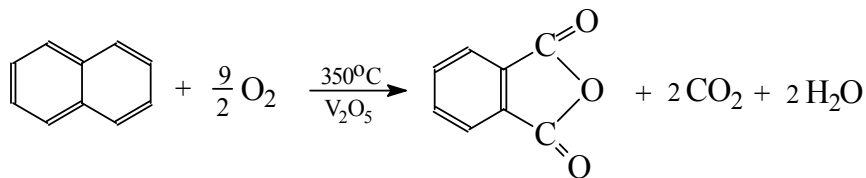


Chimie Organica - ChO TM 2014, ediția I-a

Subiecte concurs (varianta A) - rezolvare

1. Oxidarea naftalinei:

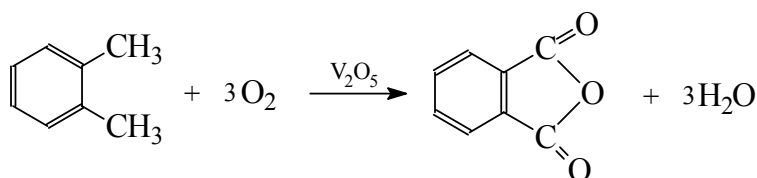


$$1 \text{ mol} = 128 \text{ g} \dots\dots\dots \frac{9}{2} \text{ moli O}_2$$

$$m_1 \dots\dots\dots 1 \text{ mol O}_2$$

$$m_1 = \frac{128}{\frac{9}{2}} = \frac{256}{9} \text{ g naftalină} / 1 \text{ mol O}_2$$

Oxidarea o-xilenului:



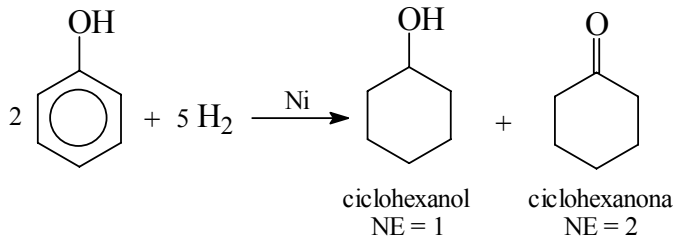
$$1 \text{ mol} = 106 \text{ g} \dots\dots\dots 3 \text{ moli O}_2$$

$$m_2 \dots\dots\dots 1 \text{ mol O}_2$$

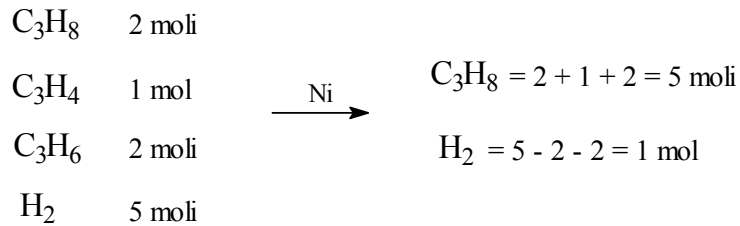
$$m_2 = \frac{106}{3} \text{ g o-xilen} / 1 \text{ mol O}_2$$

$$\frac{m_2}{m_1} = \frac{\frac{106}{3}}{\frac{256}{9}} = \frac{318}{256} = 1,24$$

2. Hidrogenarea fenolului:



3. Se consideră 10 moli amestec cu compoziția dată:



Hidrogenarea propinei și a propenei este totală, deoarece amestecul final nu decolorează apa de brom. Final se regăsesc doar C3H8 și H2.

Pentru propină se consumă $1 \times 2 = 2$ moli H2.

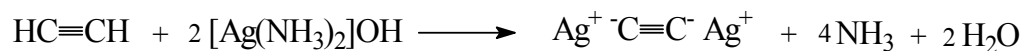
Pentru propenă se consumă $2 \times 1 = 2$ moli H2.

