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2,4 l PH = 11,1 S₁

ke = 10⁻¹⁴ (mol / l)² V_M = 24 l / mol :

(NH₃) S₁ c₁ :1-1

(S₁) :2-1

(S₁) :3-1

(S₁) :4-1

(NH₄⁺ / NH₃) :5-1

S₂ v₁ = 10 cm³ S₁ c₁ (2

v₂ = 10 cm³ c₂ = 10⁻¹ mol / l

S₁ v₁ S₂

(S₁) :1-2

(S₁) . c₁ :2-2

(S₁) . 5,3 pH :3-2

(S₁) :4-2

4,4-----3,2	
6,2-----4,2	
7,6-----6,0	

(3

(S₁) (4

(S₁) (

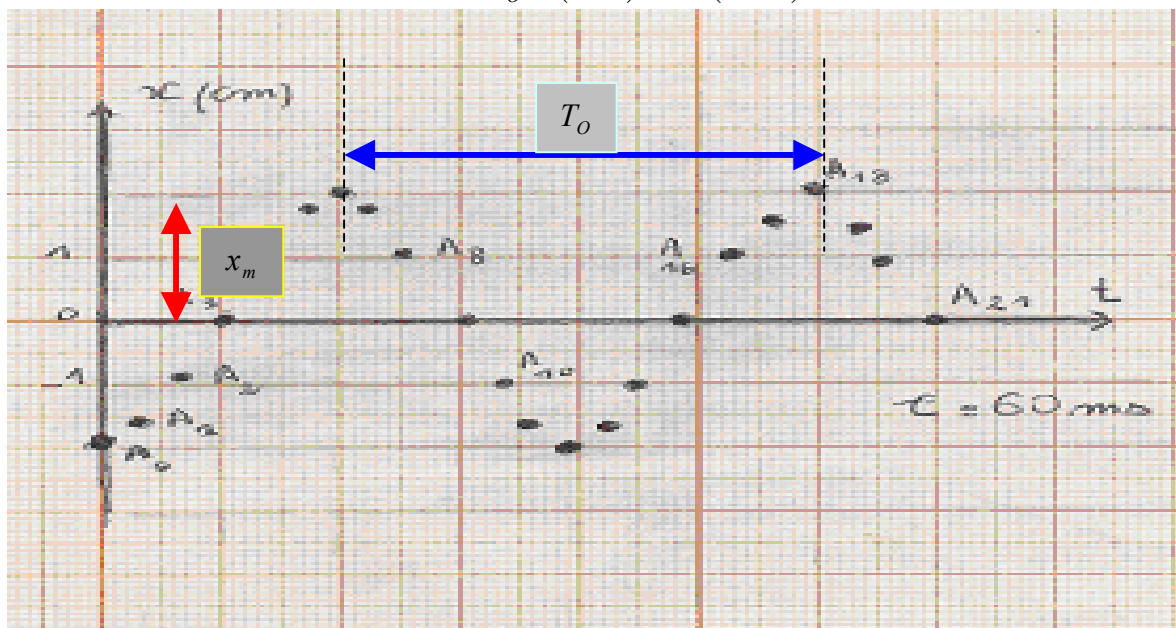
M(N) = 14g / mol M(Cl) = 35,5g / mol M(H) = 1g / mol :

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(I)

$$T_0 = 12 \cdot \tau = 12 \times 60 \text{ms} = 720 \text{ms} = 0,72 \text{s} \quad (1)$$

$$T_0 = (n-1) \times \tau = (13-1) \cdot \tau = 12 \cdot \tau :$$



$$x_m = 2 \text{cm} = 2 \times 10^{-2} \text{m}$$

$$-1 \leq \cos(\omega_0 t + \varphi) \leq +1 : \quad x = x_m \cdot \cos(\omega_0 t + \varphi) \quad =$$

$$\omega_0 = \frac{2\pi}{T_0} = \frac{2\pi}{0,72} \approx 8,72 \text{rad/s} : \quad \underline{\hspace{2cm}}$$

$$x = x_m \cos(\omega_0 t + \varphi) \quad : \quad \underline{\hspace{2cm}}$$

$$\varphi = \pm\pi \quad \Leftarrow \cos \varphi = -1 \quad \Leftarrow -x_m = x_m \cos \varphi : \quad x = -x_m \quad : t = 0$$

