

Les Corrections

1-1) $E_{\text{m}} = az + b$

$b = 1,92 \text{ J}$

$a = \frac{1,92 - 2,152}{0 - 0,25} = 2,4$

$E_{\text{m}} = 2,4z + 1,92$

1pt

1-2) $E_{\text{m}}(C) = 2,4z_c + 1,92$

$E_{\text{m}}(C) = 3 \text{ J}$

1pt

1-3) $E_{\text{m}}(C) = \frac{1}{2}mv_c^2 + E_{\text{pp}}(C)$

$E_{\text{pp}}(C) = E_{\text{m}}(C) - \frac{1}{2}mv_c^2$
 $= 3 - \frac{1}{2} \times 0,4 \times 9 \times 3^2$

1pt

$E_{\text{pp}}(C) = 1,2 \text{ J}$

1-4) $E_{\text{pp}}(C) = m \cdot g \cdot z_c + C$

$C = E_{\text{pp}}(C) - m \cdot g \cdot z_c$

$C = 1,2 - 0,4 \times 10 \times 0,45$

$C = -0,6 \text{ J}$

0,75pt

$C = -m \cdot g \cdot z_0$

$z_0 = \frac{-C}{m \cdot g}$

$z_0 = \frac{+0,6}{0,4 \times 10} = 0,15 \text{ m}$

1-5)

la variation de l'énergie mécanique entre A et C

$\Delta E_{\text{m}} = \Delta E_c + \Delta E_{\text{pp}}$

$\Delta E_{\text{m}} = W(\vec{P}) + W(\vec{R}) + W(\vec{T}) - W(\vec{P})$

$\Delta E_{\text{m}} = W(\vec{T})$

$E_{\text{m}}(C) - E_{\text{m}}(A) = -T \cdot AC$

$a(z_c - z_A) = -T \cdot AC$

1pt

$-a \cdot AC \sin \alpha = -T \cdot AC$

$T = a \cdot \sin \alpha$

$T = 1,2 \text{ N}$

1-6) En appliquant T.E.C à (S) entre les positions A et C

$\Delta E_c = W(\vec{P}) + W(\vec{R}) + W(\vec{T})$

$\frac{1}{2}mv_c^2 - \frac{1}{2}mv_A^2 = m \cdot g(z_A - z_c) - T \cdot AC$

$= m \cdot g(z_A - z_c) - T \cdot \frac{z_A - z_c}{\sin \alpha}$

$v_A = \sqrt{2(z_A - z_c) \left(m \cdot g + \frac{T}{\sin \alpha} \right) + v_c^2}$

A.N $v_A = \sqrt{\frac{2(125 - 45) \cdot 10^{-2}}{0,4} (0,4 \times 10 + 2,4) + 3^2}$

0,75pt

1,5pt

$v_A = 4,61 \text{ m/s}$

2-1)

En appliquant T.E.c à la poulie entre t_A et t_C :

$$\Delta E_c = W(\vec{P}) + W(\vec{R}) + W(\vec{T})$$

$T = T'$: le fil et la poulie de masse négligeable

$$\frac{1}{2} J_D \omega_C^2 - \frac{1}{2} J_D \omega_A^2 = T \cdot r_A + M_C \cdot \Delta \theta$$

$$\frac{1}{2} J_D \left(\frac{v_C}{r} \right)^2 - \frac{1}{2} J_D \left(\frac{v_A}{r} \right)^2 = T \cdot r \cdot \frac{\Delta \theta}{r} + M_C \cdot \frac{\Delta \theta}{r}$$

$$\left(T + \frac{M_C}{r} \right) \frac{(z_A - z_C)}{\sin \alpha} = \frac{1}{2} J_D \left(\left(\frac{v_C}{r} \right)^2 - \left(\frac{v_A}{r} \right)^2 \right)$$

$$T + \frac{M_C}{r} = \frac{1}{2} \frac{J_D \sin \alpha}{r^2 (z_A - z_C)} (v_C^2 - v_A^2)$$

$$M_C = \frac{1}{2} \frac{J_D \sin \alpha}{r (z_A - z_C)} (v_C^2 - v_A^2) - T \cdot r$$

A.N

$$M_C = \frac{1}{2} \frac{2,3 \cdot 10^{-2} \sin 30^\circ}{0,2 \cdot 0,8} (3^2 - 1,61^2) - 1,2 \times 0,92$$

$$M_C = -9,71 \cdot 10^{-3} \text{ N.m}$$

2-2) En appliquant T.E.c à la poulie entre t_C et t_D

$$-\frac{1}{2} J_D \omega_C^2 = W_C$$

$$-\frac{1}{2} J_D \left(\frac{v_C}{r} \right)^2 = M_C \cdot \Delta \theta = M_C \cdot 2\pi \cdot n$$

$$n = -\frac{1}{4\pi} J_D \left(\frac{v_C}{r} \right)^2 \cdot \frac{1}{M_C}$$

A.N $n = 4 \frac{1}{4\pi} 2,3 \cdot 10^{-2} \left(\frac{3}{0,2} \right)^2 \frac{1}{971}$

$$n = 42 \text{ tr}$$

EX2:

