

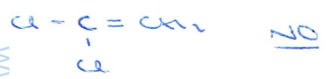
# Ejercicios Tema 4

## 1. Isomeria geométrica?

a) 1-buteno



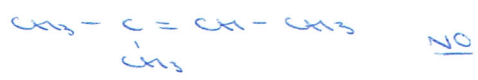
b) 1,1-dicloroeteno



c) 1,2-dicloroeteno



d) 2-metil-2-buteno



e) 1-penteno



f) 1-cloro-2-metil-2-buteno

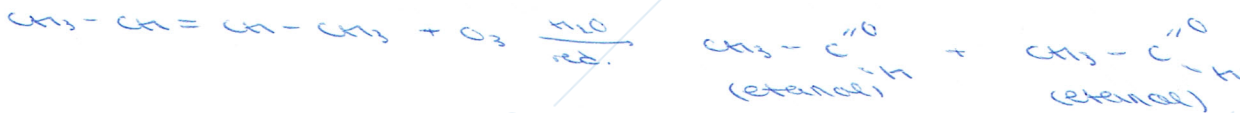


## 2. Productos

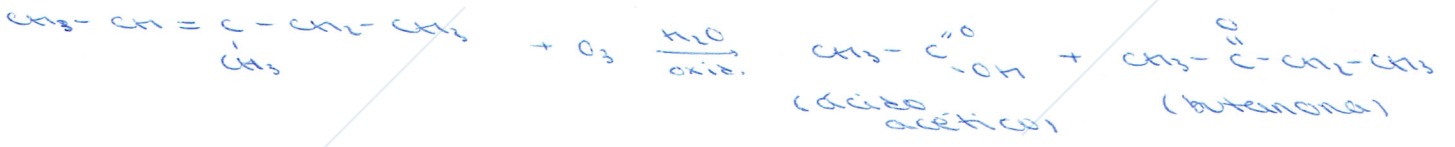
a) 1-hexeno + H<sub>2</sub> (Pt)



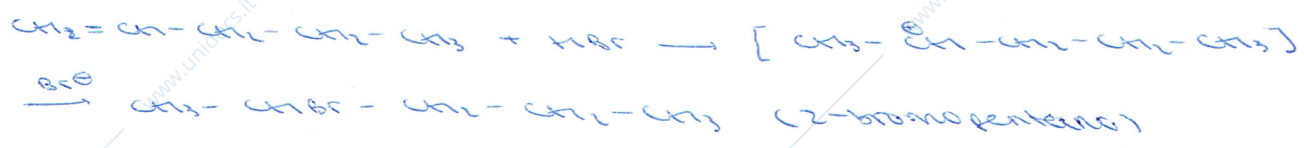
b) 2-buteno + O<sub>3</sub> con H<sub>2</sub>O y agente reductor



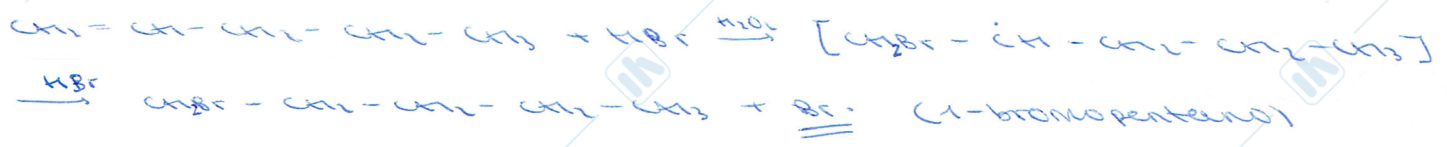
c) 3-metil-2-penteno + O<sub>3</sub> con H<sub>2</sub>O y agente oxidante



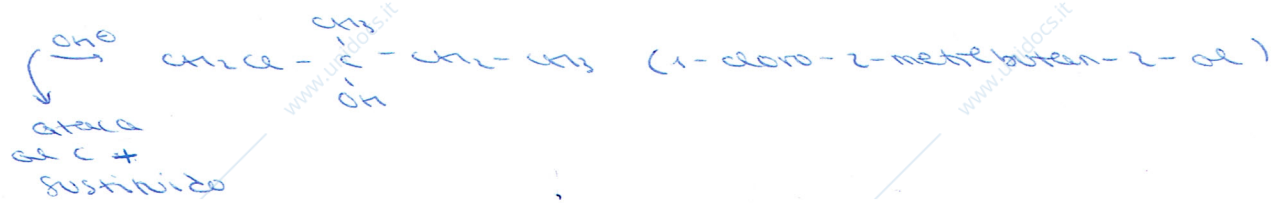
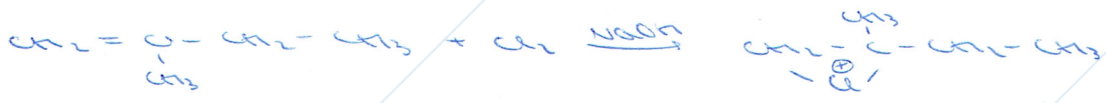
d) 1-penteno + HBr sin peróxidos



e) 1-penteno + HBr con peróxidos



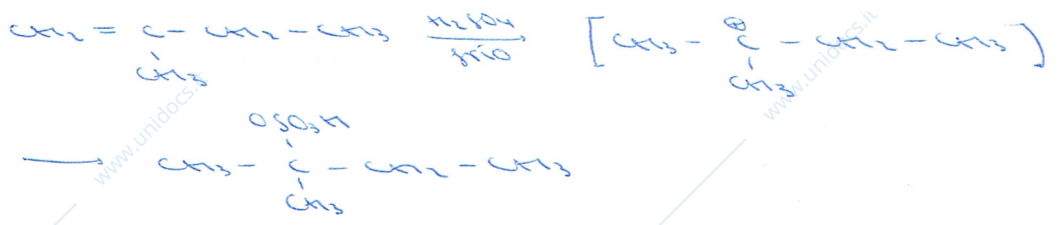
f) 2-metil-1-buteno + Cl<sub>2</sub> con NaOH



