

**Subiectul I ( 20 puncte )**

1) 3,5 puncte 2) 2,5 puncte 3) 2 puncte 4) 4 puncte 5) 2 puncte 6) 3 puncte 7) 3 puncte

1) A:  $\text{H}_3\text{C}-\text{CH}=\text{CH}-\text{CH}=\text{CH}-\text{CH}=\text{CH}-\text{COOH}$  ( 1 punct )

A +  $\text{NaHCO}_3$  ( 0,5 puncte )

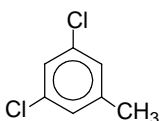
Structurile  $\text{B}_1 \dots \text{B}_8$  (cis-cis-cis, cis-cis-trans, cis-trans-cis, trans-cis-cis, trans-trans-trans, trans-trans-cis, trans-cis-trans, cis-trans-trans) ( 8 x 0,25 puncte )

2) A:  $(\text{H}_3\text{C}-\text{CH}_2)(\text{CH}_3)_2\text{C}-\text{Br}$  ( 0,5 puncte ) ; B:  $(\text{H}_3\text{C}-\text{CH}_2)(\text{CH}_3)_2\text{C}-\text{OH}$  ( 0,5 puncte ) ;

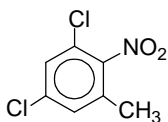
C:  $(\text{H}_3\text{C}-\text{CH}_2)(\text{CH}_3)_2\text{C}-\text{Cl}$  ( 0,5 puncte ) ;

A +  $\text{NaOH}$  ( 0,5 puncte ) ; B +  $\text{HCl}(\text{ZnCl}_2)$  ( 0,5 puncte )

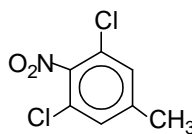
3)



A ( 1 puncte )



$\text{B}_1$  ( 0,5 puncte )



$\text{B}_2$  ( 0,5 puncte )

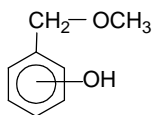
4)  $\text{NE}_A = 4$ ;  $\text{M}_A = 138$ ;

0,138g A .....  $22,4 \cdot 10^{-3}$  L  $\text{CH}_4$

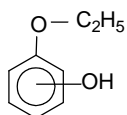
138 g .....  $V = 22,4$  L  $\text{CH}_4 \Rightarrow$  1 singur H activ (o gr. OH fenolică) ( 0,5 puncte )

$\text{Ar}-\text{OH} + \text{CH}_3\text{MgCl} \rightarrow \text{CH}_4 + \text{Ar}-\text{OMgCl}$  ( 0,5 puncte )

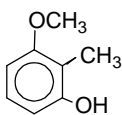
Structuri posibile pentru A:



(3 structuri)  
( 0,75 puncte )



(3 structuri)  
( 0,75 puncte )



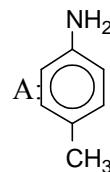
(10 structuri)  
( 1,5 puncte )

5)  $\text{C}_n\text{H}_{2n-7}\text{NH}_2 + \text{CH}_3\text{COCl} \rightarrow \text{C}_n\text{H}_{2n-7}\text{NH}-\text{COCH}_3 + \text{HCl}$

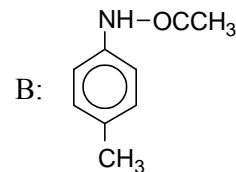
( $14n + 9$ ) g amină ..... ( $14n + 51$ ) g amină acilată

2,14 g ..... 2,98 g  $\Rightarrow n = 7$  ( 0,5 puncte )

Dintre toluidinele izomere, p-toluidina este cristalină.



A: ( 1 puncte )



B: ( 0,5 puncte )

6)  $\text{C}_n\text{H}_{2n+4}\text{N}^+\text{Cl}^-$

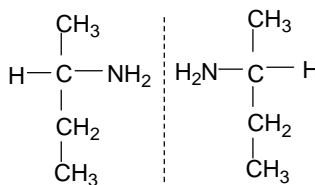
100 g clorhidrat ..... 32,42g Cl

( $14n + 53,5$ ) ..... 35,5 g Cl  $\Rightarrow n = 4$  ( 0,5 puncte )

A:  $(\text{H}_3\text{C}-\text{CH}_2)\text{N}(\text{CH}_3)_2$  ( 0,5 puncte )

