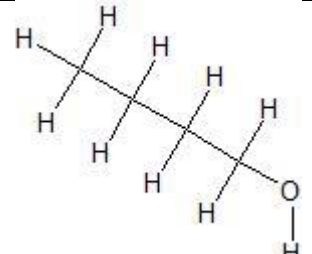


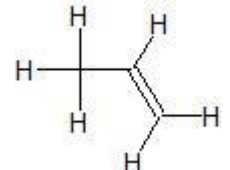
Capitolul 5 –EXERCIIȚII ȘI PROBLEME PENTRU CONCURSURI

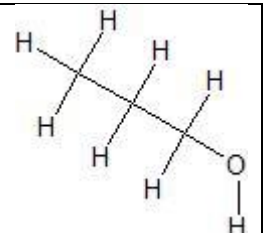
5.5.ALCOOLI

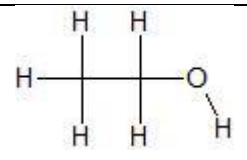
Exerciții și probleme

5.5. 1. Identifică substanțele notate cu litere în transformările de mai jos:

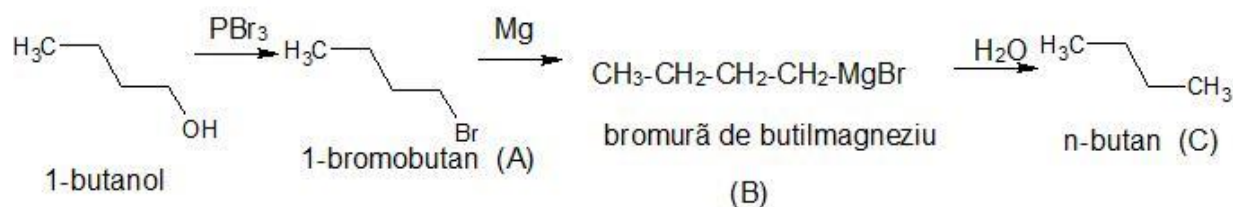
a		PBr ₃		Mg		H ₂ O	
		→	A	→	B	→	C
				eter			

b		1.H ₂ SO ₄		Br ₂		NaNH ₂	
		→	A	→	B	→	C
		2.H ₂ O				2 echiv.	

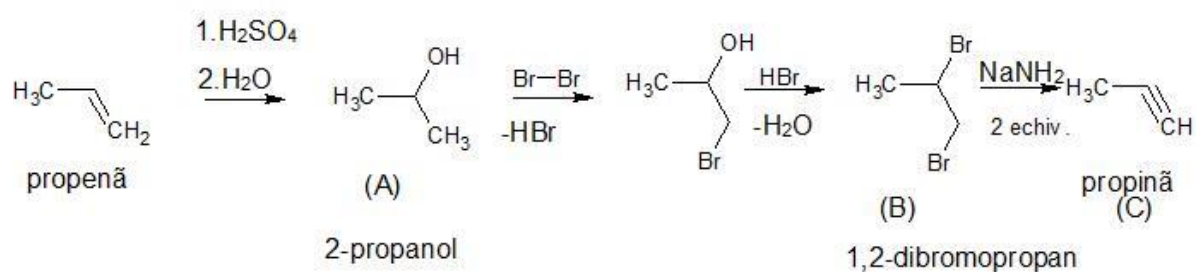
c		PI ₃		KOH		1.H ₂ SO ₄	
		→	A	→	B	→	C
				alcoolic		2.H ₂ O	

d		HI		Na		AlBr ₃	
		→	A	→	B	→	C

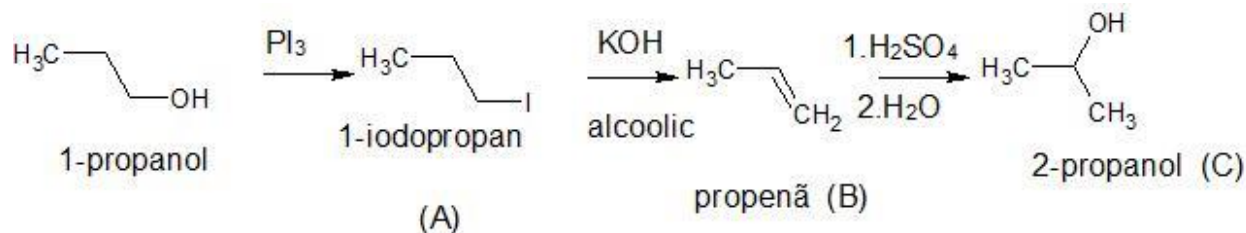
Rezolvare a:



