

ΦΡΟΝΤΙΣΤΗΡΙΟ

Δ
B
M. E.

ΜΕΛΟΣ
ΟΜΟΣΠΟΝΔΙΑΣ
ΕΚΠΑΙΔΕΥΤΙΚΩΝ
ΦΡΟΝΤΙΣΤΩΝ
ΕΛΛΑΔΟΣ Ο.Ε.Φ.Ε.



ΔΙΚΑΙΟΥΛΑΚΟΣ ΒΑΣΙΛΕΙΟΣ

Αριστομένους 65, τηλ. 27210 86210

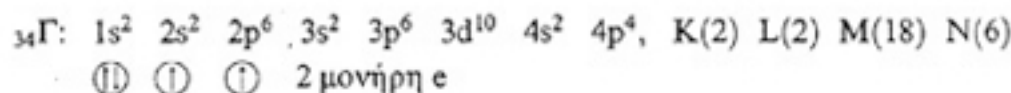
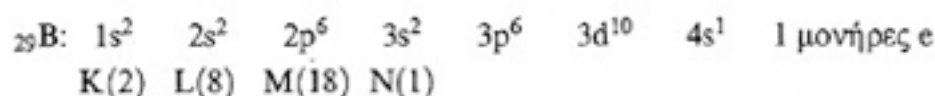
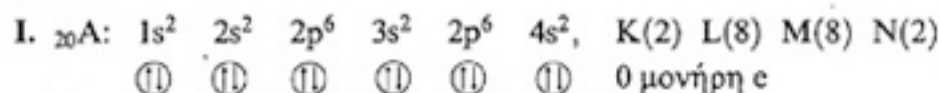
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ΧΗΜΕΙΑ ΘΕΤΙΚΗΣ ΚΑΤΕΥΘΥΝΣΗΣ Γ' ΛΥΚΕΙΟΥ

Επιμέλεια: **ΤΟΜΕΑΣ ΧΗΜΕΙΑΣ**

Απαντήσεις θεμάτων για την τελευταία επανάληψη

Θέμα 1ο

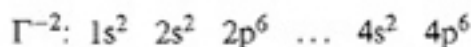


II. A: 4η περ./IIA ομάδα, B: 4η περ./11η ομ.

Γ: 4η περ./VIA ομάδα, Δ: 2η περ./VIIA ομ.

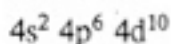
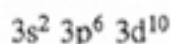
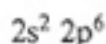


ενεργειακά
σταθερή δομή

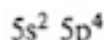
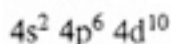
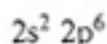


IV. ΙΔΙΟΤΗΤΕΣ ΣΤΟΙΧΕΙΩΝ ΜΕΤΑΠΤΩΣΗΣ

V. B': καταλήγει σε $4d^{10} 5s^1$ άρα



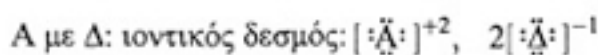
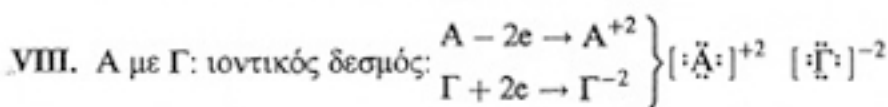
Γ': καταλήγει σε $5s^2 5p^4$