B:  $(\text{H}_3\text{C}-\text{CH}_2)\text{NH}(\text{CH}_3)_2^+\text{Cl}^-$  ( 1 puncte )

C:  $\text{H}_3\text{C}-\text{CH}_2\text{C}^*\text{H}(\text{CH}_3)\text{NH}_2$  ( 0,5 puncte )



$\text{C}_1$   $\text{C}_2$  ( 0,5 puncte )

7) B<sub>3</sub>: C<sub>n</sub>H<sub>2n+1</sub>COOH

100 g acid..... 9,09 g H

(14n + 46) ..... 2n+2 => n = 3 (0,5 puncte) B<sub>3</sub>: H<sub>3</sub>C-CH<sub>2</sub>-CH<sub>2</sub>-COOH (0,5 puncte)

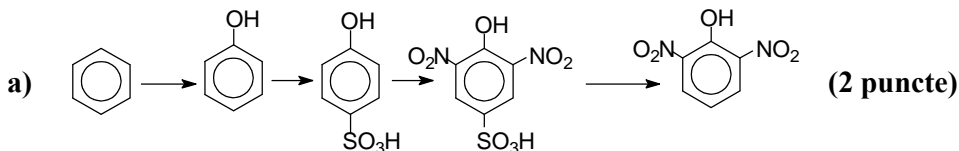
B<sub>2</sub>: H<sub>3</sub>C-CH<sub>2</sub>-COOH (0,25 puncte)

B<sub>1</sub>: H<sub>3</sub>C-COOH (0,25 puncte)

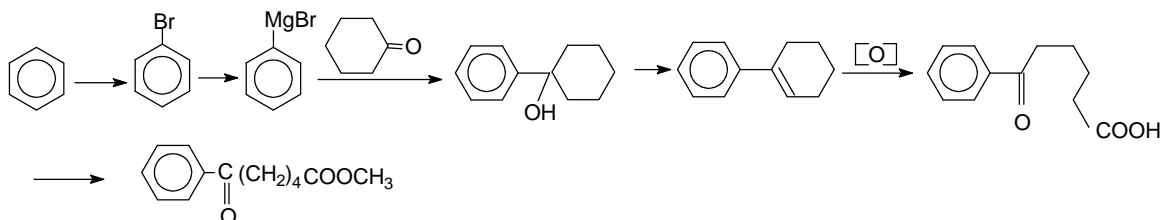
A: H<sub>3</sub>C-CH<sub>2</sub>-CH(OH)CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>3</sub> (1 puncte)

Reacția (egalată) (0,5 puncte)

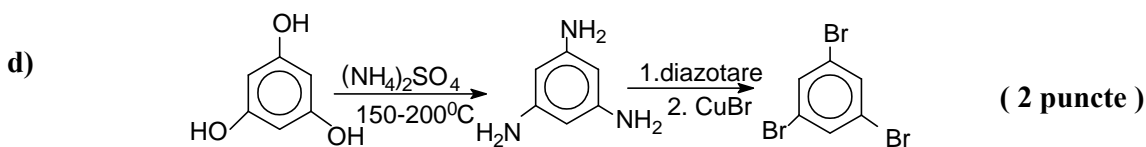
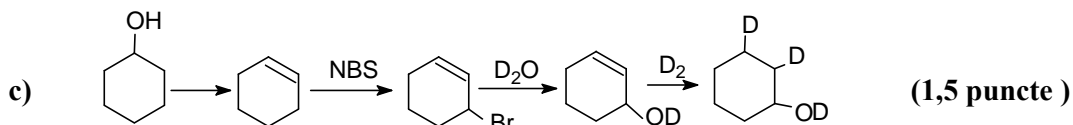
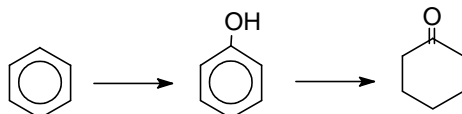
**Subiectul II (20 puncte)**