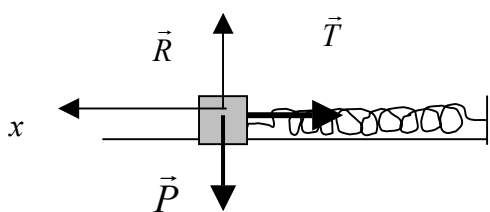
$$t = 0 \quad v > 0 \quad \Leftarrow \quad t = 0 \quad (0, x)$$

$$: \quad -x_m \cdot \omega_0 \cdot \sin \varphi > 0 \quad : \quad t = 0 \quad v = \dot{x} = -x_m \cdot \omega_0 \sin(\omega_0 t + \varphi) :$$

$$(m) \quad : \quad \varphi = -\pi \Leftarrow \varphi < 0 \quad \Leftarrow \quad \sin \varphi < 0 \quad \boxed{x = 2 \times 10^{-2} \cos(8,73t - \pi)}$$

$$-0,02 \text{m} \leq x \leq +0,02 \text{m} : \quad -1 \leq \cos(8,73t - \pi) \leq +1 :$$

$$(C) \quad \underline{\hspace{2cm}} \quad (2)$$



$$\vec{P} + \vec{R} + \vec{T} = m \cdot \vec{a}_G$$

: ox

$$Px + Rx + Tx = m \cdot ax$$

$$m\ddot{x} + kx = 0 \quad : \quad 0 + 0 - k \cdot x = m \cdot \ddot{x}$$

$$: \quad \ddot{x} + \frac{k}{m} x = 0 :$$

$$\omega_0^2 = \frac{k}{m} : \quad \ddot{x} + \omega_0^2 \cdot x = 0$$

$$K = m \cdot \omega_0^2 = 15,2 \text{N/m}$$

$$E_p = \frac{1}{2} k \cdot x^2 : \quad \underline{\hspace{2cm}} \quad x = 0 : \quad E_p = 0 \quad : 1-3$$

$$E_p = \frac{1}{2} \cdot 15,2 \cdot (2 \cdot 10^{-2} \cos(8,73t - \pi))^2$$

$$E_p = 3 \cdot 10^{-3} \cos^2(8,73t - \pi)$$

:2-3

$$\dot{x} \approx -0,175 \sin(8,73t - \pi) \quad : \quad E_C = \frac{1}{2} m \dot{x}^2 \quad : \quad \underline{\hspace{2cm}}$$

$$E_C = 3 \cdot 10^{-3} \sin^2(8,73t - \pi)$$

$$8,73 = \omega_o = \frac{2 \cdot \pi}{T_o} \quad :$$

$$(1) \quad E_M = 2 \cdot E_p \quad : \quad E_C = E_p \quad : \quad E_M = E_C + E_p \quad : \quad :3-3$$

$$E_p = \frac{1}{2} k \cdot x^2 \quad : \quad E_M = \frac{1}{2} k x_M^2 \quad :$$

$$x = \pm \frac{x_M}{\sqrt{2}} \approx \pm 1,4 \times 10^{-2} m \quad : \quad x^2 = \frac{x_M^2}{2} \quad : \quad \frac{1}{2} k x_M^2 = 2 \cdot \frac{1}{2} k x^2 \quad : \quad (1)$$

$$\begin{cases} x_1 = +1,4 cm \\ x_2 = -1,4 cm \end{cases} \quad :$$

(4)

$$E_C = 3 \cdot 10^{-3} \sin^2(8,73t - \pi)$$

$$\sin^2 \alpha = 1 - \cos^2 \alpha \quad \Leftarrow \quad \sin^2 \alpha + \cos^2 \alpha = 1 \quad :$$

$$E_C = 3 \cdot 10^{-3} [1 - \cos^2(8,73t - \pi)] \quad :$$

$$\cos(8,73t - \pi) = \frac{x}{2 \times 10^{-2}} \quad : \quad x = 2 \cdot 10^{-2} \cos(8,73t - \pi) \quad :$$

$$E_C = 3 \cdot 10^{-3} - 7,5 \cdot x^2$$

$$-0,02 m \leq x \leq +0,02 m \quad :$$

$$E_C = f(x)$$

2	1	0	-1	-2	$x(10^{-2} m)$
0	2,25	3	2,25	0	$E_C(10^{-3} J)$