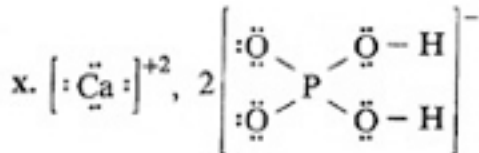
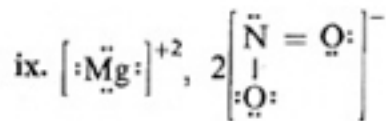
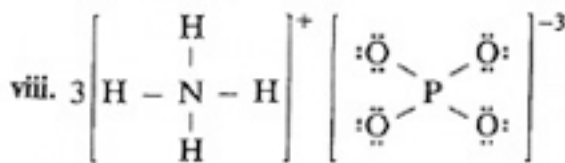
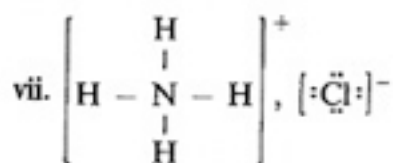
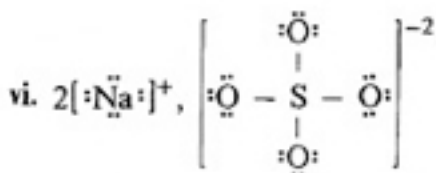
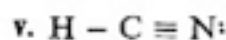
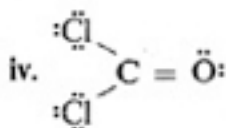
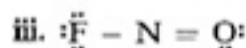
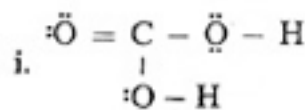
VI. Το πιο ηλεκτροθετικό: A, Το πιο ηλεκτραρνητικό Δ

Μεγαλύτερη E_i : Δ, Διατομικό μόριο: Γ_2 , Δ_2 , Όξινο οξείδιο: Γ και Δ.

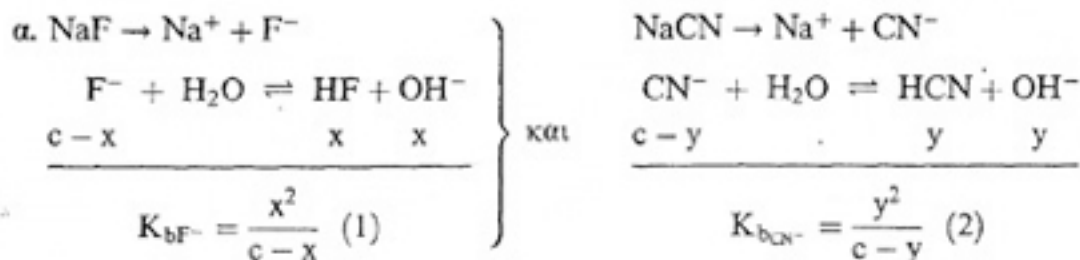
VII. ${}_{20}\text{A} > {}_{20}\text{A}^{+2}$ γιατί το ${}_{20}\text{A}$ διαθέτει 20e τα οποία απωθούνται εντονότερα από τα 18e που διαθέτει το A^{+2} . Επιπλέον το ${}_{20}\text{A}$ καταλήγει σε 4s υποστιβάδα ενώ το A^{+2} σε $3s^2 3p^6$ και προφανώς μέγεθος στιβάδας $\text{N} >$ μέγεθος στιβάδας M . Ομοια ${}_{9}\Delta^- > {}_{9}\Delta$.



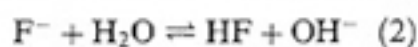
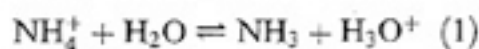
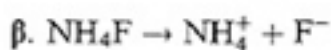
Θέμα 2ο



Θέμα 3ο



$\text{pH}_{\text{NaF}} < \text{pH}_{\text{NaCN}} \Rightarrow \text{pOH}_{\text{NaF}} > \text{pOH}_{\text{NaCN}} \Rightarrow -\log x > -\log y \Rightarrow x < y$ άρα
 από (1) και (2) $\Rightarrow K_{\text{bF}^-} < K_{\text{bCN}^-} \Rightarrow K_{\text{aHF}} > K_{\text{aHCN}}$

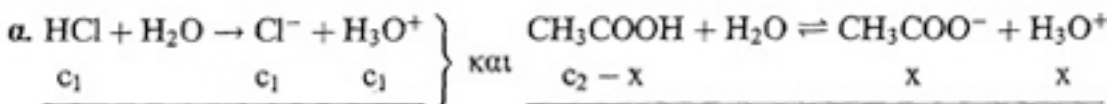


Αφού το δ/μα είναι όξινο, $[\text{H}_3\text{O}^+] > [\text{OH}^-]$, η (1) είναι περισσότερο μετατο-

