HESS' LAW 3

Find : $2\,C(s) + 3\,H_2(g) \longrightarrow C_2H_6(g)$ $\Delta H = \ ?$

Given :

(1) $C_2H_6(g) + \frac{1}{2}\,Cl_2 \longrightarrow C_2H_5Cl(g) + \frac{1}{2}\,H_2(g)$ $\Delta H = +\ 8.6$ kJ

(2) $C_2H_5OH(l) + 3\,O_2(g) \longrightarrow 2\,CO_2(g) + 3\,H_2O(l)$ $\Delta H = -\ 1409.2$ kJ

(3) $C_2H_5Cl(g) + H_2O(l) \longrightarrow C_2H_5OH(l) + HCl(g)$ $\Delta H = +\ 33.5$ kJ

(4) $C(s) + O_2(g) \longrightarrow CO_2(g)$ $\Delta H = -\ 393.5$ kJ

(5) $H_2(g) + \frac{1}{2}\,O_2(g) \longrightarrow H_2O(l)$ $\Delta H = -\ 285.8$ kJ

(6) $\frac{1}{2}\,H_2(g) + \frac{1}{2}\,Cl_2(g) \longrightarrow HCl(g)$ $\Delta H = -\ 92.3$ kJ

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rev (1) $C_2H_5Cl(g) + \frac{1}{2}\,H_2(g) \longrightarrow C_2H_6(g) + \frac{1}{2}\,Cl_2$ $\Delta H = -\ 8.6$ kJ

rev (3) $C_2H_5OH(l) + HCl(g) \longrightarrow C_2H_5Cl(g) + H_2O(l)$ $\Delta H = -\ 33.5$ kJ

rev (2) $2\,CO_2(g) + 3\,H_2O(l) \longrightarrow C_2H_5OH(l) + 3\,O_2(g)$ $\Delta H = +\ 1409.2$ kJ

(6) $\frac{1}{2}\,H_2(g) + \frac{1}{2}\,Cl_2(g) \longrightarrow HCl(g)$ $\Delta H = -\ 92.3$ kJ

2 x (4) $2\,C(s) + 2\,O_2(g) \longrightarrow 2\,CO_2(g)$ $\Delta H = -\ 787.0$ kJ

2 x (5) $2\,H_2(g) + O_2(g) \longrightarrow 2\,H_2O(l)$ $\Delta H = -\ 571.6$ kJ

$2\,C(s) + 3\,H_2(g) \longrightarrow C_2H_6(g)$ $\Delta H = -\ 83.8$ kJ
