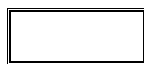


$$V_f = 121 \text{ mL} :$$

$$V_{\max} = 121 \text{ mL} :$$



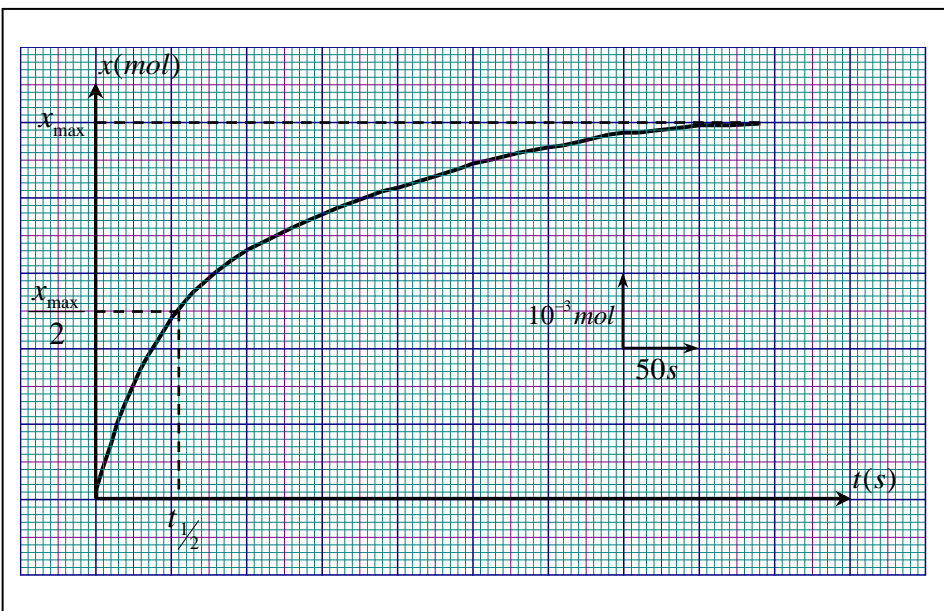
$$V_{\max} = V_f :$$

$$v = \frac{1}{V} \cdot \frac{dx}{dt}$$

:/ 14

$$x(t) \quad \frac{dx}{dt}$$

:/



$$x = \frac{x_{\max}}{2} : t_{1/2} = 1,1 \times 50 :$$

$$t_{1/2} = 55 \text{ s} :$$

الإجابة النموذجية لإختبار الثلاثي الأول في مادة العلوم الفيزيائية 3 ن (2011/2010)

التمرين الأول :



$$M = 40 + 12 + 3 \times 16 = 100 \text{ g/mol}$$

$$n_1 = \frac{m}{M} = \frac{2}{100} = 2 \times 10^{-2} \quad \boxed{n_1 = 2 \times 10^{-2} \text{ mol}}$$

$$n_2 = C \cdot V = 0,1 \times 0,1 = 10^{-2} \quad \boxed{n_2 = 10^{-2} \text{ mol}}$$

:/ 2

	$\text{CaCO}_{3(s)} + 2\text{H}_3\text{O}^+_{(aq)} \longrightarrow \text{Ca}^{2+}_{(aq)} + \text{CO}_{2(g)} + 3\text{H}_2\text{O}_{(l)}$						
	n_1	n_2		0	0	//////	0
	$n_1 - x$	$n_2 - 2 \cdot x$		x	x	//////	x
	$n_1 - x_{\max}$	$n_2 - 2 \cdot x_{\max}$		x_{\max}	x_{\max}	//////	x_{\max}

:/ CaCO_3

$$n_1 - x_{\max} = 0 \Rightarrow x_{\max} = 2 \times 10^{-2} \text{ mol}$$

:/ H_3O^+

$$n_2 - 2 \cdot x_{\max} = 10^{-2} - 2 \times 2 \times 10^{-2} = -3 \times 10^{-2} < 0$$

:/ CaCO_3

$$n_2 - 2 \cdot x_{\max} = 0 \Rightarrow x_{\max} = \frac{n_2}{2} = \frac{10^{-2}}{2} \quad \boxed{x_{\max} = 5 \times 10^{-3} \text{ mol}}$$

