

Correction of the Thermodynamics

and Chemistry Solution

Exo 1 = 6 points

exp 1 and 4 =

$$\begin{cases} r_1 = 0,6 \cdot 10^{-2} = k(0,1)^{\alpha} (0,1)^{\beta} & \text{--- (1)} \\ r_4 = 2,40 \cdot 10^{-2} = k(0,4)^{\alpha} (0,1)^{\beta} & \text{--- (4)} \end{cases}$$

$$\frac{(4)}{(1)} \Rightarrow \frac{2,40}{0,6} = \left(\frac{0,4}{0,1}\right)^{\beta} \Rightarrow 4 = 4^{\beta} \Rightarrow \boxed{\beta = 1}$$

exp 2 and 3 =

$$\begin{cases} r_2 = 7,2 \cdot 10^{-2} = k(0,3)^{\alpha} (0,2)^{\beta} & \text{--- (2)} \\ r_3 = 28,8 \cdot 10^{-2} = k(0,3)^{\alpha} (0,4)^{\beta} & \text{--- (3)} \end{cases}$$

$$\frac{(3)}{(2)} \Rightarrow \frac{28,8}{7,2} = \left(\frac{0,4}{0,2}\right)^{\beta} \Rightarrow 4 = 2^{\beta} \Rightarrow \boxed{\beta = 2}$$

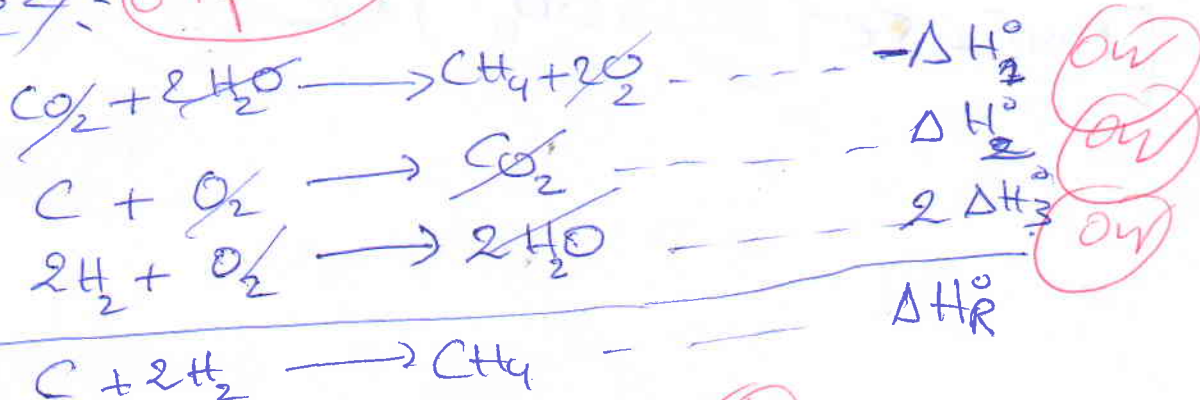
$$(3) \quad n = \alpha + \beta = 1 + 2 = 3$$

$$(4) \quad r = k[A][B]^2$$

$$(5) \quad \text{exp 1: } k = \frac{r_0}{[A]_0[B]_0^2} = \frac{0,6 \cdot 10^{-2}}{(0,1)(0,1)^2}$$

$$k = 6 \text{ mol}^{-2} \text{ l}^{+2} \text{ s}^{-1}$$

Exo 2 = 4 points



$$\begin{aligned} \Delta H_R^{\circ} &= -\Delta H_1^{\circ} + \Delta H_2^{\circ} + 2\Delta H_3^{\circ} \\ &= 890,3 + (-393,5) + 2(-241,8) \\ &= 13,2 \text{ kJ} \end{aligned}$$

EX 03 = 6 points (0.2)

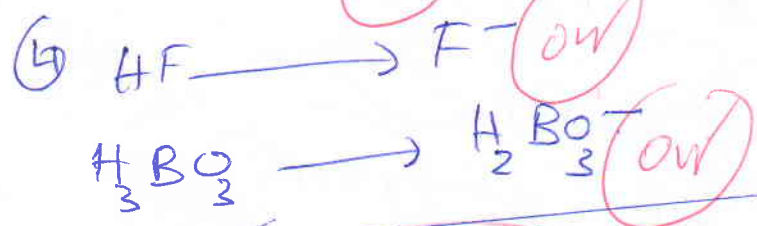
① $pH = \frac{1}{2}(pK_a - \log c) \Rightarrow pK_a = 2pH + \log c$ (0.4)

$pK_a = 6 - \log 2 \Rightarrow K_a = 2 \times 10^{-6}$ (0.4)

② $pH = \frac{1}{2}(pK_a - \log c)$ with $pK_a = -\log 5.8 \times 10^{-10} = 9.23$ (0.4)

$pH = \frac{1}{2}(9.23 - \log 846) = 4.15$ (0.4)

③ HF stronger than H₃BO₃ because $K_a(HF) > K_a(H_3BO_3)$
 or: $pK_a(HF) < pK_a(H_3BO_3)$
 (5.63) (9.23)



EX 04 = 4 points