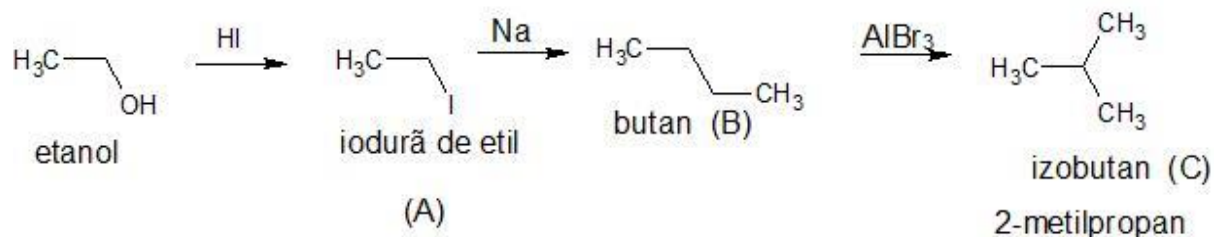
Rezolvare b:



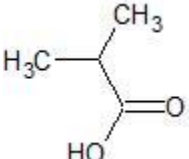
Rezolvare c:

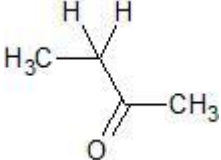


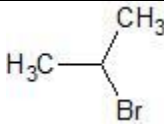
Rezolvare d:



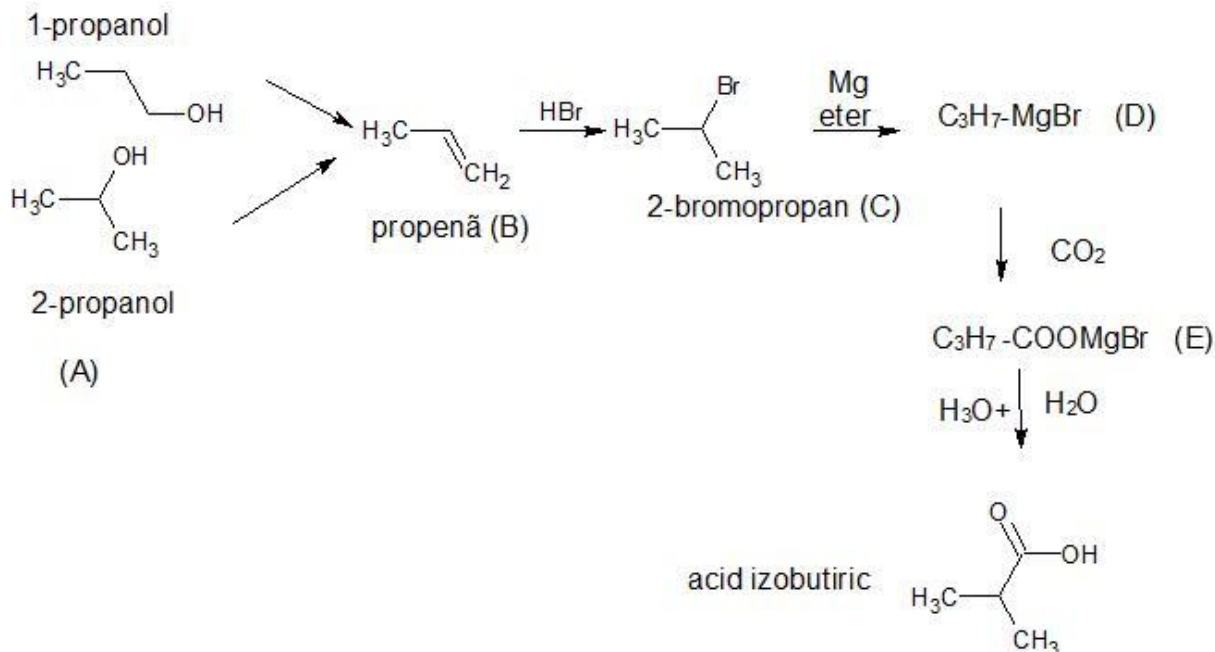
5.5. 2. Indică formulele structurale probabile pentru compușii organici notați cu litere în transformările de mai jos:

a	-H ₂ O		HBr		Mg		CO ₂		H ₂ O	
A	→	B	→	C	→	D	→	E	→	
	H ₂ SO ₄				eter				H ₃ O ⁺	