Scăderea de volum $\Delta V = 10 - 6 = 4$ moli

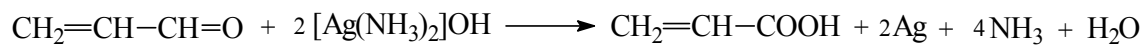
Procentual: $\Delta V = \frac{4}{10} \cdot 100 = 40\%$

4. Reacționează cu hidroxidul diaminoargentic în raport de 1 la 2:

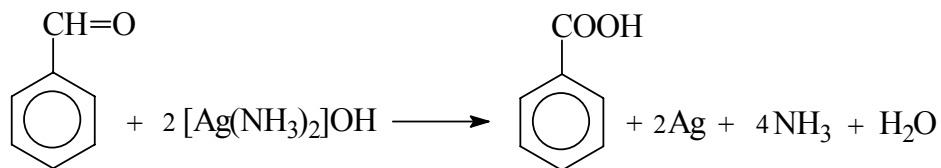
- acetilena



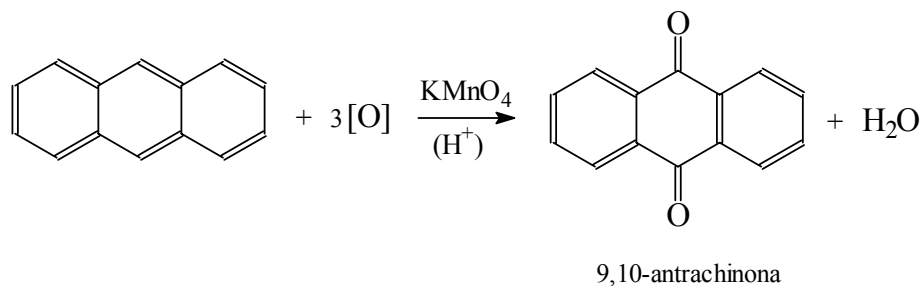
- acroleina



- benzaldehida

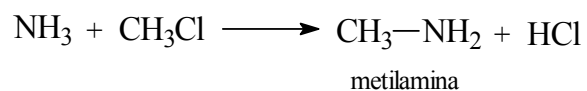


5. Se obține compus dicarboxilic prin oxidarea antracenului:

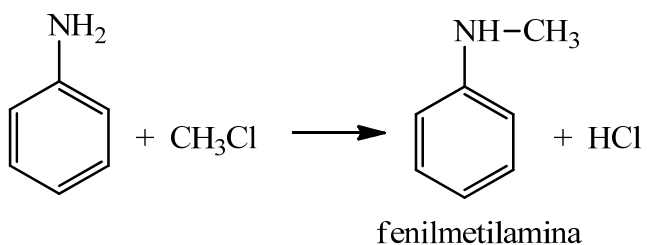


6. Se pot alchila cu CH_3Cl :

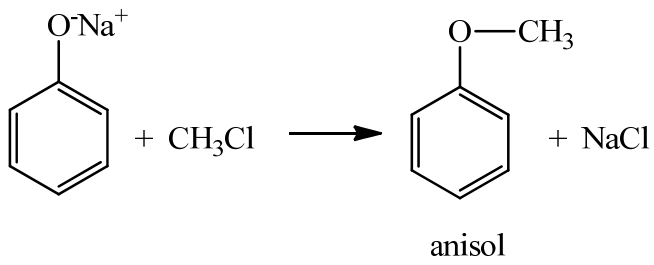
- amoniacul



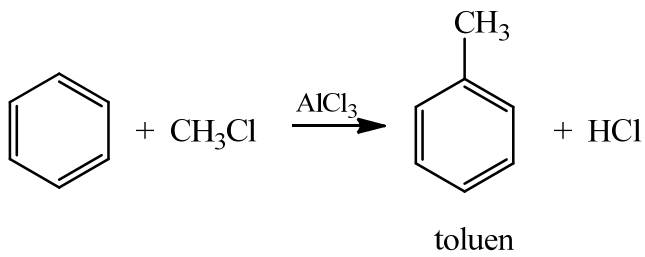
- anilina



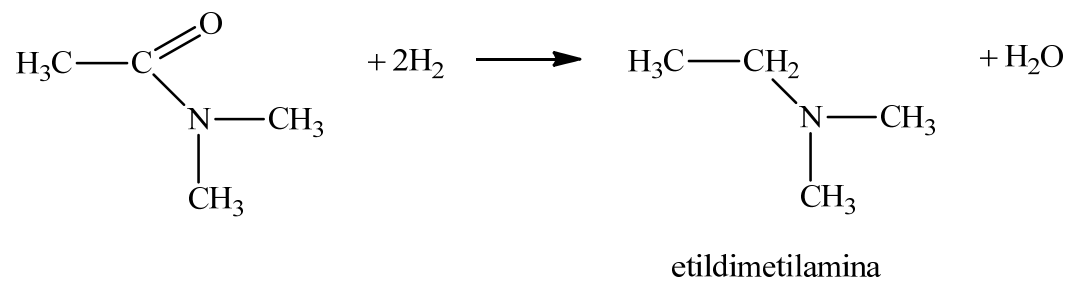
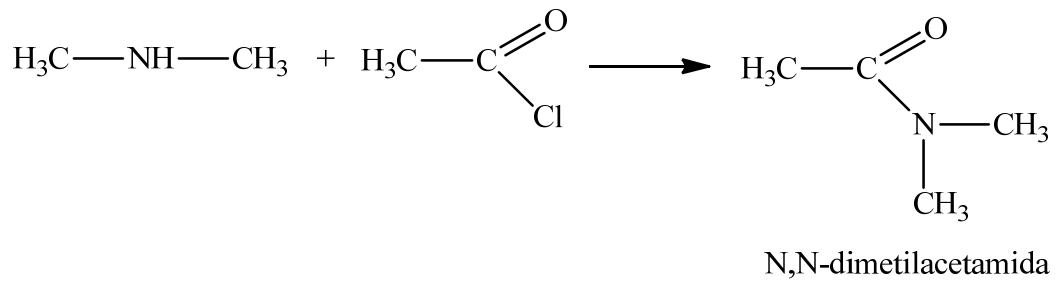
- fenoxidul de sodiu



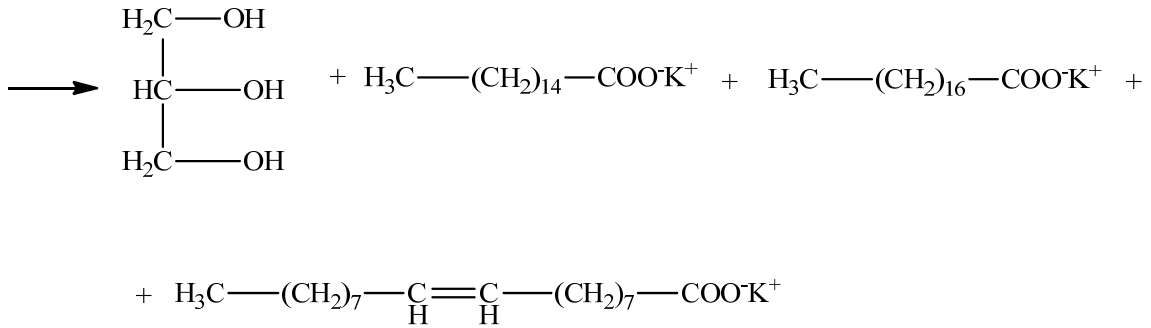
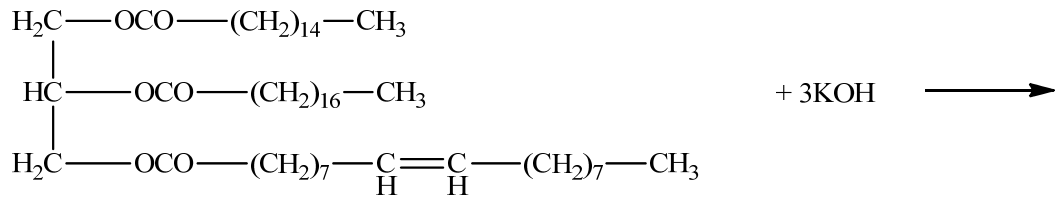
- benzenul



7.



8.