$$\boxed{\text{H}_3\text{O}^+ :}$$

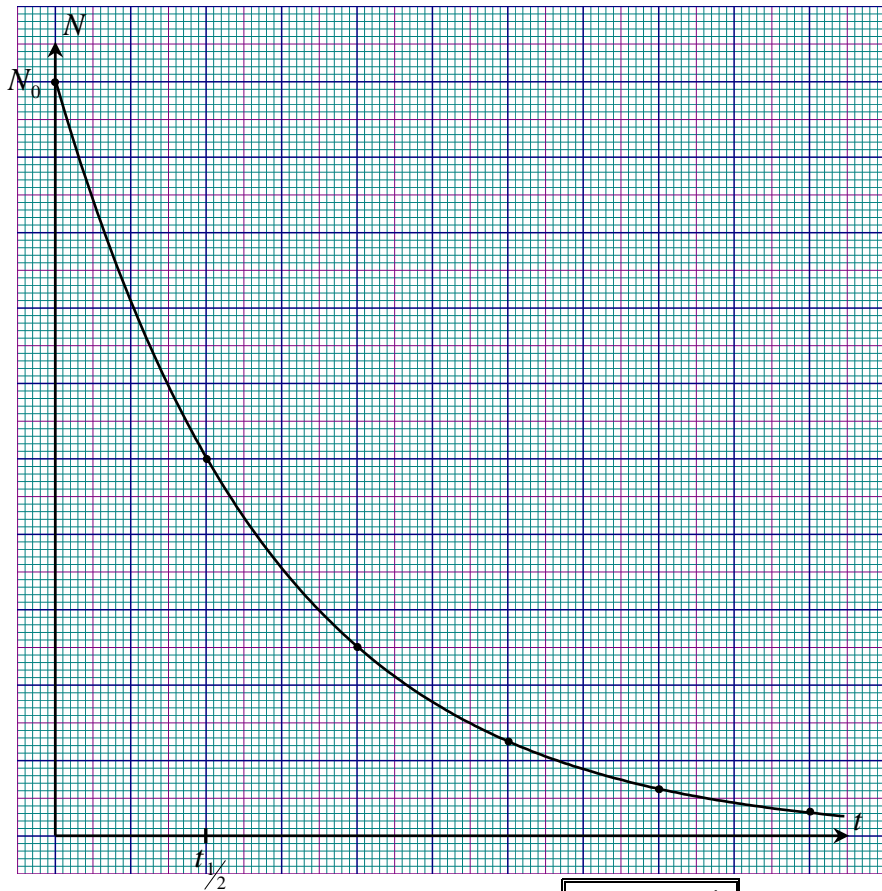
:/ CO_2 $n_{\text{CO}_2} = x$: / 13

$$P \cdot V_{\text{CO}_2} = n_{\text{CO}_2} \cdot R \cdot T \Rightarrow P \cdot V_{\text{CO}_2} = x \cdot R \cdot T \Rightarrow \boxed{x = \frac{P \cdot V_{\text{CO}_2}}{R \cdot T}}$$

:/

$$V = \frac{x \cdot R \cdot T}{P} \Rightarrow V_{\max} = \frac{x_{\max} \cdot R \cdot T}{P} = \frac{5 \times 10^{-3} \times 8,31 \times 298}{1,02 \times 10^5} = 121 \times 10^{-6}$$

$$\boxed{V_{\max} = 121 \text{ mL}}$$



$$N = N_0 \cdot e^{-\lambda t} \quad : \quad /$$

$$: \quad - \text{II}$$

$$\begin{cases} A = -\frac{dN}{dt} \\ A = \lambda \cdot N \end{cases} \Rightarrow -\frac{dN}{dt} = \lambda \cdot N \Rightarrow \boxed{\frac{dN}{dt} + \lambda \cdot N = 0} \quad : \quad / \text{I}$$

$$: \quad /$$

$$N = N_0 \cdot e^{-\lambda t} \Rightarrow \frac{dN}{dt} = -\lambda \cdot N_0 \cdot e^{-\lambda t} \Rightarrow \frac{dN}{dt} = -\lambda \cdot N \Rightarrow \boxed{\frac{dN}{dt} + \lambda \cdot N = 0}$$

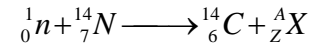
$$: \quad / \text{I2}$$

$$N = N_0 \cdot e^{-\lambda t} \Rightarrow \frac{N}{N_0} = e^{-\lambda t} \Rightarrow \ln \frac{N}{N_0} = \ln e^{-\lambda t}$$

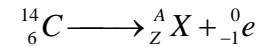
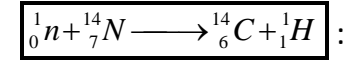
التمويه الثاني :

$$: 14 \quad - \text{I}$$

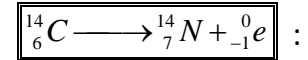
$$: \quad / \text{I}$$



$$\begin{cases} 1+14 = 14 + A \\ 0+7 = 6 + Z \end{cases} \Rightarrow \begin{cases} A = 1 \\ Z = 1 \end{cases}$$



$$\begin{cases} 14 = A + 0 \\ 6 = Z - 1 \end{cases} \Rightarrow \begin{cases} A = 14 \\ Z = 7 \end{cases}$$



$$: \beta^- \quad / \text{2}$$

$$: \quad / \text{3}$$

$$\lambda = \frac{\ln 2}{t_{1/2}} = \frac{0,69}{5570 \times 365,25 \times 24 \times 3600} = 3,92 \times 10^{-12}$$