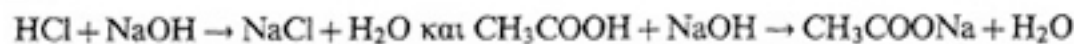
πισμένη προς τα δεξιά απ' ό,τι η (2) άρα το NH_4^+ ιοντίζεται σε μεγαλύτερο ποσοστό από το F^- .

$$\text{Άρα } K_{\text{bNH}_4^+} > K_{\text{bF}^-} \Rightarrow \frac{K_w}{K_{\text{aNH}_3}} > \frac{K_w}{K_{\text{aHF}}} \Rightarrow K_{\text{aHF}} > K_{\text{aNH}_3}$$

Θέμα 4ο



Ισχύει: $\text{pH}_1 = \text{pH}_2 \Rightarrow x = c_1$, έχουμε ότι $c_2 - x > 0 \Rightarrow c_2 > x \Rightarrow c_2 > c_1$



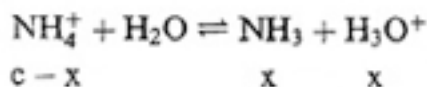
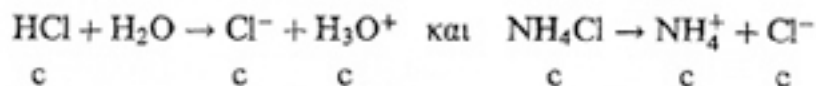
$$n_1 \quad n_1 = c_1 V$$

$$n_2 \quad n_2 = c_2 V$$

Ισχύει ότι $c_2 > c_1$ άρα και $n_2 > n_1$.

$$\beta. \text{pH}_{\text{CH}_3\text{COONa}} > 7$$

$$\text{pH}_{\text{HCl}} < \text{pH}_{\text{NH}_4\text{Cl}} < \text{pH}_{\text{CH}_3\text{COONa}}$$

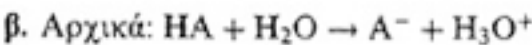


$$\text{Ισχύει } c - x > 0 \Rightarrow c > x \Rightarrow [\text{H}_3\text{O}^+]_{\text{HCl}} > [\text{H}_3\text{O}^+]_{\text{NH}_4\text{Cl}} \Rightarrow \text{pH}_{\text{HCl}} < \text{pH}_{\text{NH}_4\text{Cl}}$$

Θέμα 5ο

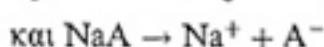
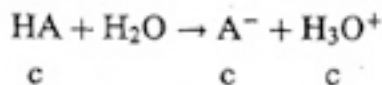


Λόγω της αύξησης της $[\text{F}^-]$ η (1) μετατοπίζεται προς τα αριστερά άρα α_F ↓.



Εστω ότι το HA είναι ισχυρό οξύ $[\text{H}_3\text{O}^+]_{\text{αρχ.}} = c = 10^{-2}\text{M}$

Προσθέτω NaA:



↓

δεν αντιδρά με το H₂O
γιατί δεν προέρχεται
από ισχυρό οξύ

} άρα $c_{\text{H}_3\text{O}^+\text{αρχ.}} = c = 10^{-2}\text{M}$
Δεκτό άρα το HA ισχυρό οξύ.

Θέμα 6ο

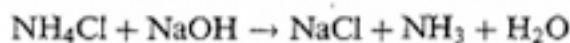
α. i. Ανάμειξη δ/των NH_3 και NH_4Cl

Ανάμειξη περίσσειας NH_3 με HCl

$$\text{ii. } K_b = \frac{[\text{NH}_4^+][\text{OH}^-]}{[\text{NH}_3]} \Rightarrow K_b = \frac{(c_{\text{αλ.}} + x) \cdot x}{c_{\text{βασ.}} - x} \Rightarrow x = K_b \cdot \frac{c_{\text{βασ.}}}{c_{\text{αλ.}}} \Rightarrow$$

$$[\text{OH}^-] = K_b \frac{c_{\text{βασ.}} \text{ δόσης } \text{NH}_3}{c_{\text{αλ.}} \text{ αμικ } \text{NH}_4^+}$$

