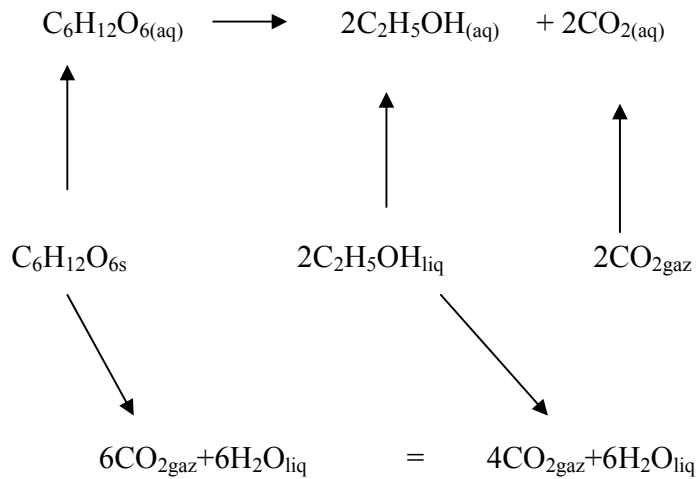
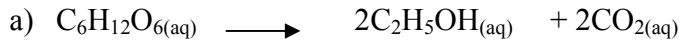


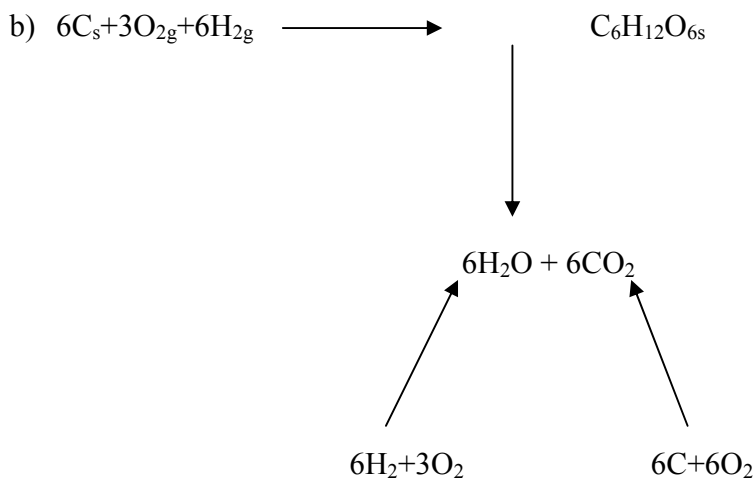
Correction : CORRECTION DES EXERCICES

Exercice 1 :



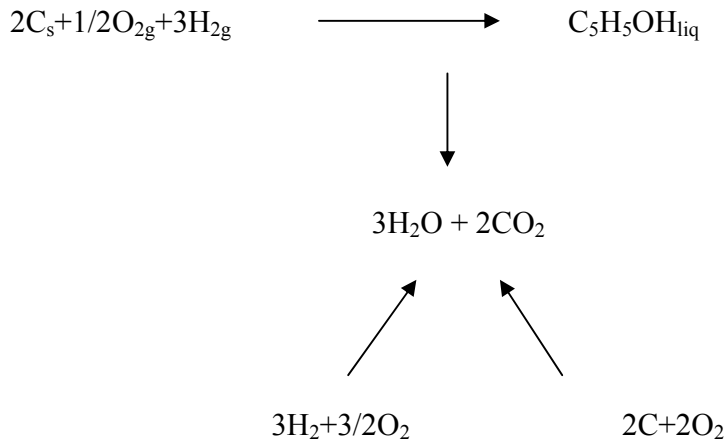
$$\Delta H_f^\circ = -\Delta H_3^\circ + \Delta H_1^\circ - \Delta H_2^\circ + 2\Delta H_4^\circ + 2\Delta H_5^\circ$$