$$\boxed{\lambda = 3,92 \times 10^{-12} \text{ s}^{-1}}$$

$$\boxed{\lambda = 1,238 \times 10^{-4} \text{ an}^{-1}} :$$

$$\lambda = \frac{\ln 2}{t_{1/2}} = \frac{0,69}{5570} = 1,238 \times 10^{-4} \quad :$$

$$t = 0 : N = N_0$$

$$/ \text{4}$$

$$t_1 = t_{1/2} : N_1 = \frac{N_0}{2}$$

$$t_2 = 2 \cdot t_{1/2} : N_2 = \frac{N_1}{2} = \frac{N_0}{4}$$

$$t_3 = 3 \cdot t_{1/2} : N_3 = \frac{N_2}{2} = \frac{N_0}{8}$$

$$t_4 = 4 \cdot t_{1/2} : N_4 = \frac{N_3}{2} = \frac{N_0}{16}$$

$$t_5 = 5 \cdot t_{1/2} : N_5 = \frac{N_4}{2} = \frac{N_0}{32}$$

$$: \quad /$$

$$\boxed{\frac{q_1}{q_2} = \frac{C_1}{C_2}} : \quad \boxed{\frac{q_1}{C_1} = \frac{q_2}{C_2}} : \quad U_1 = U_2 :$$

$$* \begin{cases} q_1 \cdot C_2 = q_2 \cdot C_1 \\ q_2 = q - q_1 \end{cases} \Rightarrow q_1 \cdot C_2 = (q - q_1) \cdot C_1 \Rightarrow q_1 \cdot C_2 = q \cdot C_1 - q_1 \cdot C_1$$

$$\Rightarrow q_1 \cdot (C_1 + C_2) = q \cdot C_1 \Rightarrow \boxed{q_1 = \frac{C_1}{C_1 + C_2} \cdot q}$$

$$* q_2 = q - q_1 = q - \frac{C_1}{C_1 + C_2} \cdot q \Rightarrow \boxed{q_2 = \frac{C_2}{C_1 + C_2} \cdot q}$$

$$q_1 = \frac{150}{150 + 100} \times 0,03 = 0,018 \quad \boxed{q_1 = 0,018C}$$

$$q_2 = \frac{100}{150 + 100} \times 0,03 = 0,012 \quad \boxed{q_2 = 0,012C}$$

$$* E_{C1} = \frac{1}{2} \cdot q_1 \cdot U_1 = \frac{1}{2} \cdot \frac{q_1^2}{C_1} = \frac{1}{2} \times \frac{0,018^2}{150 \times 10^{-6}} = 1,08 \quad \boxed{E_{C1} = 1,08J}$$

$$* E_{C2} = \frac{1}{2} \cdot \frac{q_2^2}{C_2} = \frac{1}{2} \times \frac{0,012^2}{100 \times 10^{-6}} = 0,72 \quad \boxed{E_{C2} = 0,72J}$$

$$E_{C1} + E_{C2} = 1,08 + 0,72 = 1,8$$

$$E_{C1} + E_{C2} = 1,8J :$$

$$E_C = 3J :$$

$$\boxed{E_{C1} + E_{C2} < E_C} :$$

$$\Rightarrow -\lambda \cdot t = \ln \frac{N}{N_0} \Rightarrow \boxed{t = \frac{-1}{\lambda} \cdot \ln \frac{N}{N_0}}$$

$$t_1 = \frac{-1}{1,238 \times 10^{-4}} \times \ln 0,9399 = 500 \quad : " "$$

$$\boxed{t_1 = 500 \text{ ans}}$$

$$t_2 = \frac{-1}{1,238 \times 10^{-4}} \times \ln 0,9057 = 800 \quad : " "$$

$$\boxed{t_2 = 800 \text{ ans}}$$

300 " " " " 300 /

" " " "

التمرين الثالث :

/1

$$\tau = R \cdot C = 10^3 \times 150 \times 10^{-6}$$

$$\boxed{\tau = 0,15s}$$

/2

$$q = C \cdot U_C = C \cdot E = 150 \times 10^{-6} \times 200 = 0,03$$

$$\boxed{q = 0,03C}$$

/3

$$E_C = \frac{1}{2} \cdot q \cdot U_C = \frac{1}{2} \cdot q \cdot E = \frac{1}{2} \times 0,03 \times 200 = 3$$

$$\boxed{E_C = 3J}$$

/4

$$\boxed{q = q_1 + q_2} :$$

q
: q₂ q₁ C₂ C₁ /

$$\begin{cases} q_1 = C_1 \cdot U_1 \\ q_2 = C_2 \cdot U_2 \end{cases} \Rightarrow \begin{cases} U_1 = \frac{q_1}{C_1} \\ U_2 = \frac{q_2}{C_2} \end{cases}$$