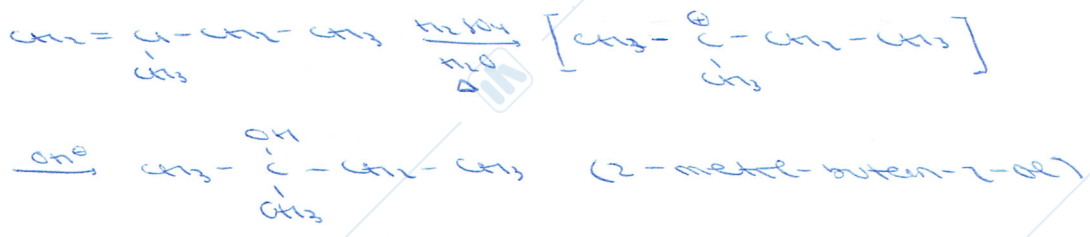
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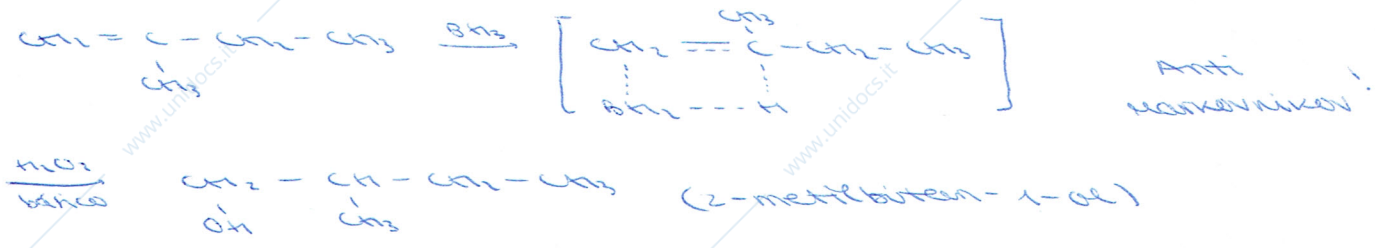
g) 2-metil-1-buteno + H<sub>2</sub>SO<sub>4</sub> (H<sub>2</sub>O)



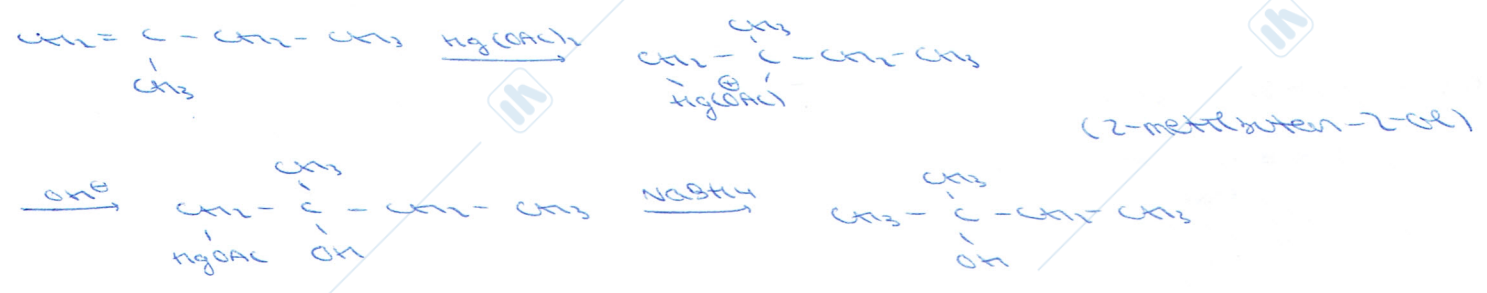
h) 2-metil-1-buteno + H<sub>2</sub>SO<sub>4</sub> (CCl<sub>4</sub>) con H<sub>2</sub>O y calor



i) 2-metil-1-buteno + Br<sub>2</sub> con H<sub>2</sub>O<sub>2</sub> (medio básico)



j) 2-metil-1-buteno + Hg(OAc)<sub>2</sub> con NaOH

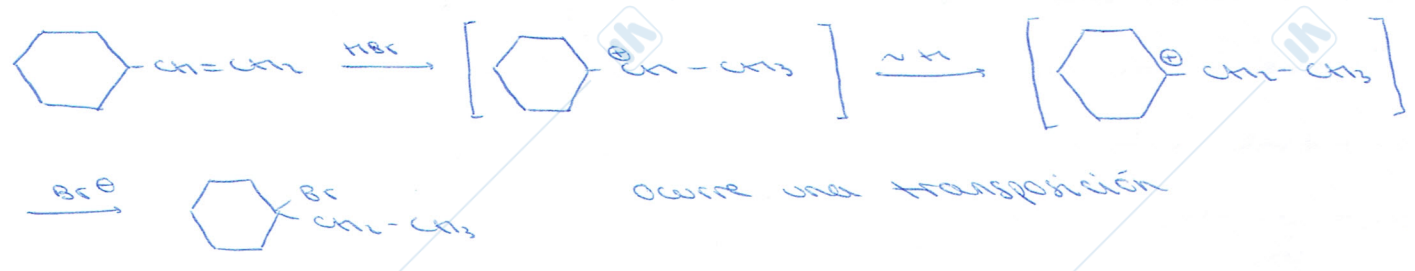


k) 1-buteno con CH<sub>3</sub>-CO<sub>3</sub>H



8. Patos intermedios

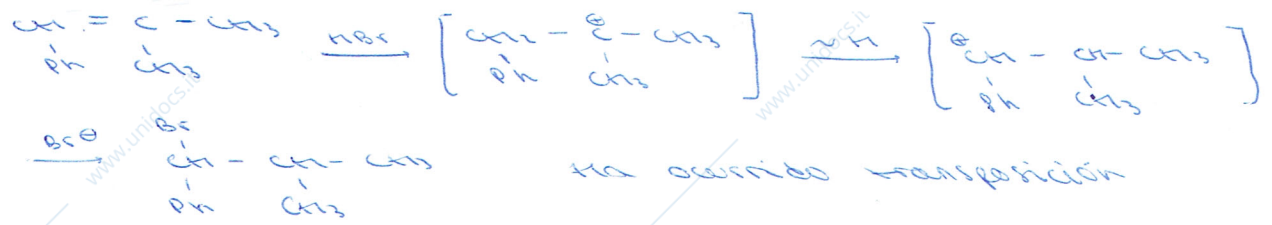
a) Vinilciclohexano + HBr → 1-bromo-1-etilciclohexano