β. $(\Delta_1 + \Delta_4)$, (περίσσεια $\Delta_1 + \Delta_3$), (περίσσεια $\Delta_4 + \text{NaOH}$)



Θέμα 7ο

α. Σ β. Σ γ. Σ δ. Σ ε. Λ στ. Λ ζ. Σ η. Λ

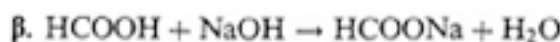
Θέμα 8ο

α. Στο Ι.Σ. έχουμε πλήρη εξουδετέρωση:

$$n_{\text{HCOOH}} = n_{\text{NaOH}} \Rightarrow c \cdot 0,05 = 1 \cdot 0,1 \Rightarrow c = 2\text{M}$$

$$\left. \begin{array}{ccc} \text{HCOOH} + \text{H}_2\text{O} \rightleftharpoons \text{A}^- + \text{H}_3\text{O}^+ \\ 2 - x \qquad \qquad \qquad x \qquad \qquad x \end{array} \right\} K_a = 2 \cdot 10^{-4} = \frac{x^2}{2 - x} \Rightarrow x = 2 \cdot 10^{-2} \text{ και}$$

$$\alpha = x/2 = 10^{-2} \left(\text{ή } \alpha = \sqrt{\frac{K_a}{c}} \right)$$



$$0,1 \text{ mol} \quad 0,1 \text{ mol} \quad 0,1 \text{ mol}$$

$$c_{\text{HCOONa}} = 0,1/0,5 = 0,1 \text{ mol}$$



$$0,2 \text{ M} \quad 0,2 \text{ M} \quad 0,2 \text{ M}$$

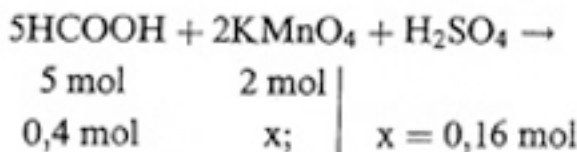


$$0,2 - y \qquad \qquad \qquad y \qquad \qquad y$$

$$K_b = \frac{10^{-14}}{2 \cdot 10^{-4}} = \frac{y^2}{0,2 - y} \Rightarrow y = 10^{-5,5}$$

$$\text{pOH} = 5,5 \text{ και } \text{pH} = 8,5$$

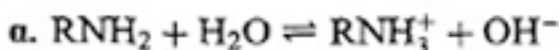
$$\gamma. n_{\text{HCOOH}} = cV = 2 \cdot 0,2 = 0,4 \text{ mol}$$



$$\text{άρα } n_{\text{KMnO}_4} = 0,16 \text{ mol}$$

$$V = \frac{n}{c} = \frac{0,16}{0,5} = 0,32 \text{ L}$$

Θέμα 9ο



$$\begin{array}{ccc} c-x & & x \quad x, \quad \text{pH} = 11,5 \Rightarrow \text{pOH} = 2,5 \end{array}$$

$$[\text{OH}^-] = 10^{-2,5} \text{ M} \Rightarrow x = 10^{-2,5}$$

$$K_b = \frac{x^2}{c-x} \Rightarrow 10^{-4} = \frac{10^{-5}}{c} \Rightarrow c = 0,1 \text{ M} \text{ άρα } n = cV = 0,4 \text{ mol και}$$

$$n = \frac{m}{M_r} \Rightarrow M_r = \frac{m}{n} \Rightarrow M_r = \frac{12,4}{0,4} = 31 \text{ οπότε:}$$