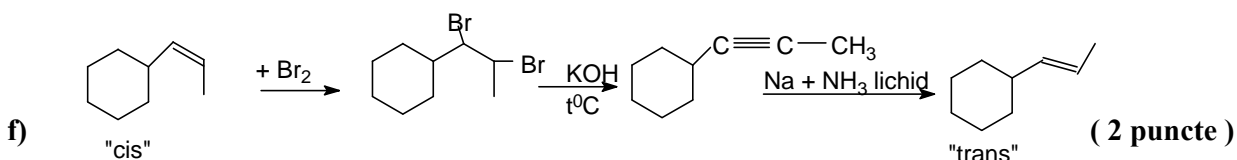
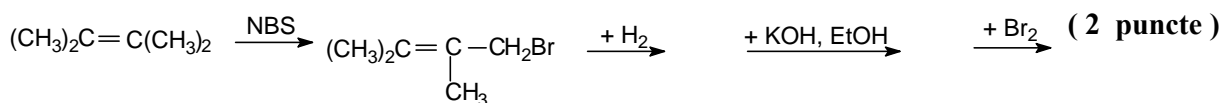
b) (2,5 puncte)



și obținerea ciclohexanonei:

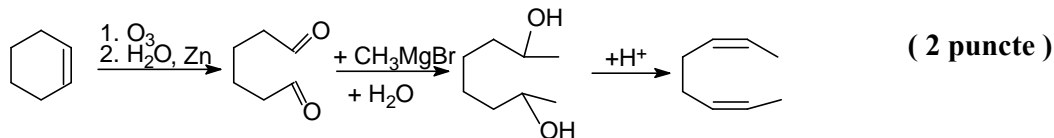


e)

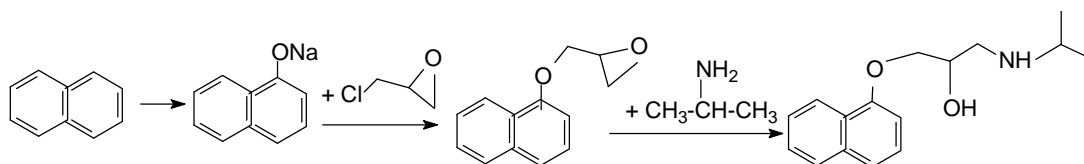


g) Nitro benzen → Anilină → Benzonitril → Acid benzoic → Alcool benzilic (2 puncte)

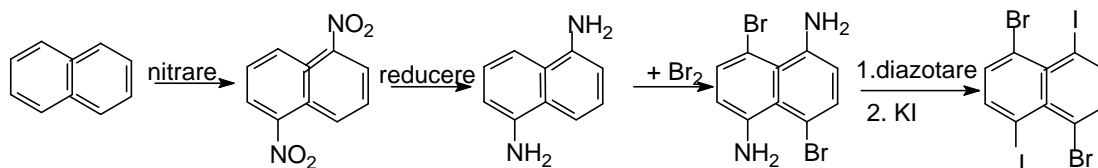
h)



i) (2 puncte)



j) (2 puncte)



### Subiectul III (25 puncte)

1). (14 puncte)

a) 4 puncte: E: Acidul o- hidroxi benzoic (2p); C: Acidul o-aminobenzoic (1p);  
A: o- nitrotoluen (1p)

b) 4 puncte (6x 0,5p + 1p J) :

B: Acidul o- nitro benzoic; D: Clorură de o-carboxi benzen diazoniu; G: Toluen; F. Benzen;

H: Acidul benzensulfonic; I: Benzensulfonat de sodiu; J: Fenoxid de sodiu;

c) 6 puncte: ( 10 x 0,5 p + 1p reacția J → E)

2). (11 puncte)

a) 5 puncte:  $x$  moli  $C_6H_5-R-NH_3^+Cl^-$  100 g clorhidrat ..... 24,74 g Cl  
 $x$  M .....  $x$  35,5 g Cl  $\Rightarrow M = 143,5$  g/mol (1p)

$\Rightarrow$  o-, m-, p- toluidine și benzilamina și clorhidrații corespunzători (8x 0,5p)

b) 4 puncte (7x 1p) :

! Numai clorhidratul benzilaminei formează la diazotare  $N_2$  ceilalți formează săruri de diazoniu.

$0,224$  L  $N_2 \Rightarrow 0,01$  moli clorhidrat de benzil amină  $\Rightarrow 0,04$  moli amestec

$m_{\text{amestec}} = 0,04$  M =  $0,04 \times 143,5 = 5,74$  g amestec