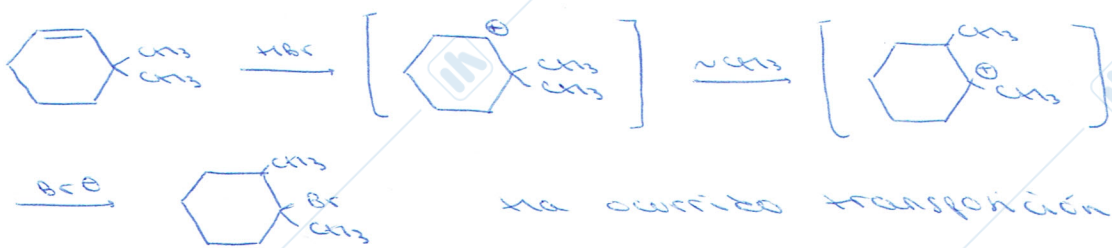
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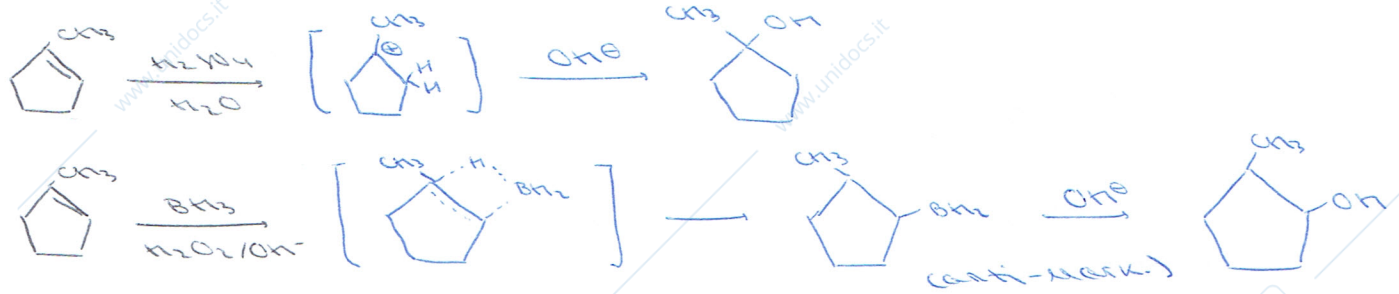
b) 1-pent-2-ene + HBr → 1-bromo-2-pentano



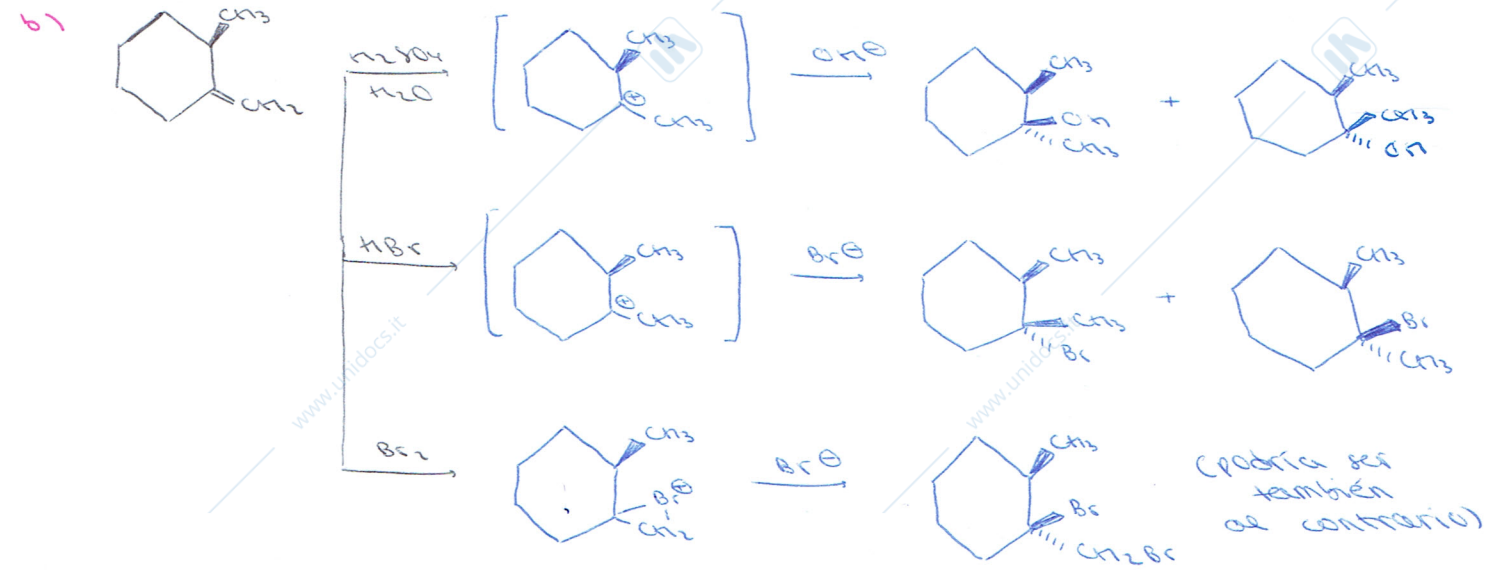
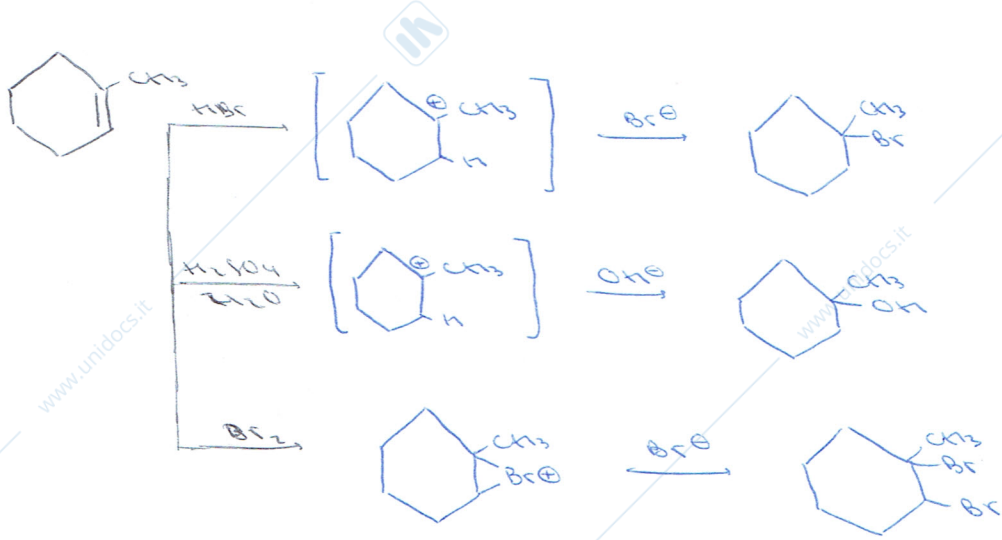
c) 3,3-dimetilciclohexeno + HBr → 1-bromo-1,2-dimetilciclohexano



