Physique : 13 pts | Les Corrections |

EX 1 :

Partie I

① ⓐ La vitesse angulaire des roues arrière et avant ont la même vitesse

ⓑ La vitesse linéaire d'un point de la circonférence des deux roues ont la même.

② $w_R = \dfrac{V}{D/2}$

A.N $w_R = \dfrac{20}{3{,}6} \times \dfrac{2}{69.10^{-2}}$

$w_R = 16{,}1 \text{ rad/s}$

③ $V_R = R_R \cdot w_R$

A.N $V_R = \dfrac{6}{2} \cdot 10^{-2} \times 16{,}1$

$V_R = 0{,}483 \text{ m/s}$

④ $V_p = V_R = 0{,}483 \text{ m/s}$

⑤ ⓐ $w_p = \dfrac{V_p}{R_p}$

A.N $w_p = \dfrac{0{,}483}{10.10^{-2}}$

$w_p = 4{,}83 \text{ rad/s}$

ⓑ $W_M = W_p = 4{,}83 \text{ rad/s}$

ⓒ $V_A = L \cdot W_M$

A.N $V_A = 17.10^{-2} \times 4{,}83$

$V_A = 0{,}821 \text{ m/s}$

Partie II

① $\Delta\theta = 2\pi \cdot n$

$= 4\pi$

$= 12{,}56 \text{ rad}$

② $x_1 = R_1 \cdot \Delta\theta$ | $x_2 = R_2 \cdot \Delta\theta$

$x_1 = 0{,}628 \text{ m}$ | $x_2 = 0{,}314 \text{ m}$

③ $x_1 = R_1 \cdot \Delta\theta$

$R_1 = 2R_2$ On remplace

$x_1 = 2\underbrace{R_2 \cdot \Delta\theta}_{x_2}$

Donc $x_1 = 2 \cdot x_2$

④ On a $V = R \cdot w \Rightarrow w = \dfrac{V}{R}$

$w_1 = w_2$

$\dfrac{V_1}{R_1} = \dfrac{V_2}{R_2}$

$\dfrac{V_1}{2\cancel{R_2}} = \dfrac{V_2}{\cancel{R_2}}$

$V_1 = 2V_2$

EX2 :

① Le principe d'inertie :

$\vec{T} + \vec{P} = \vec{0}$

$T = m \cdot g$

A.N $= 250 \times 10$

$T = 2500 \text{ N}$

2) On a $\begin{cases} \Delta\theta = 2\pi n \\ \Delta\theta = \frac{h}{r} \end{cases}$

$$n = \frac{\Delta\theta}{2\pi} = \frac{h}{2\pi . r}$$

A.N $n = \frac{20}{2\pi . 10.10^{-2}}$

$n = 31,83 \, Trs$

3) $\omega = \frac{\Delta\theta}{\Delta t} = \frac{v}{r}$ $(v = r.\omega)$

A.N $\omega = \frac{4}{10.10^{-2}}$

$\omega = 40 \, rad/s$

$P_m = M_m . \omega$

$$M_m = \frac{P_m}{\omega}$$

A.N $M_m = \frac{12.10^3}{40}$

$M_m = 300 \, N.m$

4) On a $v = cte$ donc $\omega = cte$
donc selon théorème des moments

$\sum M = 0$

$M(\vec{T}) + M_m + M_c = 0$

$M_c = T.r - M_m$

$M_c = 2500 \times 10.10^{-2} - 300$

$M_c = -50 \, N.m$

II)

1) $v(t) = A.t + B$

La courbe
$A = \frac{\Delta v}{\Delta t} = \frac{12-0}{0-20}$
$A = -0,6$
$B = 12 \, m/s$

$v(t) = -0,6.t + 12$

$P(t) = \vec{f} . \vec{v}(t)$

$P(t) = -f . v(t)$
$= -f(A.t + B)$

$P(t) = \underbrace{-f.A}_{a}.t \underbrace{- f.B}_{b}$

2) $P(t) = a.t + b$

$a = -f.A = -500 \times (0,6)$
$= 300 \, W/s$

$b = -f.B = -500 \times 12 = 6000 \, W$

$$\boxed{P(t) = 300t - 6000}$$

Partie II :

1) $W_{A\to B}(\vec{P}) = m.g(z_A - z_B)$

$W_{A\to B}(\vec{P}) = m.g.h$
$= m.g.AB.\sin\alpha$

A.N $W_{A\to B}(\vec{P}) = 0,5 \times 10 \times 2 \times \sin 60°$
$= 8,66 \, J$

$W_{B\to C}(\vec{P}) = m.g.(z_B - z_C)$
$= m.g.h'$
$= m.g.r(1 - \cos\theta)$

A.N $W_{B\to C}(\vec{P}) = 0,5 \times 10 \times 0,5 (1 - \cos 60°)$
$= 1,25 \, J$

② a) $W_{A\to B}(\vec{R}) = \vec{R}\cdot\vec{AB}$

$= \vec{f}\cdot\vec{AB} + \underbrace{\vec{R}_N\cdot\vec{AB}}_{0}$

$= -f\cdot AB + 0$

$W_{A\to B}(\vec{R}) = -0,9\times 2 = -1,8\,J$

$W_{B\to C}(\vec{R}) = \vec{R}\cdot\vec{BC} = \vec{f}\cdot\vec{BC} + \underbrace{\vec{R}_N\cdot\vec{AB}}_{0}$

$= -f\cdot\widehat{BC} + 0$

$W_{B\to C}(\vec{R}) = -f\cdot\widehat{BC} = -f\cdot r\cdot\theta$

A.N $W_{B\to C}(\vec{R}) = -f\cdot r\cdot\theta$ $\left(\theta = 60° = \frac{\pi}{3}\right)$

