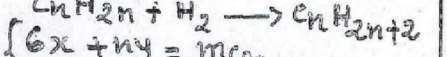


Corrigé-type BACI série C₄ 2013 SC. PHYS.

Exercice 1 (5,5pts)

A/Composition en moles et formule de l'alcène.

$$n_{C_6H_6} = x ; n_{C_nH_{2n}} = y$$



$$\begin{cases} 6x + ny = m_{CO_2} \\ 3x + ny = \frac{m_{H_2O}}{M_{H_2O}} \end{cases} \Rightarrow x = 0,5 \text{ mol}$$

$$3x + y = \frac{V_{H_2}}{V_m} \times 64,2 \Rightarrow y = 0,3 \text{ mol}$$

$$78x + 14ny = 64,2 \Rightarrow n = 6$$

alcène: C_6H_{12}

B/Composition Centésimale

massique

$$\%C = \frac{3}{11} \times 100 \Rightarrow \%C = 91,34$$

$$\%H = \frac{1}{9} \times 100 \Rightarrow \%H = 8,66$$

2/ Masse d'eau formée

$$m_{H_2O} = \frac{9}{100} m_{H_2} \Rightarrow m_{H_2O} = 836 \text{ g}$$

3/ Formule brute de A

$$\frac{12x}{100} = \frac{29d}{100} \Rightarrow x = 8$$

$$y = \frac{29d}{100} \Rightarrow y = 9,999$$

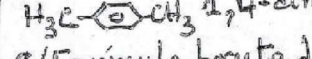
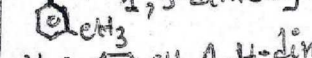
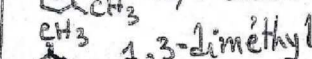
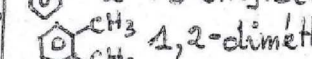
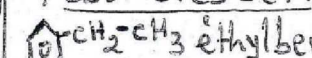
$$y = 29d - 12x \Rightarrow y = 10$$

A: C_8H_{10}

4/a) Composé aromatique

Justification: réaction de substitution en présence de $AlCl_3$.

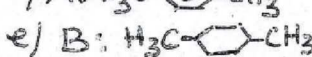
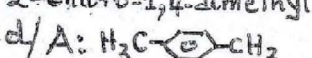
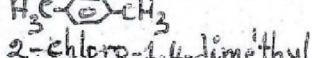
b/ Isomères de A



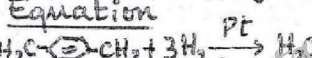
c/ Formule brute de C et nom.

$$\%Cl = \frac{35,5x}{29d + 34,5x} \times 100 \Rightarrow x = 1$$

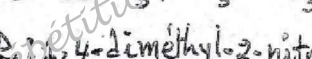
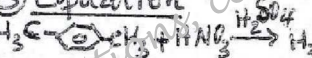
C: C_8H_9Cl



Equation

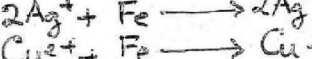
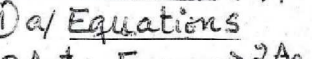


5/ Equation



Exercice 2 (4pts)

1/ a/ Equations



$$b/ m_1 = m_s - m_{Fe(i)}$$

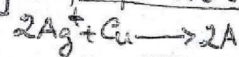
c/ Relation entre x et y

$$m_{Ag} + m_{Cu} - m_{Fe(i)} = m_1$$

$$(M_{Ag} + \frac{M_{Fe}}{2})x + (M_{Cu} - M_{Fe})y = m_1$$

$$80x + 7,5y = 2,795$$

2/ a/ Equation



$$b/ m_2 = m_s - m_{Cu(i)}$$

* Deduction

$$m_s = m_{Ag} + m_{Cu(i)}$$

$$m_{Cu(i)} = m_{Cu(i)} - m_{Cu(d)}$$

$$m_2 = m_{Ag} - m_{Cu(d)}$$

$$(M_{Ag} - \frac{M_{Cu}}{2})x = m_2$$

$$76,25x = 2,16 \Rightarrow x = 2,83 \cdot 10^{-2} \text{ mol}$$

$$y = 7,948 \cdot 10^{-2} \text{ mol}$$

$$m = 5x M_{AgNO_3} ; m = 24,08 \text{ g}$$

$$m = 5y M_{CuSO_4} ; m = 56,208 \text{ g}$$

Exercice 3 (5,5pts)