$$12v + 2v + 1 + 14 + 2 = 31 \Rightarrow 14v = 14 \Rightarrow v = 1$$

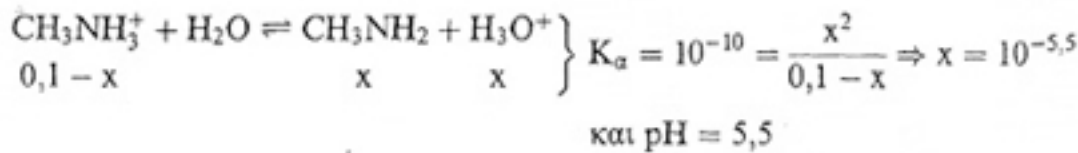
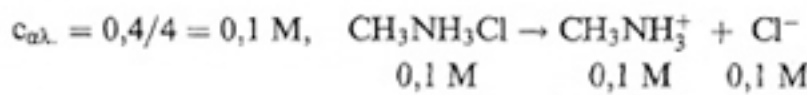
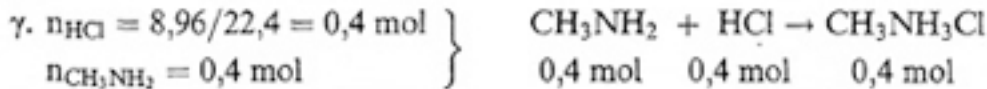
CH_3NH_2 μεθυλαμίνη

$$\beta. \alpha_1 = \sqrt{\frac{K_b}{c}} = \sqrt{\frac{10^{-4}}{0,1}} = \sqrt{10^{-3}} \text{ και } \alpha_2 = 2\sqrt{10^{-3}}$$

$$\text{Επιπλέον } \alpha_2 = \sqrt{\frac{K_b}{c'}} \Rightarrow 2 \cdot \sqrt{10^{-3}} = \sqrt{\frac{10^{-4}}{c'}} \Rightarrow 4 \cdot 10^{-3} = \frac{10^{-4}}{c'} \Rightarrow$$

$$c' = \frac{10^{-1}}{4} \Rightarrow \frac{n}{V'} = \frac{10^{-1}}{4} \Rightarrow V' = \frac{4 \cdot n}{0,1} \Rightarrow V' = \frac{4 \cdot 0,4}{0,1} = 16 \text{ L}$$

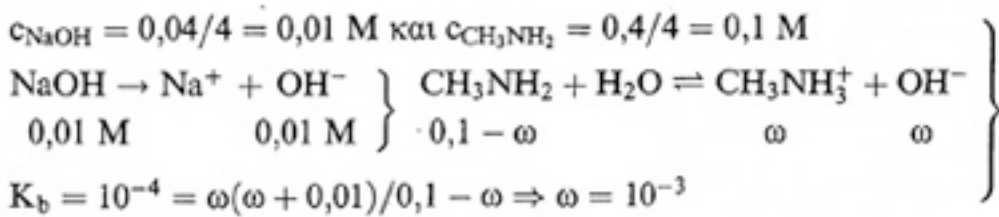
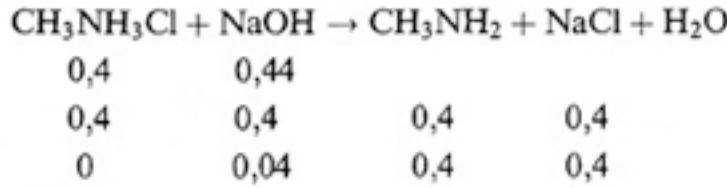
$$\text{άρα } V_{\text{H}_2\text{O}} = 16 \text{ L} - 4 \text{ L} = 12 \text{ L.}$$