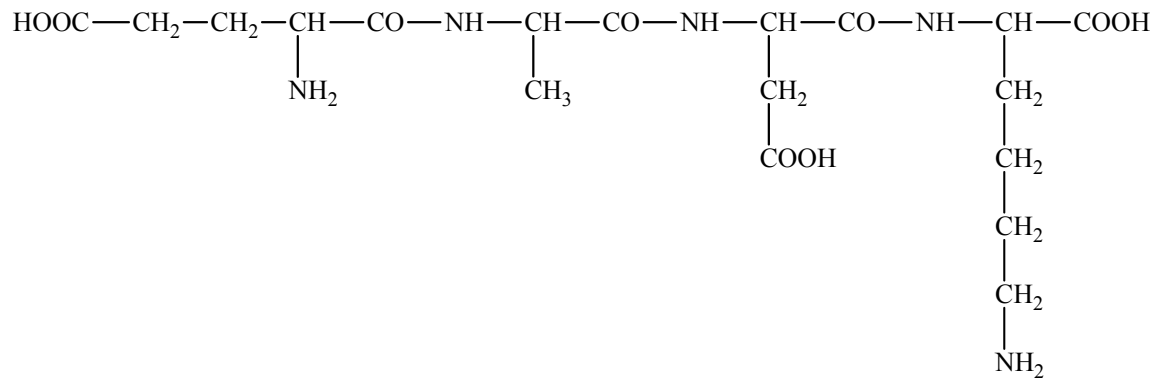
$$M_{\text{C}_{55}\text{H}_{104}\text{O}_6} = 860$$

$$1 \text{ mol} = 860 \text{ g C}_{55}\text{H}_{104}\text{O}_6 \dots\dots\dots 3 \cdot 56 \cdot 10^3 \text{ mg KOH}$$

$$1 \text{ g} \dots\dots\dots \text{I.S.}$$

$$\text{I.S.} = \frac{3 \cdot 56 \cdot 10^3}{860} = 195,3 \text{ mg KOH/g produs}$$

9. Formula tetrapeptidului glutamilalanilaspartil lisinei este:



$$M_{\text{C}_{18}\text{H}_{31}\text{O}_9\text{N}_5} = 461$$

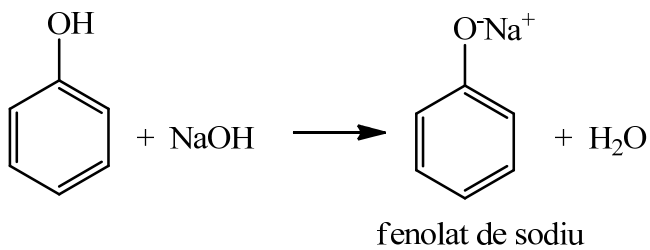
$$461 \text{ g peptid} \dots\dots\dots 216 \text{ g C}$$

$$100 \text{ g} \dots\dots\dots x$$

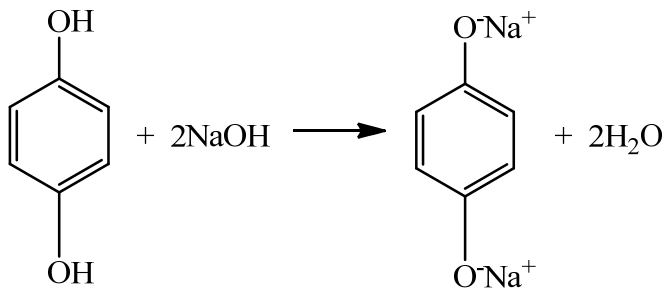
$$x = \frac{21600}{461} = 46,85\% \text{ C}$$

10. Hidroxidul de sodiu reacționează cu:

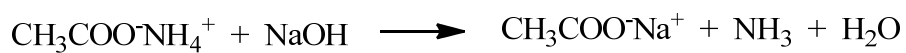
- fenol (acid slab + baza tare)