$$= +25,37 - 2813,1 + 2 \times 1369,4 - 2 \times 7,52 + 2 \times 4,85 = -54,27 \text{ kJ} \cdot \text{mol}^{-1}$$



$$\Delta H_f^\circ = 6\Delta H_f^\circ(H_2O) + 6\Delta H_f^\circ(CO_2) - \Delta H_1^\circ$$

$$=6(-284)+6(-394)+2813,1 = -1254,9\text{kJ}\cdot\text{mol}^{-1}$$



$$\begin{aligned}
 \Delta H^\circ_f &= 3\Delta H^\circ(\text{H}_2\text{O}) + 2\Delta H^\circ(\text{CO}_2) - \Delta H^\circ_1 \\
 &= -270,4\text{kJ}\cdot\text{mol}^{-1}
 \end{aligned}$$

Exercice 2 :

a) $\text{ATP} + \text{Mg} \rightleftharpoons \text{ATPMg}$
 $K = (\text{ATPMg}) / (\text{ATP} \cdot \text{Mg})$ activités

Activités = $\gamma[c]$

$$K = [\text{ATPMg}] / [\text{ATP} \cdot \text{Mg}] \times \gamma_{\text{ATPMg}} / (\gamma_{\text{ATP}} \gamma_{\text{Mg}})$$

b) $\Delta G = -RT \ln K = -26,76\text{kJ}\cdot\text{mol}^{-1}$

c) $K_a = K \times 1/0,7 = 71429\text{M}^{-1}$

d) $a = \text{ATP}$ $b = \text{Mg}$ $x = \text{ATPMg}$

$$x = [a + b + 1/K - \sqrt{(a + b + 1/K)^2 - 4ab}] / 2 = 6,5 \cdot 10^{-5}\text{M}$$

e) Van' t Hoff

$$\ln(K_{25^\circ\text{C}}/K_{37^\circ\text{C}}) = -(\Delta H/R)(1/T_1 - 1/T_2) = +21,5\text{kJ}\cdot\text{mol}^{-1}$$

f) $\Delta G = \Delta H - T\Delta S$

$$\Delta S = +162\text{J/mol}$$

Exercice 3 :

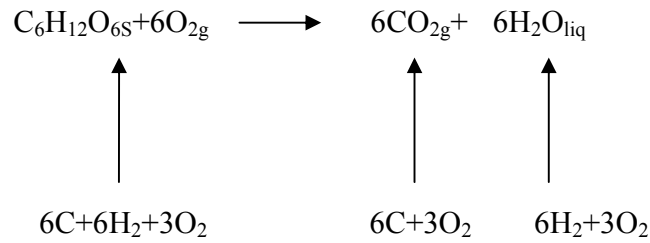
A T=427K nous avons $K_p = P(C_6H_6) \times P(H_2)^3 = 10^{-6} \text{atm}^3$

A T=483K nous avons $K_p = P(C_6H_6) \times P(H_2)^3 = 10^{-3} \text{atm}^3$

ΔH considéré comme constant donc Van't Hoff

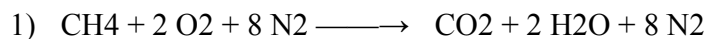
$$\ln(K_1/K_2) = -(\Delta H_r/R)(1/T_1 - 1/T_2) = 211,2 \text{kJ} \cdot \text{mol}^{-1}$$

Exercice 4 :



$$\Delta H^\circ_r = -\Delta H^\circ_f(\text{glucose}) + 6\Delta H^\circ_f(\text{eau}) + 6\Delta H^\circ_f(\text{CO}_2) = -2810 \text{kJ} \cdot \text{mol}^{-1}$$

Exercice 5 :



2) $\Delta_r H = \Delta_f H(\text{CO}_2) + 2 \Delta_f H(\text{H}_2\text{O}) + 2\Delta H_{\text{vap}}(\text{H}_2\text{O}) - \Delta_f H(\text{CH}_4)$
 $= -392 + 2 \times (-284) + 2 \times 42 - (-71,4)$
 $= -804,6 \text{ kJ/mol.}$