δ. διάλυμα Δ₃: 4 L δ/τος CH₃NH₃Cl 0,1 M

$$n_{\text{CH}_3\text{NH}_3\text{Cl}} = 0,4 \text{ mol}$$

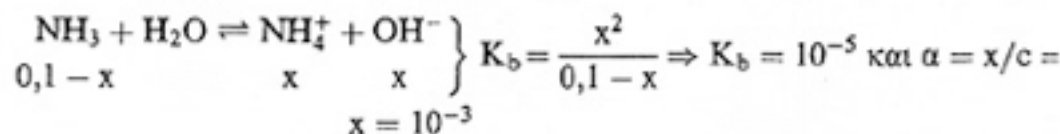
$$n_{\text{NaOH}} = 0,44 \text{ mol}$$



$$\text{pOH} = 2, \quad \text{pH} = 12, \quad \alpha = \omega/0,1 = 0,01$$

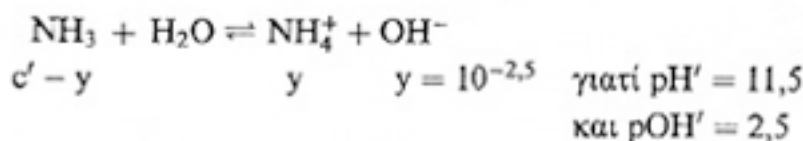
Θέμα 10ο

α. Στην πλήρη εξουδετέρωση: $n_{\text{NH}_3} = n_{\text{HCl}} \Rightarrow c \cdot 0,04 = 0,2 \cdot 0,2 \Rightarrow c = 0,1 \text{ M}$



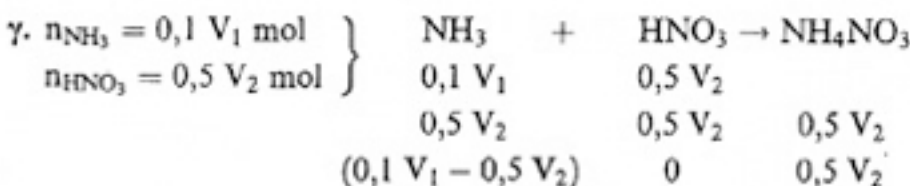
β. $n_{\text{NH}_3} = cV = 0,1 \cdot 0,5 = 0,05 \text{ mol}$

$$n_{\text{ολ.}} = (0,05 + n) \text{ mol } \acute{\alpha}\rho\alpha \ c' = \frac{0,05 + n}{0,5} \text{ M (1)}$$



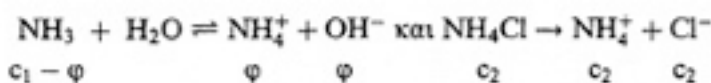
$$K_b = 10^{-5} = \frac{y^2}{c' - y} \Rightarrow c' = 1 \text{ M}$$

$$\text{Από (1)} \Rightarrow 1 = \frac{0,05 + n}{0,5} \Rightarrow n = 0,45 \text{ mol}$$



Πρέπει να γίνει διερεύνηση και να απορριφθούν οι δύο περιπτώσεις (πλήρως αντίδραση/περίσσεια HNO_3).

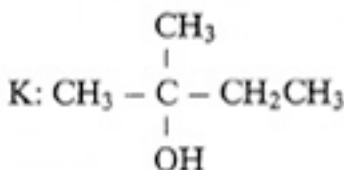
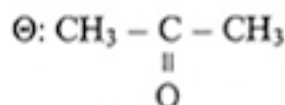
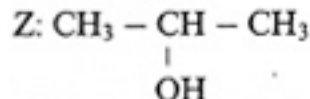
$$c_{\text{NH}_3} = \frac{0,1 V_1 - 0,5 V_2}{V_1 + V_2} = c_1 \text{ και } c_{\text{NH}_4\text{NO}_3} = \frac{0,5 V_2}{V_1 + V_2} = c_2$$



$$\boxed{\varphi = 10^{-6}} \acute{\alpha}\rho\alpha \ K_b = \frac{(c_2 + \varphi)\varphi}{c_1 - \varphi} \Rightarrow 10^{-5} = \frac{c_2 \cdot 10^{-6}}{c_1} \Rightarrow c_1 = 0,1 \ c_2 \Rightarrow$$