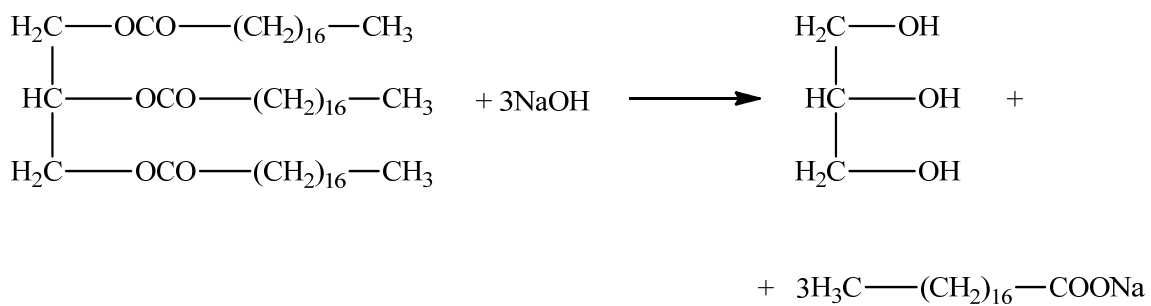
- hidrochinonă (acid slab + baza tare)



- acetat de amoniu (baza tare + sarea unei baze slabe)



- tristearina (triesterul se saponifică cu NaOH, formând glicerină și stearat de sodiu)

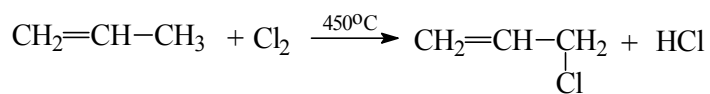


11. $d_{\text{acr}}A = 1,453$

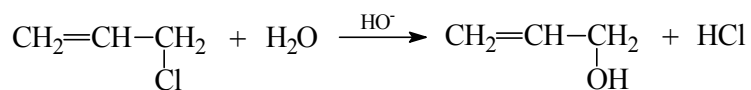
$$\frac{M_A}{28,9} = 1,453$$

$$M_A = 42$$

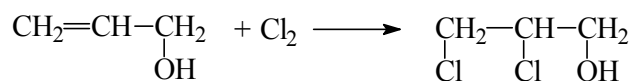
A: C₃H₆ propena



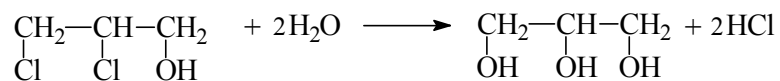
B **C**



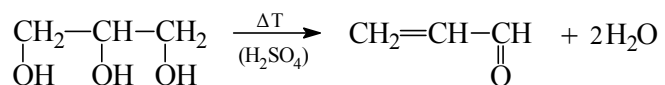
D



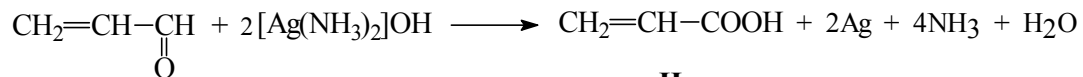
E



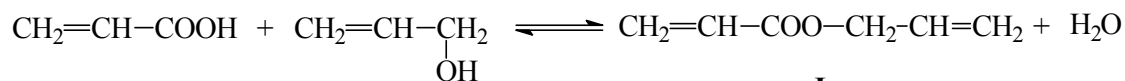
F



G



H



I

I = acrilat de alil

12.