4. completar



5. completar



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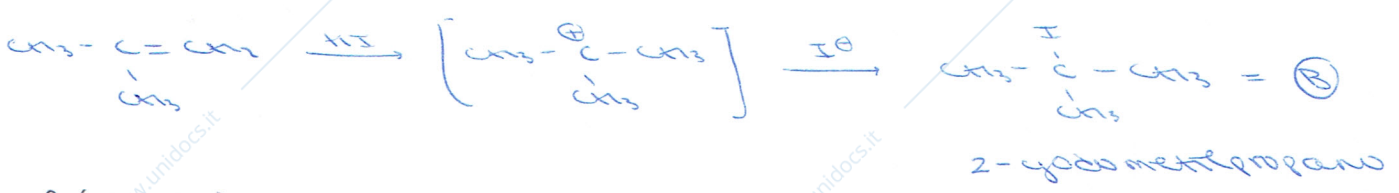
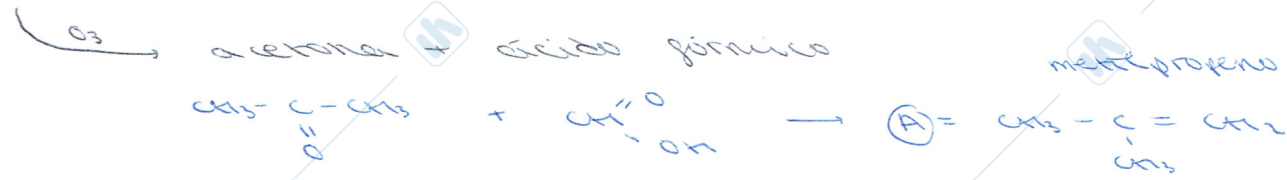
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6. A  $\xrightarrow[\text{oz}]{\text{max.}}$  3,6-dimetilacetone

$\xrightarrow{\text{oz}}$   $\text{C}_5\text{H}_{10}\text{O} \rightarrow$  este producto saldría x2, entonces A tiene que ser simétrica en el doble enlace

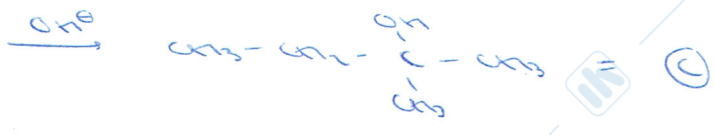
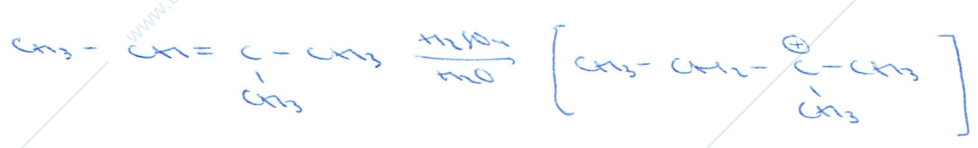
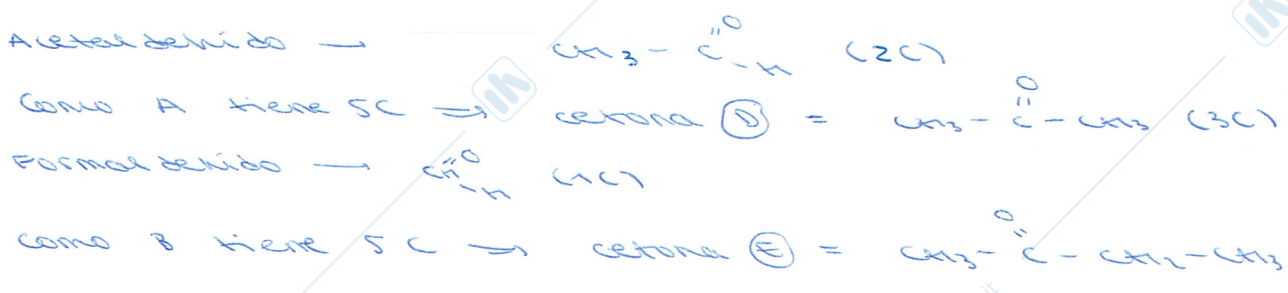


7. A ( $\text{C}_4\text{H}_8$ )  $\xrightarrow{\text{HI}}$  B



8. A ( $\text{C}_5\text{H}_{10}$ )  $\xrightarrow{\text{KMnO}_4}$  C ( $\text{C}_5\text{H}_{10}\text{O}$ )  
 B ( $\text{C}_5\text{H}_{10}$ )  $\xrightarrow{\text{D}}$  C ( $\text{C}_5\text{H}_{10}\text{O}$ )

A  $\xrightarrow{\text{oz}}$  acetaldehído + cetona D  
 B  $\xrightarrow{\text{oz}}$  formaldehído + cetona E

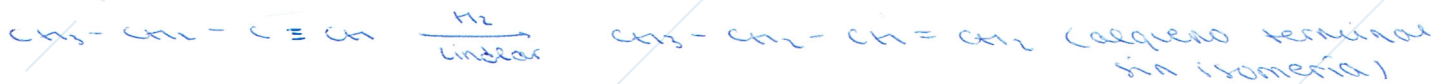


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1. Reacción de 1-butino con:

a)  $H_2$  (cat. Lindlar)



b)  $Na, NH_3$



c)  $NaNH_2, NH_3$



d) producto org. c) con bromometano

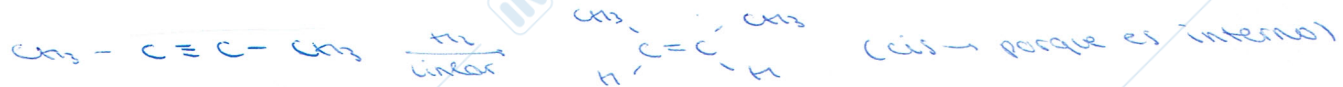


e)  $H_2SO_4$ , sales mercuricas



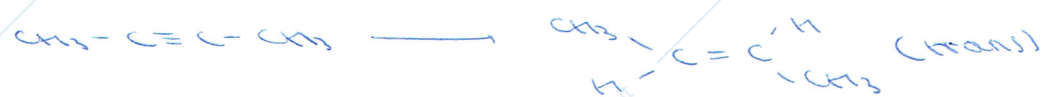
2. Igual que 1 pero con 2-butino

a)  $H_2$  (cat. Lindlar)

