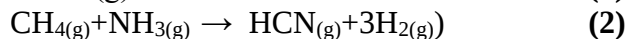


Series N° 3

Exercise 1:

Consider the following reactions at 289 K:



- Calculate $\Delta H^\circ_{R(1)}$ at 289 K, given the following data at 289 K:

$$\Delta H^\circ_f(\text{NH}_3\text{(g)}) = -46 \text{ KJ.mol}^{-1}, \Delta H^\circ_f(\text{CH}_4\text{(g)}) = -74,8 \text{ KJ.mol}^{-1},$$
$$\Delta H^\circ_f(\text{C}_5\text{H}_5\text{N}_5\text{(s)}) = -46 \text{ KJ.mol}^{-1}, \Delta H^\circ_{R(2)} = 251.2 \text{ KJ}$$

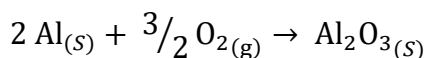
Exercise 2:

Calculate the standard enthalpy of formation of methane gas, $\Delta H^\circ_f(\text{CH}_4)$, given the standard enthalpies ΔH° for the following reactions:



Exercise 3:

Consider the following reaction:



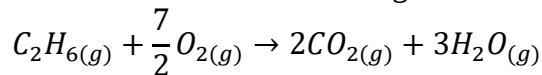
- Calculate the change in enthalpy for this reaction at 500°C and 1 atm pressure, given that the change in enthalpy at 25°C is $\Delta H^\circ_R = 1676 \text{ kJ}$.
- Given that aluminum (Al) melts at 660°C, calculate the change in enthalpy for the same reaction at 750°C and 1 atm pressure.

Given:

$$\Delta H_{fus(Al)} = 10,8 \text{ KJ.mol}^{-1}.K^{-1}, \text{Cp}_{Al(s)} = 24,2 \text{ J.mol}^{-1}.K^{-1}, \text{Cp}_{Al(l)} = 29,3 \text{ J.mol}^{-1}.K^{-1}$$
$$\text{Cp}_{Al_2O_3(s)} = 81,2 \text{ J.mol}^{-1}.K^{-1}, \text{Cp}_{O_2(g)} = 29,3 \text{ J.mol}^{-1}$$

Exercise 4:

The combustion of ethane occurs according to the following reaction:



- Calculate the heat of combustion at constant volume and at 298 K.
- Calculate the standard enthalpy of formation of C_2H_6 .
- Calculate the C-C bond energy in C_2H_6 .

Given:

$$\Delta H^\circ_{C(C_2H_6)} = -336,65 \text{ Kcal.mol}^{-1}, \Delta H^\circ_{f(H_2O(l))} = -68,32 \text{ Kcal.mol}^{-1}$$
$$\Delta H^\circ_{vap(H_2O)} = 10,53 \text{ Kcal.mol}^{-1}, \Delta H^\circ_{f(CO_2(g))} = -94,05 \text{ Kcal.mol}^{-1}$$
$$\Delta H^\circ_{sub(C(gr))} = 171,86 \text{ Kcal.mol}^{-1}$$
$$E_{C-H} = -98,8 \text{ Kcal.mol}^{-1}, E_{H-H} = -103,2 \text{ Kcal.mol}^{-1}$$