$= -0,9\times 50\cdot 10^{-2}\times\frac{\pi}{3}$

$W_{B\to C}(\vec{R}) = -0,471\,J$

b. $R = \sqrt{f^2 + R_N^2}$

Le coefficient de frottement $k = \frac{f}{R_N} \Rightarrow R_N = \frac{f}{k}$

$R = \sqrt{f^2 + \left(\frac{f}{k}\right)^2}$

A.N $R = 2,657\,N$

③ a) $P(\vec{P}) = \vec{P}\cdot\vec{v}$

$P_A(\vec{P}) = P\cdot \cancel{v_A}\cdot\cos(30°) = 0$

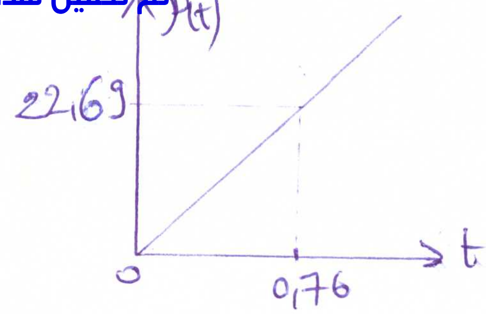
$P_B(\vec{P}) = P\cdot v_B\cos(30°)$

$= m\cdot g\cdot v_B\cos 30°$

$P_B(\vec{P}) = 22,69\,W$

b) on trace la courbe $P(t)$

$t_A = 0 \longrightarrow P_A(t) = 0$



$P(\vec{P}) = 29,855\cdot t$

$P(\vec{P}) = \frac{\partial W(\vec{P})}{\partial t}$

$\Rightarrow W_{A\to B}(\vec{P}) = \frac{1}{2}(29,855)t^2$

$= 8,62\,J$

Chimie

Partie I:

① - éthanol : alcool

- C_2H_6O : formule brute

éthanol à 95% : Pourcentage en volume

- corrosif et inflammable

② $m_{S_1}(al) = n(al)\times M(al)$

$P = \frac{V(al)}{V_{sol}}$

$m_{S_1}(al) = \rho_{al}\cdot V_{al}$

$d = \frac{\rho_{al}}{\rho_{eau}}$

donc :

$m_{S_1}(al) = \rho_{eau}\cdot d\cdot P\cdot V_{sol}$

A.N $= 1\times 0,79\times 0,95\times 100$

$m_{S_1}(al) = 75,05\,g$

③ $C_1 = \frac{n_1(al)}{V_{sol}} = \frac{m_1 al}{M_{al}}\times\frac{1}{V_{sol}}$

$$C_1 = \frac{\rho_{eau} \times d \cdot P}{M_{al}}$$

$$= \frac{1\times10^3 \times 0{,}79 \times 0{,}95}{24+6+16}$$

$$C_1 = 16{,}31\ mol/L$$

$$C_2 = \frac{\rho_{eau} \times d \cdot P'}{M_{al}}$$

$$= \frac{10^3 \times 1 \times 0{,}79 \times 0{,}19}{24+6+16}$$

$$C_2 = 3{,}26\ mol/L$$

relation de la dilution

$$C_1 \cdot V_1 = C_2 \cdot V_2$$

$$V_1 = \frac{C_2 \cdot V_2}{C_1}$$

A.N $$V_1 = \frac{3{,}26 \times 100}{16{,}31}$$

$$V_1 = 20\,mL$$

Partie II :

1) a) $$P \cdot V = n \cdot R \cdot T$$

$P \to Pa$, $V \to m^3$, $n \to mol$, $R \to J \cdot K^{-1} \cdot mol^{-1}$, $T \to K$

b) $n = 1 \Rightarrow V = V_m$

$$P \cdot V_m = R \cdot T$$

$$V_m = \frac{R \cdot T}{P}$$

A.N $$V_m = \frac{8{,}314 \times (20+273)}{10^5}$$

$$V_m = 24{,}36\ L/mol$$

c) $$n(\alpha) = \frac{V(\alpha)}{V_m}$$

A.N $$n(\alpha) = \frac{2}{24{,}36}$$

$$n(\alpha) = 8{,}21 \cdot 10^{-2}\ mol$$

d) $P = cte$ et $n = cte$

$$\frac{P}{n} = \frac{R \cdot T}{V} = cte$$

$$\frac{R \cdot T}{V} = cte$$

$$\frac{\cancel{R} \cdot T_i}{V_i} = \frac{\cancel{R} \cdot T_2}{V_2}$$

état i état 2

$$T_2 = \frac{V_2}{V_i} \cdot T_1$$

$$T_2 = \frac{5}{2} \times (20+273)$$

$$T_2 = 732{,}5\,K$$

2)

2-1 $V = cte$ et $n = cte$ (T et P varie)

$$\frac{V}{n} = \frac{R \cdot T}{P} = cte$$

2-2) état i ; état f

$$\frac{\cancel{R} \cdot T_i}{P_i} = \frac{\cancel{R} \cdot T_f}{P_f}$$

$$\frac{P_f}{P_i} = \frac{T_f}{T_i}$$

$$P_f = P_i \cdot \frac{T_f}{T_i}$$

A.N $P_f = 1{,}14\ 10^5\ Pa$

3) $d = \dfrac{M_{gaz}}{M_{air}}$ et $M_{air} = \overbrace{\rho_{air} \times V_m}^{29}$

$$M_{gaz} = 16\ g/mol$$

donc c'est O_2