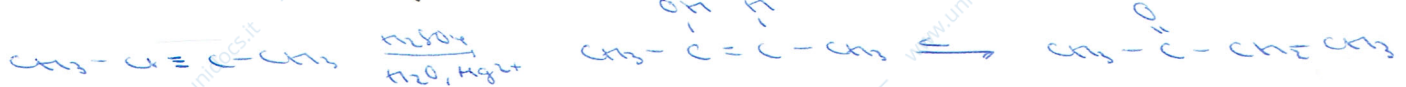


b)  $Na, NH_3$

c)  $NaNH_2, NH_3$



d)  $H_2SO_4$ , sales  $Hg^{2+}$

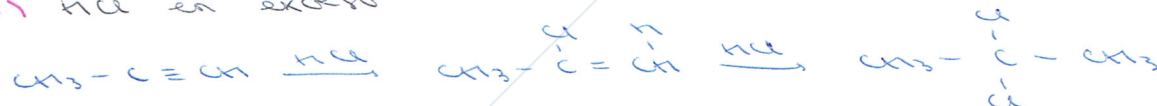


3. Reacción de 1-propino con:

a)  $H_2SO_4$  y  $Hg^{2+}$



b)  $HCl$  en exceso



c)  $NaNH_2 + ICH_2CH_3$



d)  $H_2$  (cat. Lindlar)

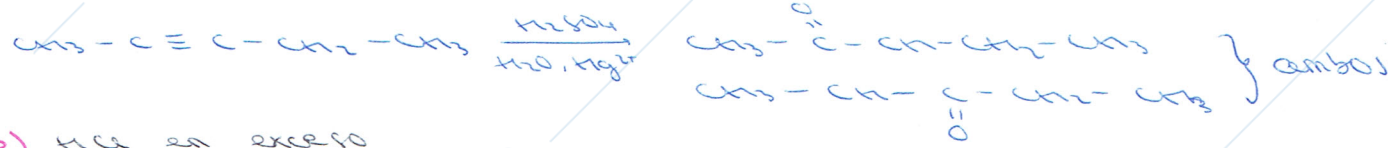


a) Li en NH<sub>3</sub>

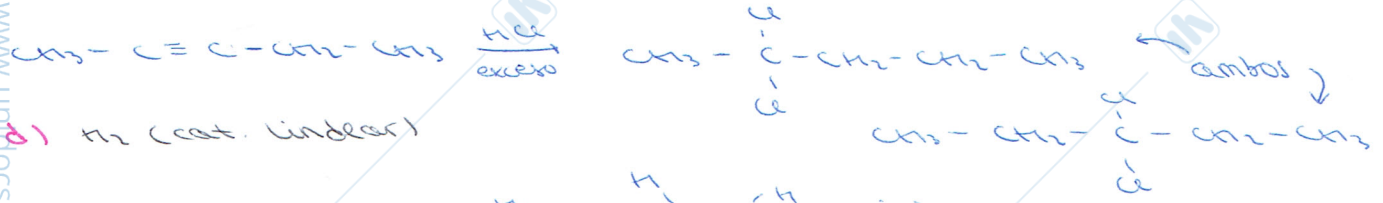


4. Igual que 3 con 2-pentino

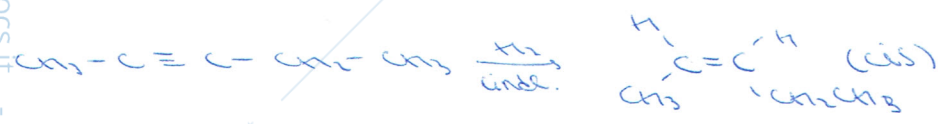
a) H<sub>2</sub>O, H<sub>2</sub>O, Hg<sup>2+</sup>



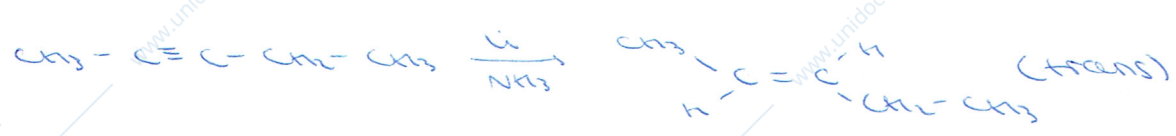
b) HCl en exceso



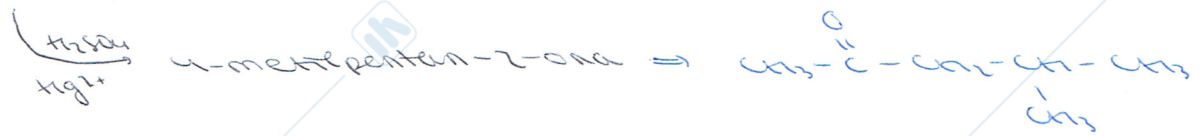
c) H<sub>2</sub> (cat. Lindlar)



e) Li en NH<sub>3</sub>

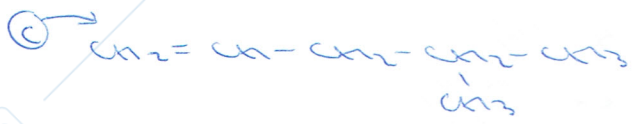
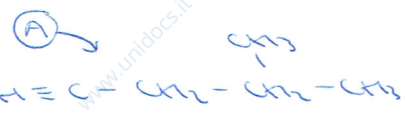
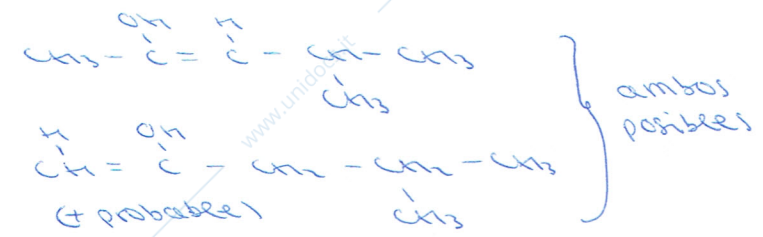


5. A (C<sub>6</sub>H<sub>10</sub>)  $\xrightarrow[\text{Pd}]{\text{H}_2}$  B (C<sub>6</sub>H<sub>14</sub>)



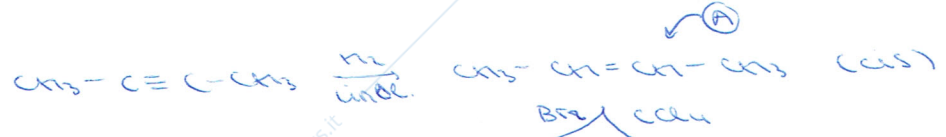
A → alquino B → alcano C → alqueno

Cetona → viene del enol

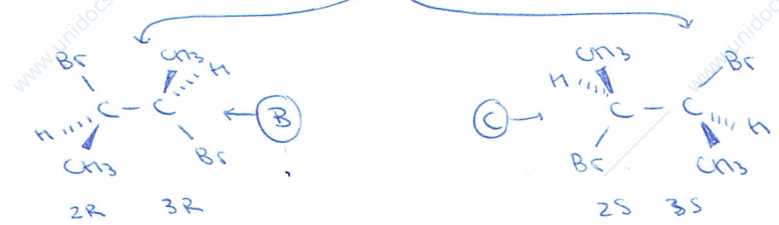


6. 2-butino  $\xrightarrow[\text{Lindlar}]{\text{H}_2}$  A (C<sub>4</sub>H<sub>8</sub>)