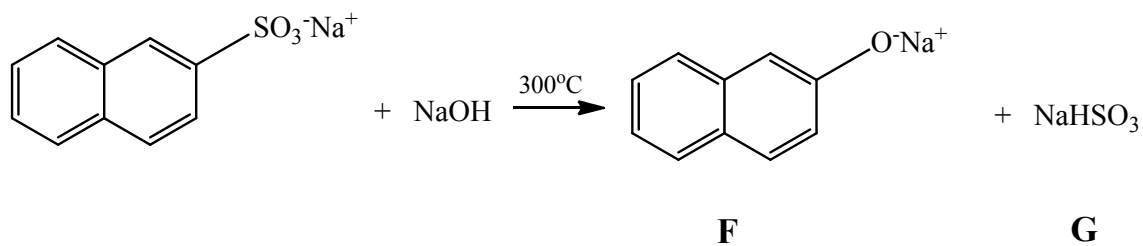
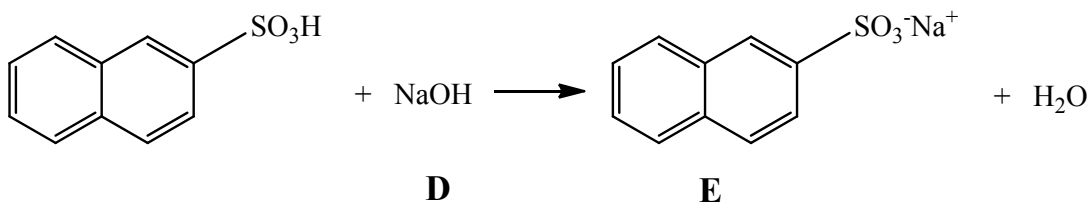
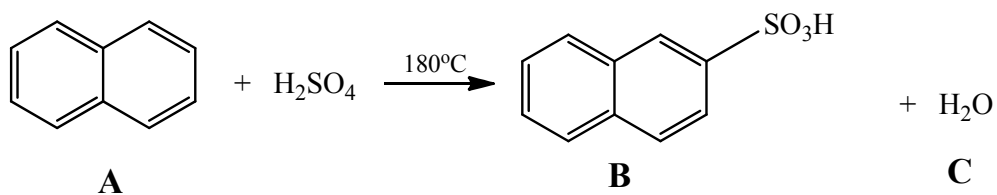
A: hidrocarbura C_xH_y

$$\frac{m_C}{m_H} = \frac{15}{1}$$

$$\frac{12x}{y} = \frac{15}{1}$$

$$y = \frac{12x}{15} = \frac{4x}{5}$$

$y \in \mathbb{N}$; pentru $x = 10$ $C_{10}H_8$ naftalina (N.E. = 7)



F: β- naftolat de sodiu

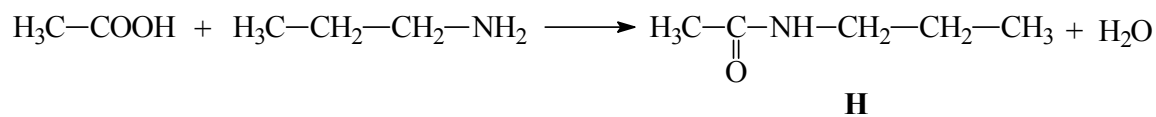
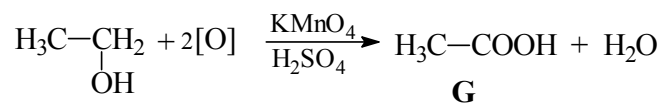
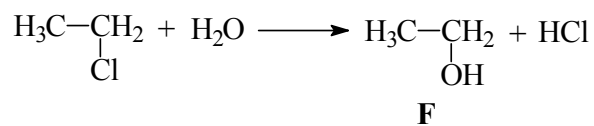
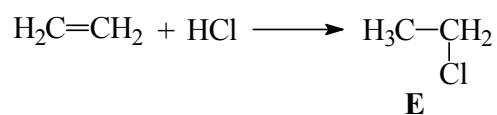
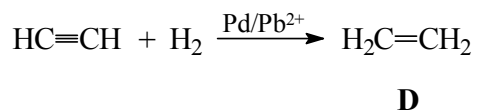
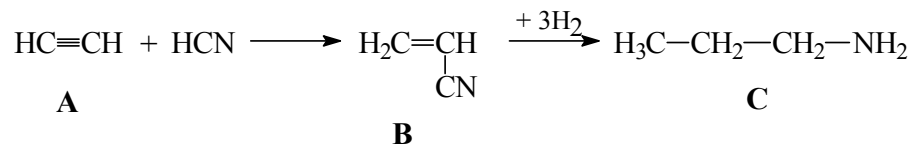
13.