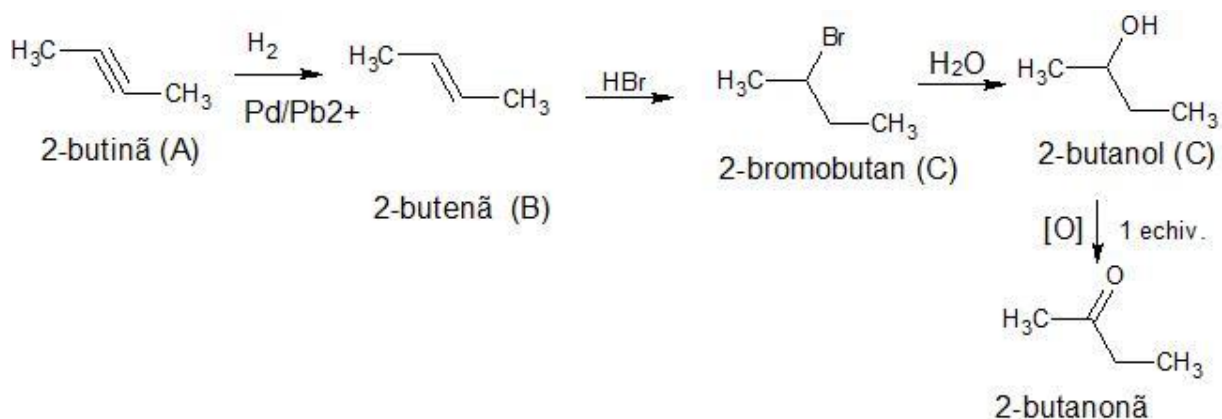
b	H ₂		HBr		H ₂ O		[O]	
A	→	B	→	C	→	D	→	
	Pd/Pb ²⁺						(1 echiv)	

c	1.O ₃		H ₂		HBr		KOH		HBr	
A	→	B	→	C	→	D	→	E	→	
1 mol	2.H ₂ O	2 moli	Pt				alcoolic			

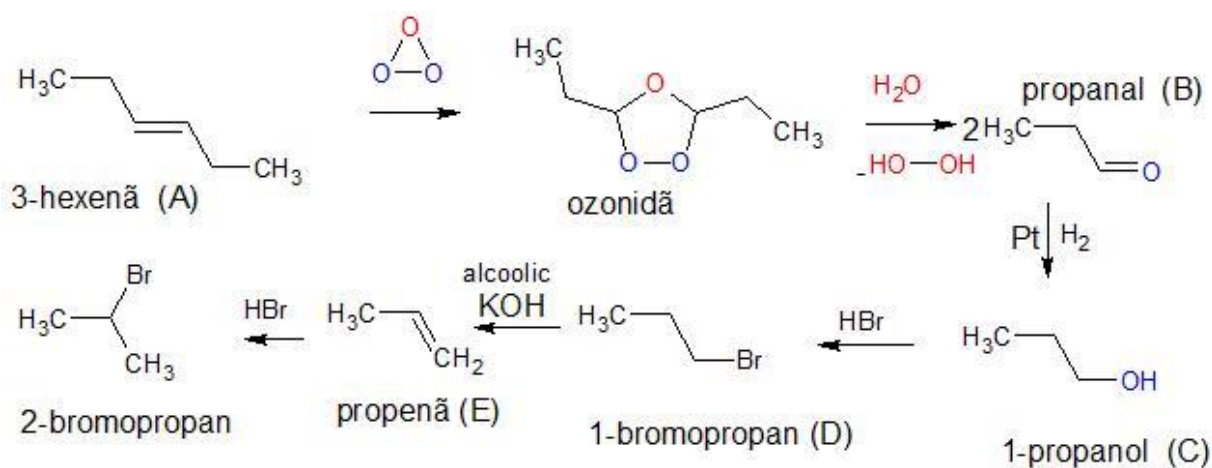
Rezolvare a:



Rezolvare b:



Rezolvare c:



5.5. 3. Un compus organic **A** reacționează cu sodiu metallic. În prezență de clorură de zinc, **A** reacționează foarte repede cu acidul clorhidric conducând la un compus **B** ce conține 38,4 % Cl. Densitatea față de aer a produsului **B** este 3,2. Stabilește formula structurală a lui **A**.

Rezolvare:

$$d_{\text{aer}} = \frac{MB}{Maer} = 3,2$$

$$M_{\text{aer}} = 28,9 \text{ g/mol}$$

$$M_B = 3,2 * 28,9 = 92,5 \text{ g/mol}$$

$$92,5 \text{ g B} \dots\dots\dots n \cdot 35,5 \text{ g Cl}$$

$$100 \text{ g B} \dots\dots\dots 38,4 \text{ g Cl}$$

$$n \cdot 35,5 = 92,5 \cdot 38,4 / 100$$

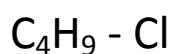
$$n \cdot 35,5 = 35,5$$

$n = 1$ deci B va conține un atom de clor în moleculă.