A  $\xrightarrow[\text{CCl}_4]{\text{Br}_2}$  B y C (ambos C<sub>4</sub>H<sub>8</sub>Br<sub>2</sub>)



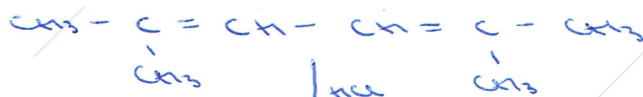
Br ataca por un lado y el otro entra en el contrario



# ejercicios tema 6

## 1. PRODUCTOS

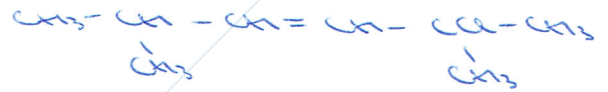
a) 2,5-dimetil-2,4-hexadieno + HCl a -80°C (y a 40°C)



(simétrico)



1,2 → mayoritario a -80°C

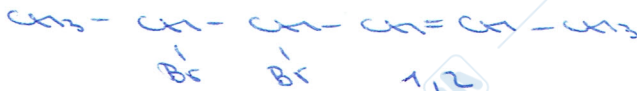


1,4 → mayoritario a 40°C

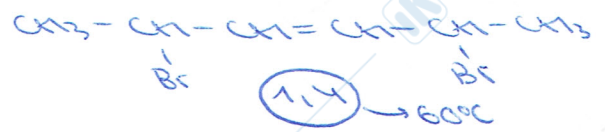
b) 2,4-hexadieno + Br<sub>2</sub> a 60°C



(simétrico)

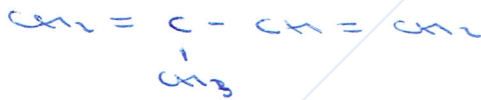


1,2

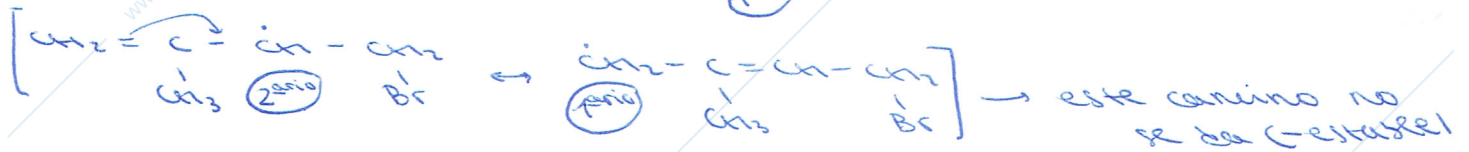


1,4 → 60°C

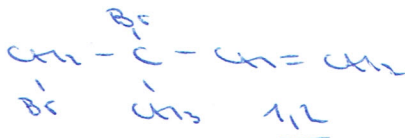
c) 2-metil-1,3-butadieno + HBr (H<sub>2</sub>O<sub>2</sub>)



mediante radicales

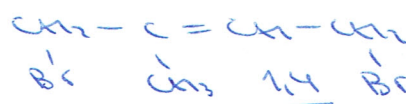


productos siguiendo el camino 1



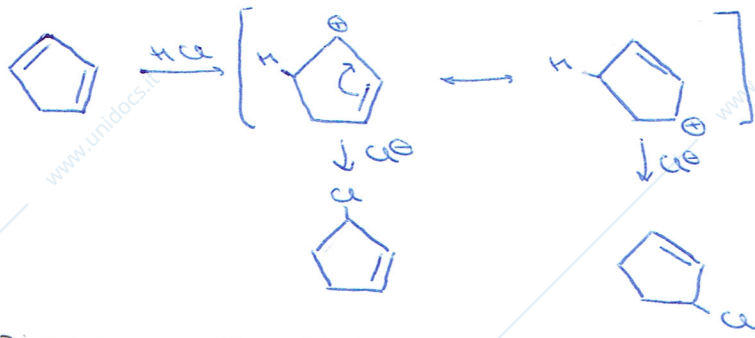
1,2

y



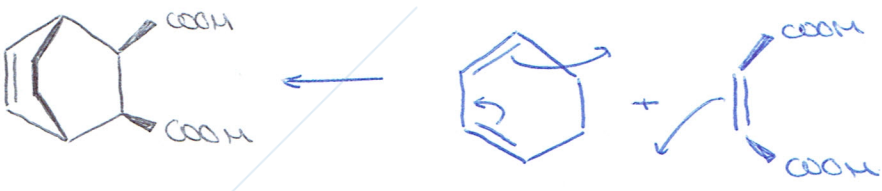
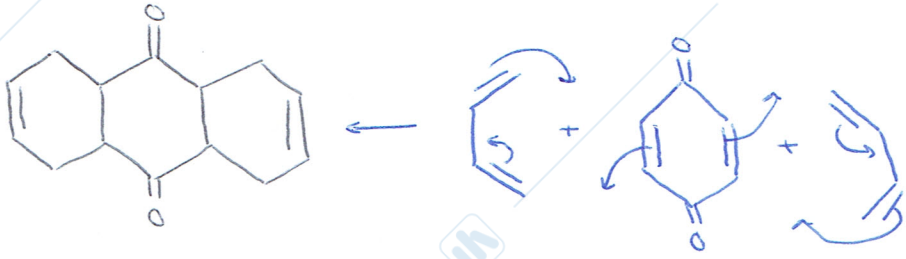
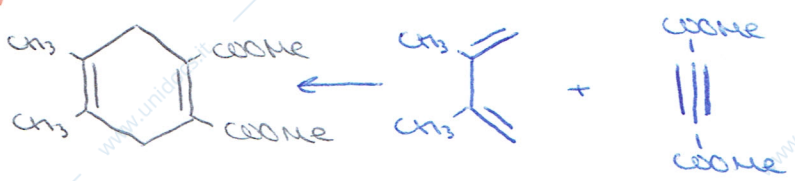
1,4