3) $\text{PCI} = (-\Delta_r H \times 1000) / M(\text{CH}_4)$
 $= (-(-804,6 \cdot 10^3) \times 1000) / 16$
 $= 50287500 \text{ J}$
 $= 50,29 \text{ MJ}$

4) $T_f = 298 + (-\Delta_r H_{298} / \Sigma C_p)$ $\Sigma C_p = 32 + 2 \times 36 + 8 \times 30 = 344$
 $= 298 + 804600 / 344$
 $= 2673 \text{ K}$

5) Systeme adiabatique (cf cours)

$$-\Delta_r H_{298} = (C_p(\text{CO}_2) + 2C_p(\text{H}_2\text{Og}) + 8C_p(\text{N}_2)) \cdot (T - 298) \\ = (32 + 2 \times 36 + 8 \times 30) \cdot (T - 298) + ((20 \cdot 10^{-3} + 2 \times 15 \cdot 10^{-3} + 8 \times 6 \cdot 10^{-3})/2) (T^2 - 298^2) \\ 0 = 344T - 102512 + 98 \cdot 10^{-3} T^2 - 8702,792 + \Delta_r H_{298}$$

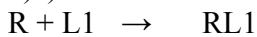
$$98 \cdot 10^{-3} T^2 + 344T - 915814,792 = 0$$

$$\Delta = 344^2 - 4 \times 98 \cdot 10^{-3} \times (-915814,792) = 477335,3985$$

$$T_f = (-344 + \Delta^{1/2}) / 2 \times 98 \cdot 10^{-3} \\ = 1770\text{K}$$

Exercice 6 :

1)a)



$$K1 = RL1 / (Rt \times L1)$$

on note $Rt = a$ $L1t = b$ $RL1 = x$

$$K1 = x / (a-x)(b-x) \quad (\text{idem pour } K2)$$



$$K2 = RL2 / (Rt \times L2)$$

$$b) x = (a + b + (1/K) - \sqrt{(a + b + (1/K))^2 - 4ab}) / 2$$

$$x1 = 3,81 \cdot 10^{-6} \text{M}$$

$$x2 = 9 \cdot 10^{-6} \text{M}$$

$$R = 6,19 \cdot 10^{-6} \text{M}$$

$$R = 10^{-6} \text{M}$$

$$RL1 = 3,81 \cdot 10^{-6} \text{M}$$

$$RL2 = 9 \cdot 10^{-6} \text{M}$$

2)

$$Rt = 10^{-5} \text{ et } K = 10^5$$

$$RL1 = 0,9 Rt$$

$$K1 = RL1 / ((Rt - RL1)(L1t - RL1))$$

$$L1t = RL1 / (K1 \cdot (Rt - RL1)) + RL1$$

$$= 0,9Rt / K1 \cdot (Rt - 0,9Rt) + 0,9Rt$$

$$= 9,9 \cdot 10^{-5} \text{M}$$

3) OUI, deux réactions avec 2 K différents, celle qui l'emporte est celle de K la plus élevée donc si compétition, les deux concentrations diminueront mais RL1 sera majoritaire par rapport à RL2

4) $\Delta_r H1 = 200 \text{ kJ/mol}$ donc endothermique car positive.

$\Delta_r H2 = 0 \text{ kJ/mol}$ donc athermique.

Van'tHoff

$$\ln(Kt1/Kt2) = \Delta_r H/R \times (1/T1 - 1/T2)$$

$$\ln(Kt1/Kt2) = 0 \quad \text{donc} \quad Kt1/Kt2 = 1 \quad \text{donc}$$

indépendante de T.

$$\ln(Kt1/Kt2) = \Delta_r H/R \times (1/T1 - 1/T2)$$

$$T2 = 316\text{K}$$