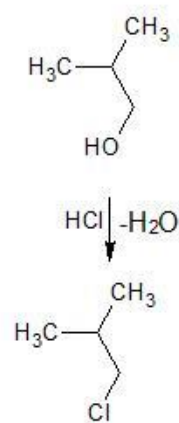
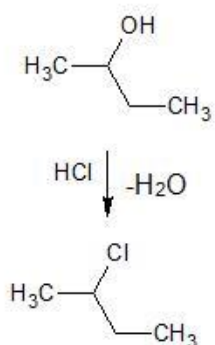
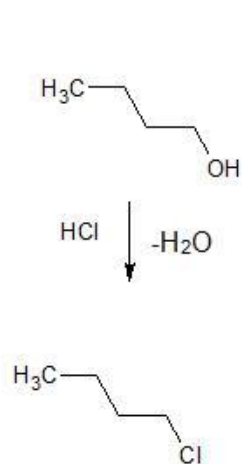


$$M_B = R + 35,5 = 92,5 \text{ g/mol}$$

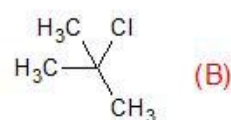
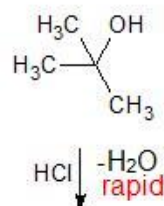
$$R = 57$$



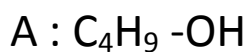
în prezență de ZnCl₂

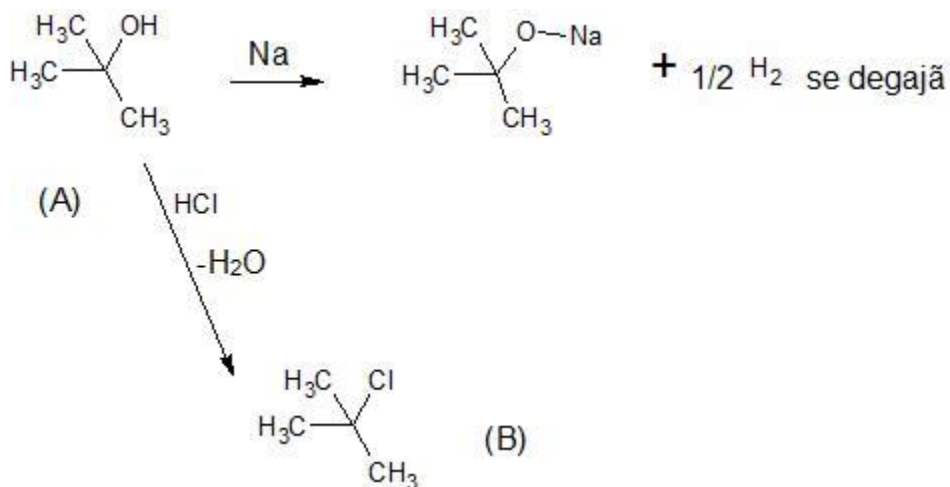
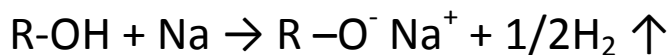


alcool tertbutilic
(A)



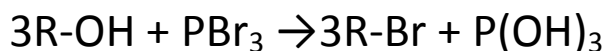
clorură de tertbutil





5.5. 4. Un alcool monohidroxilic **A**, aciclic, care conține un atom de carbon cu toți cei patru substituenți diferiți, reacționează cu PBr₃ conducând la compusul **B** care conține 59,25 % Br. Un mol de **A** reacționează cu un mol de hidrogen. Stabilește formula structurală a lui **A**.

Rezolvare:



$$M_B = R + 80 = ? \text{ g/mol}$$

$$R = ?$$



$$(R + 80) \text{ g } B \dots\dots\dots 80 \text{ g Br}$$

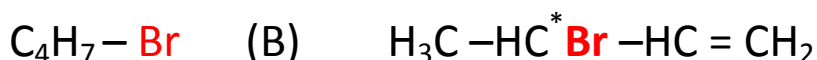
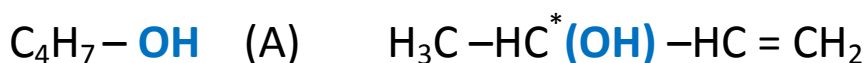
$$100 \text{ g } B \dots\dots\dots 59,25 \text{ g Br}$$