1/ Moment d'inertie J_A

$$\Delta E_c = \sum W_{F_{ext}}$$

$$\frac{1}{2} J_A \omega^2 + \frac{1}{2} m V_A^2 = 0 = mgh \Rightarrow \omega = \frac{V_A}{r}$$

$$J_A = \frac{mr^2(2gh - V_A^2)}{V_A^2}$$

$$J_A = 3,55 \cdot 10^{-2} \text{ kg} \cdot \text{m}^2$$

2/ Mouvement ultérieur

des disques

Mvt de rotation uniforme

3/ Moment des forces de frottement

$$0 = \frac{1}{2} J_A \omega^2 = M_A(\vec{r}) \cdot 2\pi \cdot n$$

$$M_A(\vec{r}) = \frac{-J_A \cdot V_A^2}{4\pi n r^2}$$

$$M_A(\vec{r}) = -2,73 \cdot 10^{-2} \text{ Nm}$$

II/ Energie mécanique

$$E_m = \frac{1}{2} m V_A^2 + mg[L \sin \alpha + R(1 - \cos \alpha)]$$

$$E_m = 26,71 \text{ J}$$

2/ Deduction de V_B

$$V_e \text{ et } V_d$$

$$E_{mA} = E_{mB} \Rightarrow$$

$$V_B = \sqrt{V_A^2 + 2g[L \sin \alpha]}$$

$$V_B = 4,67 \text{ m/s}$$

$$E_{mB} = E_{mA} \Rightarrow$$

$$V_C = \sqrt{V_A^2 + 2g[L \sin \alpha + R(1 - \cos \alpha)]}$$

$$V_C = 5,17 \text{ m/s}$$

$$E_{mB} = E_{mA} \Rightarrow$$

$$V_D = \sqrt{V_A^2 + 2g[L \sin \alpha - R \cos \alpha]}$$

$$V_D = 4,11 \text{ m/s}$$

3/ Calcul de H

$$0 - \frac{1}{2} m V_B^2 = mg(H - R)$$

$$H = \frac{1}{2g} [V_A^2 + 2g(L \sin \alpha - R \cos \alpha)] + R$$

$$H = 1,36 \text{ m}$$

4/ Calcul de f

$$V_D = 2g(H - R)$$

$$-f(L + R(\frac{1}{2} + \alpha)) = E_{mD} - E_{mA}$$

$$f = \frac{E_{mA} - E_{mD}}{L + R(\frac{1}{2} + \alpha)}$$

$$f = 3,08 \text{ N}$$

Exercice 4 (5pts)

1/ Tension U_S

$$a/ U_S = U_{SE} + U_{EE} - U_M$$

$$U_S = -U_2 \Rightarrow U_S = -8 \text{ V}$$

$$-13 \text{ V} < U_S < 13 \text{ V} \Rightarrow$$

A.D linéaire

2/ Intensité maximale

$$I_{max} = \frac{P_{max}}{U_2}$$

$$I_{max} = 0,2 \text{ A}$$

3/ $U_e = U_{AE} + U_{EE} \Rightarrow U_e = RI$

$$\text{or } 0 < I < I_{max}$$

$$0 < U_e < 48 \text{ V}$$

4/ Valeur limite de R_u

$$R_{u2} = \frac{-U_S}{I_{max}}$$

$$R_{u2} = 320 \Omega$$

5/a) Puissances P_G et P_E

$$P_G = \frac{U_e^2}{R} ; P_G \geq 0,24 \text{ W}$$

$$P_E = \frac{U_e^2}{R} + \frac{U_S^2}{R_u} + U_2 \frac{U_e}{R}$$

$$P_E = 0,4 \text{ W}$$

b/ Comparaison

$$P_G < P_E$$

Interprétation

La différence

$P_G - P_E$ est fournie

par l'alimentation.

FIN