$$d_{\text{aer}}A = 0,899$$

$$\frac{M_A}{28,9} = 0,899$$

$$M_A = 26$$

A: C₂H₂ acetilena

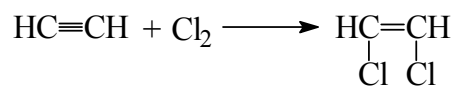


H: N- propilacetamidă

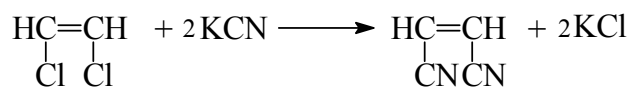


A

B



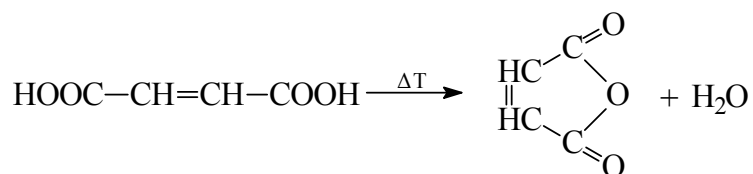
C



D



E

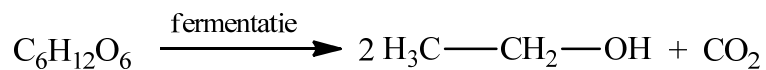
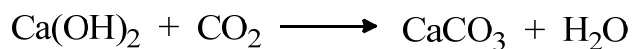


F

F: anhidrida maleică; N.E. = 4

15.

$$n_{\text{Ca(OH)}_2} = V \cdot C_M = 0,9\text{L} \cdot 2 \frac{\text{mol}}{\text{L}} = 1,8 \text{ mol}$$



$$m = n \cdot M = 1,8 \cdot 46 = 82,8 \text{ g etanol}$$

100 g sol 96 g etanol
 x 82,8 g

$$x = 86,25 \text{ g sol.}$$

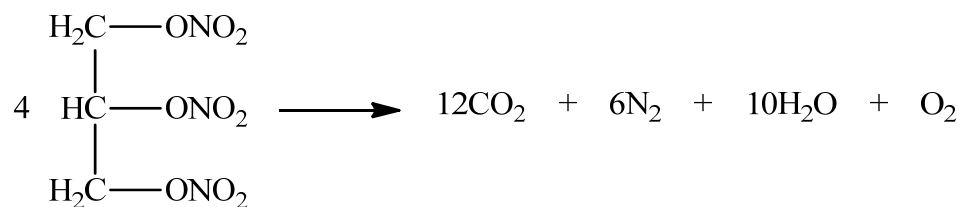
16.

100 g sol 63 g HNO₃
 300 g x

$$x = 189 \text{ g HNO}_3$$

$$n_{\text{HNO}_3} = \frac{m}{M} = \frac{189}{63} = 3 \text{ moli HNO}_3$$

1 mol glicerină 3 moli HNO₃ 1 mol TNG



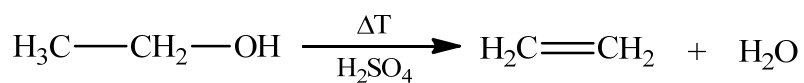
- apa condensează

4 moli TNG 19 moli gaze

0,5 moli TNG y

$$y = 2,375 \text{ moli gaze} = 53,2 \text{ L gaze (c.n.)}$$

17.



22,4 L etenă 18 g H₂O

72 L x

$$x = 57,85 \text{ g H}_2\text{O}$$

Inițial: 750 g sol.:

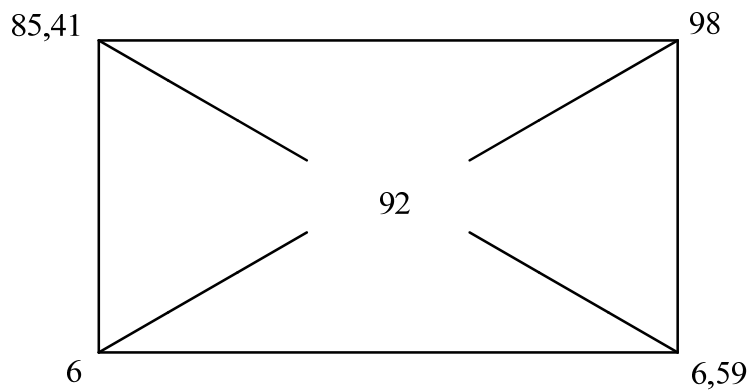
$$\frac{92}{100} \cdot 750 = 690 \text{ g H}_2\text{SO}_4$$