$$(R + 80) = 100 * 80 / 59,25 = 135 \text{ g/mol}$$

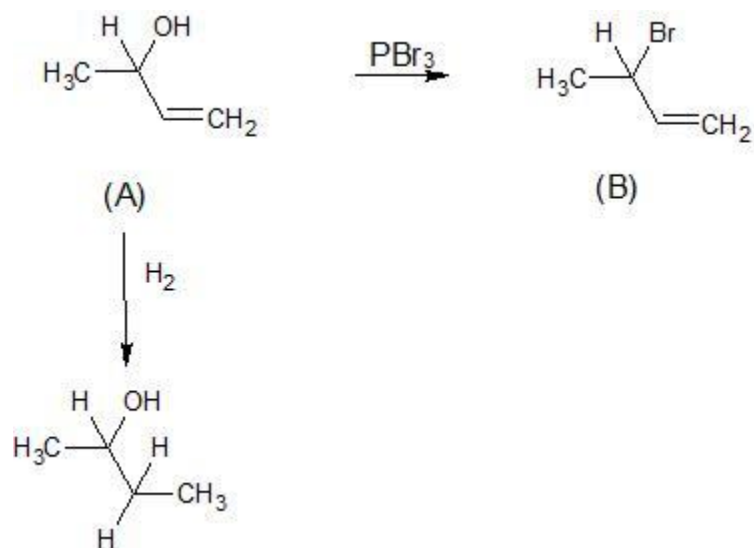
$$R = 135 - 80 = 55$$



$$M R = 4 \cdot 12 + 7 = 55$$

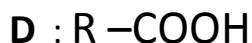


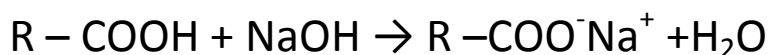
1 mol A + 1 mol H₂ → A are o legătură dublă și un atom de carbon asimetric:



5.5. 5. Prin hidroliza totală a 8,2 g compus **A** se obțin 6,1 g de compus **B** și un acid monocarboxilic **D**. 0,3 g acid **D** sunt neutralizați de 5 ml. soluție de hidroxid de sodiu 1 M. Compusul **B** conține un atom de carbon cu toți cei patru substituenți diferiți (carbon asimetric). Prin deshidratarea compusului **B** rezultă compusul **E** care sub acțiunea unei soluții concentrate de KMnO₄ conduce la acidul benzoic. Stabilește formulele structurale pentru **A**, **B** și **E**.

Rezolvare:





1000 ml soluție NaOH.....1 mol NaOH

5 ml soluție NaOH.....x moli NaOH

$$x = 5 \cdot 1 / 1000 = 5 \cdot 10^{-3} \text{ moli NaOH}$$

$$x = 5 \cdot 10^{-3} \text{ moli R -COOH}$$

$$M_{\mathbf{D}} = (R + 45) \text{ g/mol}$$

$$\text{masa } \mathbf{D} = (R + 45) \cdot 5 \cdot 10^{-3} = 0,3 \text{ g}$$

$$(R + 45) = 0,3 \cdot 1000 / 5$$

$$R + 45 = 60$$

$$R = 15$$

$$R : \text{CH}_3$$

Acidul **D** este acidul acetic : $\text{CH}_3 - \text{COOH}$

8,2 g						6,1 g
$\text{CH}_3 - \text{COO} - \text{R}'$	+	H_2O	\rightleftharpoons	$\text{CH}_3 - \text{COOH}$	+	$\text{R}' - \text{OH}$
ester (A)		apă	hidroliză	acid acetic (D)		alcool (B)
$(59 + \text{R}') \text{ g}$						$(\text{R}' + 17) \text{ g}$

$$M_{\text{CH}_3 - \text{COO} - \text{R}'} = 24 + 32 + 3 + \text{R}' = (59 + \text{R}') \text{ g/mol}$$

$$M_{\text{R}' - \text{OH}} = (\text{R}' + 17) \text{ g/mol}$$

$$8,2 \cdot (\text{R}' + 17) = 6,1 \cdot (59 + \text{R}')$$

$$8,2 \cdot R' - 6,1 \cdot R' = 6,1 \cdot 59 - 8,2 \cdot 17$$

$$2,1 \cdot R' = 360 - 139,4 \quad \rightarrow \quad R' = 220,5/2,1 \quad \rightarrow \quad R' = 105$$

$$R' : C_6H_5-C_2H_4- ; \quad M R' = 77 + 24 + 4 = 105$$

