.5
$2C_2H_2 (g) + 5 O_2 (g) \rightarrow 4CO_2 (g) + 2H_2O(l)$	$\Delta H_3 = -2598.8$ kJ	×(-0.5)

$2C(s) + H_2 (g) \rightarrow C_2H_2 (g)$ $\Delta H = 2\Delta H_1 + 0.5\Delta H_2 - 0.5\Delta H_3$

$\Delta H = 2(-393.5)+0.5(-571.6)-0.5(-2598.8) =$ **226.6 kJ**

2.

$2Al_2O_3 (s) \rightarrow 4Al (s) + 3O_2(g)$	$\Delta H_1 = +3339.6$ kJ	×0.5
$4Fe(s) + 3O_2(g) \rightarrow 2 Fe_2O_3(s)$	$\Delta H_2 = -1644.4$kJ	×(-0.5)

$2Al(s) + Fe_2O_3(s) \rightarrow 2Fe (s) + Al_2O_3(s)$ $\Delta H = 0.5\Delta H_1 - 0.5\Delta H_2$

$\Delta H = 0.5(3339.6)-0.5(-1644.4)=$ **2492 kJ**

3.

Compound	Nitrogen oxidation state
N_2O	+1
NH_3	**-3**
NO	+2
NO_2	+4

The lowest oxidation state of Nitrogen is in **ammonia**.