2. 1,3-ciclopentadieno + HCl



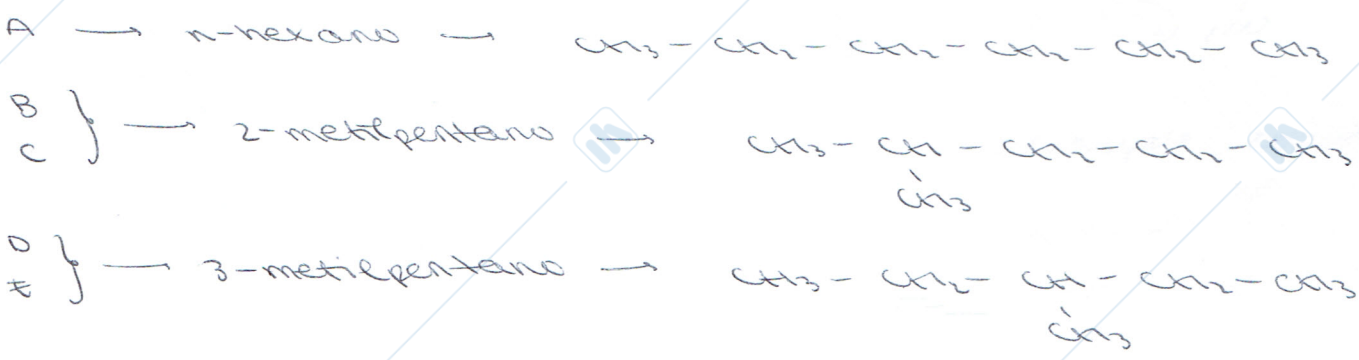
son el mismo compuesto  
3-clorociclopenteno

3. dieno y dienófilo que forman



4. A, B, C, D, E → dienos de fórmula  $C_6H_{10}$   
Sátemos que:

a) Hidrogenación



b) Energía de resonancia

A y E → no (no son conjugados)  
B, C y D → sí (son conjugados)

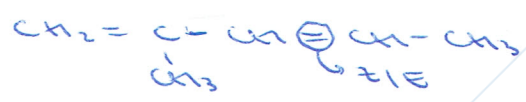
Isomería geométrica  
solo A, B y D



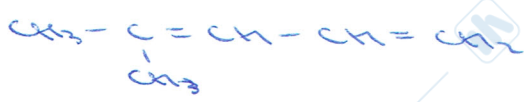
No conjugado  
Presenta isomeria  
Z/E



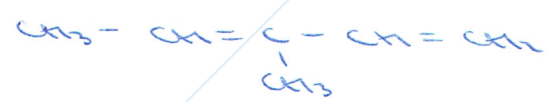
Conjugado  
Presenta isomeria



Conjugado  
No isomeria

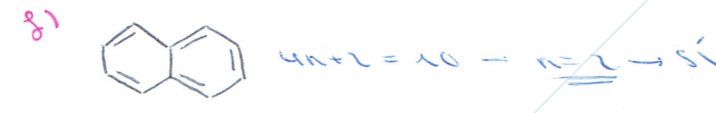
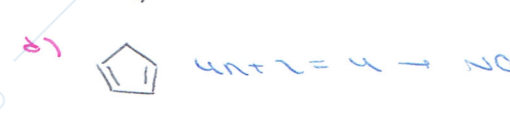
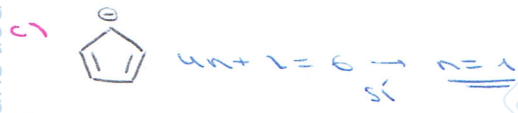
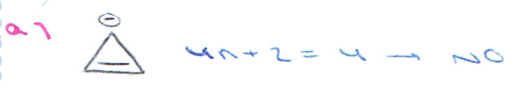


Conjugado  
Isomeria

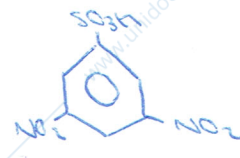
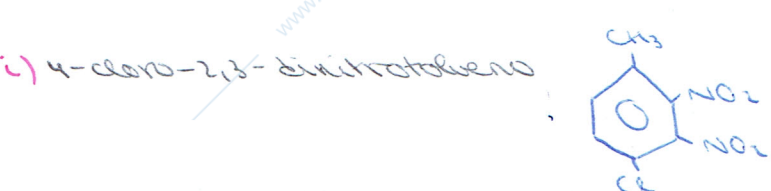
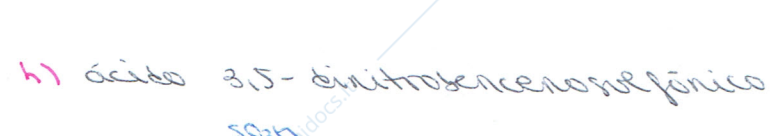
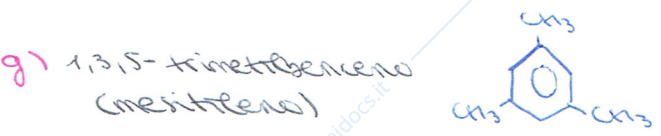
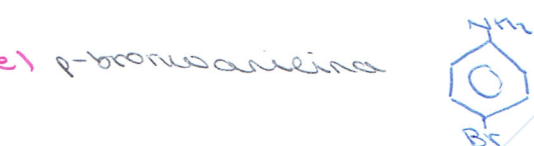
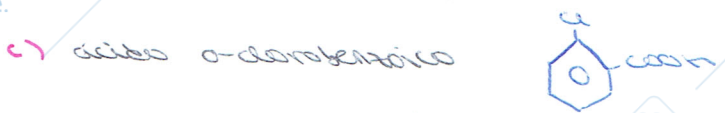
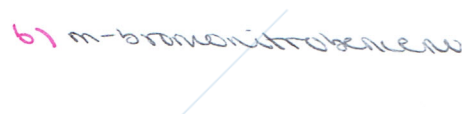
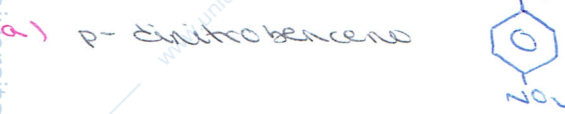


# Ejercicios Tema 7

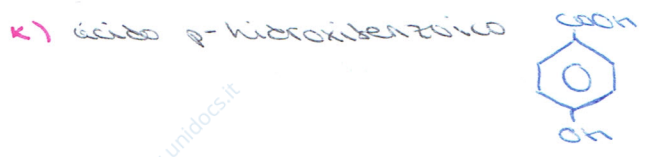
1. ¿Cuales cumplen la regla de aromaticidad?