1) $E_{pp} = m \cdot g \cdot \frac{L}{2} (1 - \cos \theta)$

2) $E_m = E_c + E_{pp}$

$$= \frac{1}{2} J_D \omega^2 + m \cdot g \cdot \frac{L}{2} (1 - \cos \theta)$$

3) $E_m = \text{cte} \Leftrightarrow \Delta E_m = 0$

$$E_m = E_{c \max} = E_{pp \max}$$

$$\frac{1}{2} J_D \omega_0^2 = m \cdot g \cdot \frac{L}{2} (1 - \cos \theta_m)$$

$$\omega_0 = \sqrt{\frac{m \cdot g \cdot L (1 - \cos \theta_m)}{J_D}}$$

A.N $\omega_0 = \sqrt{\frac{0,15 \times 10}{3 \cdot 10^{-2}} 0,4 (1 - \cos 60^\circ)}$

$$\omega_0 = 5,77 \text{ rad/s}$$

4- $E_{pp}(\theta_1) = E_c$
on pose

$$E_m = 2E_{pp} = 2E_{pp} = E_{ppmax}$$

$$E_{pp}(\theta_1) = \frac{E_{ppmax}}{2}$$

$$m \cdot g \frac{L}{2} (1 - \cos \theta_1) = m \cdot g \frac{L}{4} (1 - \cos \theta_1)$$

$$1 - \cos \theta_1 = \frac{1}{2} (1 - \cos \theta_{max})$$

$$\cos \theta_1 = 1 - \frac{1}{2} (1 - \cos \theta_{max})$$

$$\cos \theta_1 = 1 - \frac{1}{2} (1 - \cos 60^\circ)$$

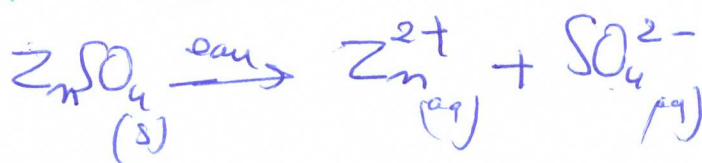
$$\cos \theta_1 = 0,75$$

1pt

$$\boxed{\theta_1 = 41,41^\circ}$$

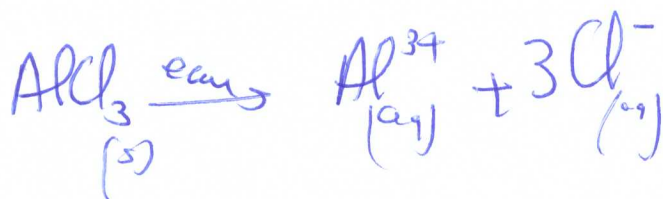
Chimie :

Partie I :



$$C = [Zn^{2+}] = [SO_4^{2-}]$$

1pt

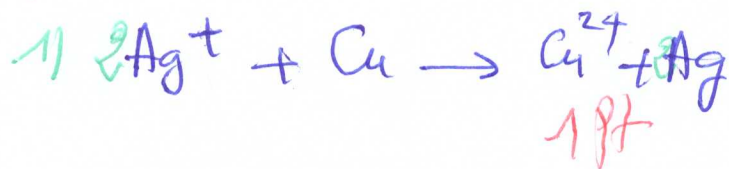


$$[Al^{3+}] = C$$

$$[Cl^-] = 3 \cdot C$$

1pt

partie II :



$$2) n_0(Ag^+) = [Ag^+] \cdot V$$

$$= 0,15 \times 20 \cdot 10^{-3}$$

$$= 3 \cdot 10^{-3} \text{ mol}$$

$$n_0(Cu) = \frac{m}{M}$$

$$= \frac{0,127}{63,5}$$

$$= 2 \cdot 10^{-3} \text{ mol}$$

1pt

$$3) \frac{n_0(Ag^+)}{2} = 1,5 \cdot 10^{-3} \text{ mol}$$

$$\frac{n_0(Cu)}{1} = 2 \cdot 10^{-3} \text{ mol}$$

le réactif limitant est Ag^+

1pt

$$x_{ma} = 1,5 \cdot 10^{-3} \text{ mol}$$

$$4- n_f(Cu) = 2 \cdot 10^{-3} - 1,5 \cdot 10^{-3}$$

$$= 0,5 \cdot 10^{-3} \text{ mol}$$

$$n_f(Cu^{2+}) = 1,5 \cdot 10^{-3} \text{ mol}$$

1pt

$$n_f(Ag) = 3 \cdot 10^{-3} \text{ mol}$$

$$5- [Cu^{2+}]_f = \frac{n_f(Cu^{2+})}{V}$$

$$= \frac{1,5 \cdot 10^{-3}}{20 \cdot 10^{-3}} = 7,5 \cdot 10^{-2} \text{ mol/L}$$

1pt

$$m = n \times M$$

$$\begin{aligned}m_p(\text{Cu}) &= n_p(\text{Cu}) \cdot M(\text{Cu}) \\&= 0.15 \cdot 10^{-3} \times 63.5 \\&= 3.175 \cdot 10^{-2} \text{ g}\end{aligned}$$

$$\begin{aligned}m_p(\text{Ag}) &= n_p(\text{Ag}) \cdot M(\text{Ag}) \\&= 3 \cdot 10^{-3} \times 107.9\end{aligned}$$

$$m_p(\text{Ag}) = 0.324 \text{ g}$$