H₂O

Final: (750 + 57,85) g sol.: 690 g H₂SO₄

(60 + 57,85) g H₂O

$$C\% = \frac{690}{807,85} \cdot 100 = 85,41\%$$



6 g sol. 85,41% 6,59 g sol. 98%

807,85 g y

$$y = 887,1 \text{ g sol. } 98\%$$

18.

$$d_{\text{aeramestec}} = 0,92 \quad \Rightarrow \quad \frac{M}{28,9} = 0,92 \quad \Rightarrow \quad M = 26,588$$

$$x_1 M_1 + x_2 M_2 = 26,588$$

x = fracția molară a C_2H_2

$(1-x)$ = fracția molară a C_2H_4

$$x \cdot 26 + (1-x) \cdot 28 = 26,588$$

$$26x + 28 - 28x = 26,588$$

$$1,412 = 2x$$

$$x = 0,706$$

La un mol amestec, avem:

$$0,706 \cdot 26 \text{ g C}_2\text{H}_2$$

$$0,294 \cdot 28 \text{ g C}_2\text{H}_4$$

$$26,588 \text{ g}$$

$$26,588 \text{ g amestec} \dots\dots\dots 0,706 \cdot 26 \text{ g C}_2\text{H}_2$$

$$100 \text{ g} \dots\dots\dots x$$

$$x = 69\% \text{ C}_2\text{H}_2$$

19.

Triglicerida poate fi: oleodistearină sau steardioleină. Se verifică indicele de iod pentru fiecare și se confirmă a fi oleodistearina, cu $M = 888$.

$$\text{oleodistearină } M_{\text{C}_{27}\text{H}_{48}\text{O}_2} = 57 \cdot 12 + 48 \cdot 1 + 2 \cdot 16 = 888$$

$$888 \text{ g trigliceridă} \dots\dots\dots 2 \cdot 127 \text{ g I}_2$$

$$100 \text{ g} \dots\dots\dots \text{I.I.}$$

$$\text{I.I.} = 28,6$$

prin hidroliză, 1 mol trigliceridă conduce la 1 mol oleat de sodiu și 2 moli stearat de sodiu

$$888 \text{ g trigliceridă} \dots\dots\dots 1 \text{ mol oleat de sodiu} \dots\dots\dots 2 \text{ moli stearat de sodiu}$$

$$2220 \text{ g} \dots\dots\dots x \dots\dots\dots y$$

$$x = 2,5 \text{ moli oleat de sodiu} = 760 \text{ g}$$

$$y = 5 \text{ moli stearat de sodiu} = 1530 \text{ g}$$

$$760 \text{ g} + 1530 \text{ g} = 2290 \text{ g}$$

$$100 \text{ g săpun} \dots\dots\dots 90 \text{ g săruri} \dots\dots\dots 10 \text{ g H}_2\text{O}$$

$$m \dots\dots\dots 2290 \text{ g}$$

$$m = 2544,44 \text{ g săpun}$$

20.

Formula esterului saturat: $C_nH_{2n}O_2$

$$M = (14n + 32)$$

$$100 \text{ g ester} \dots\dots\dots 62,07 \text{ g C}$$

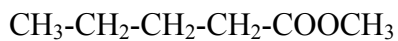
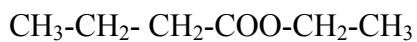
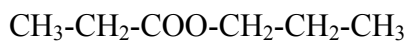
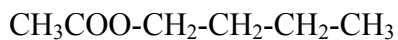
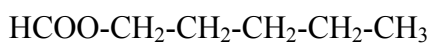
$$(14n + 32) \dots\dots\dots 12n$$

$$1200n = 62,07(14n + 32)$$

$$n = 6 \quad \text{☞} \quad \text{- acidul are 2 atomi de C}$$

- alcoolul are 4 atomi de C

- esterii izomeri, liniari:



5 izomeri esteri cu catenă liniară