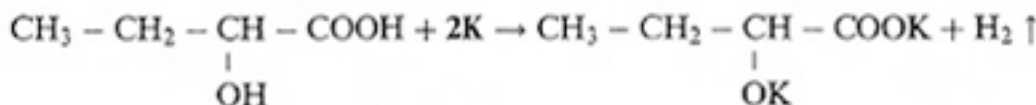
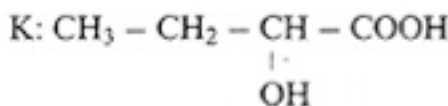
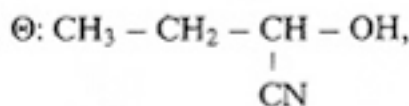
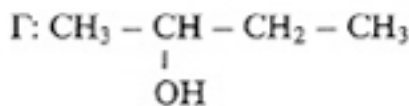
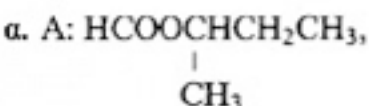
$$0,1 V_1 - 0,5 V_2 = 0,1 \cdot 0,5 V_2 \Rightarrow 0,1 V_1 = 0,55 V_2 \Rightarrow \frac{V_1}{V_2} = \frac{0,55}{0,1} = \frac{11}{2}$$

Θέμα 11ο

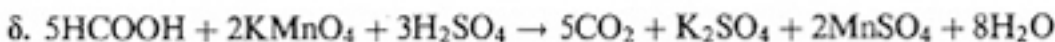


β. $V = 0,2 \text{ L}$

Θέμα 12ο



γ. οξύ: B, και Γ βάση Δ, Z



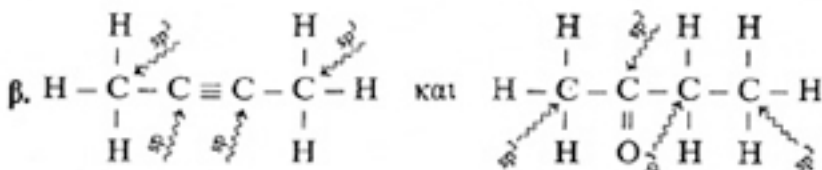
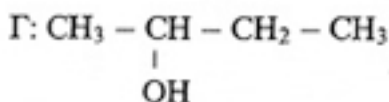
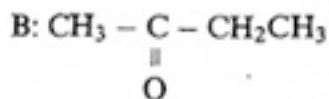
5 mol

2 mol

0,05 mol

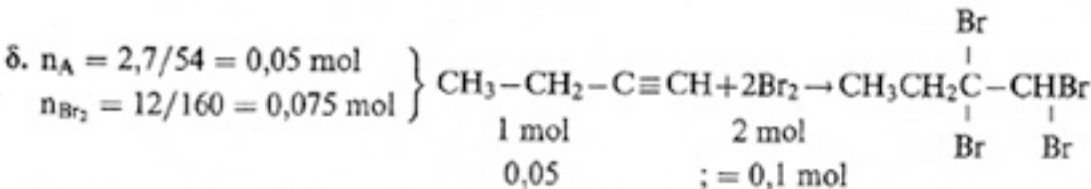
$x; = 0,02 \text{ mol}$ άρα $c = \frac{n}{V} \Rightarrow V = \frac{n}{c} = \frac{0,02}{0,1} = 0,2 \text{ L}$

Θέμα 13ο



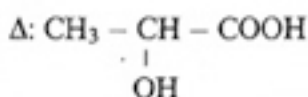
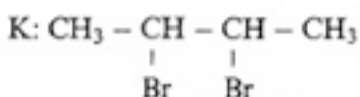
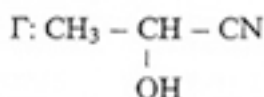
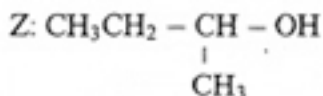
γ. Μόνο η Β με $(\text{I}_2 + \text{NaOH})$ δίνει κίτρινο ίζημα CHI_3 .

Μόνο η Θ αντιδρά με Na και δίνει αέριο H_2 .



Ισχύει ότι $0,1 > 0,075$ άρα όλο το Br_2 που έχουμε αντιδρά και αποχρωματίζεται.

Θέμα 14ο



β. οξύ: A, Δ

βάση: M, E