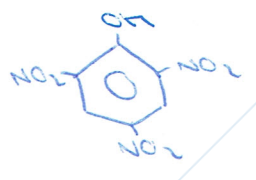
2. Formulas



j) ácido 2-carboxi-5-bromo-3-nitrobenzico

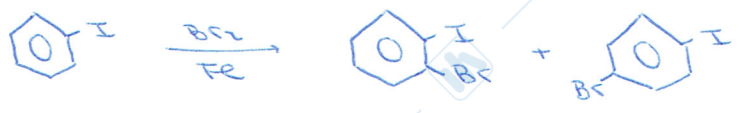


2) 2,4,6-trinitroanilina (ácido picrico) Nc1c([N+](=O)[O-])cc([N+](=O)[O-])cc1[N+](=O)[O-]

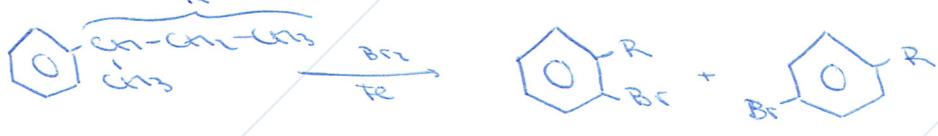


### 3. Tratamiento con Br<sub>2</sub> y Fe

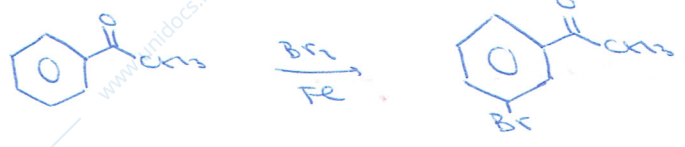
a) iodobenceno



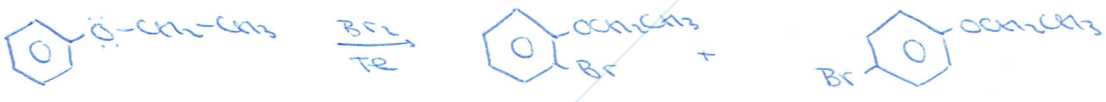
b) sec-butilbenceno



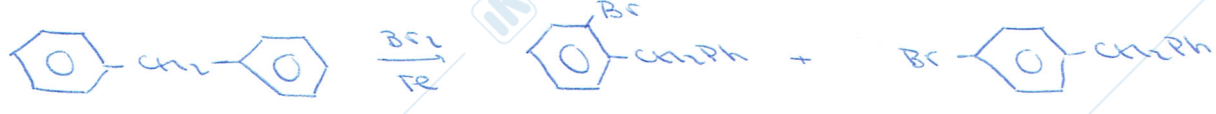
c) acetofenona



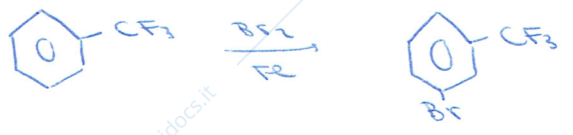
d) etoxibenceno



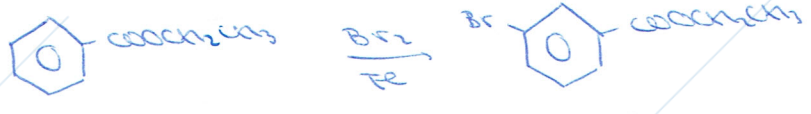
e) difenil metano



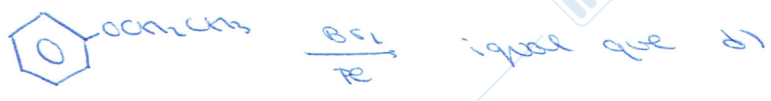
f) trifluorometilbenceno



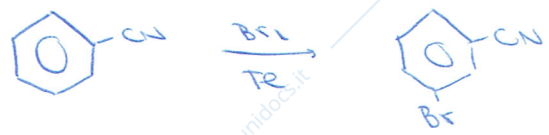
g) benzoato de etilo



h) Etil feniléter



i) Benzonitrilo



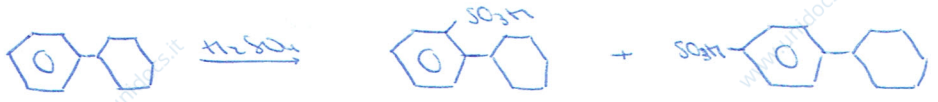
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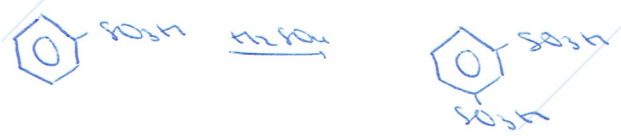
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4. Productos de nitrosulfonación

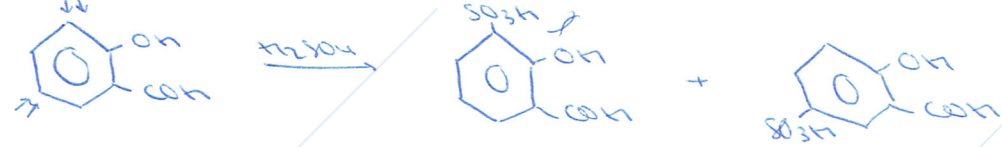
a) ciclohexilbenzeno



b) Acido benzenosulfónico

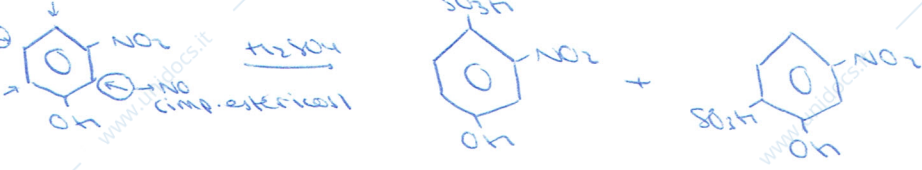


c) o-hidroxibenzaldehído (alcaloide salicílico)



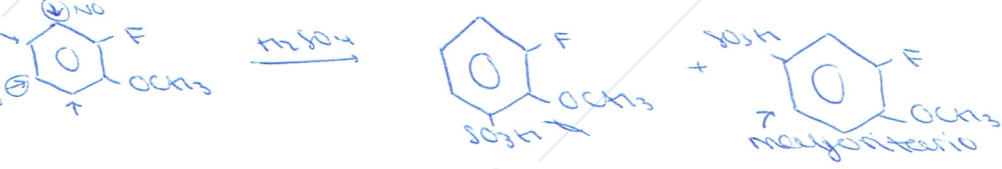
efecto cooperativo, el mayoritario será el 2º, por impedimento estérico.

d) m-nitrofenol



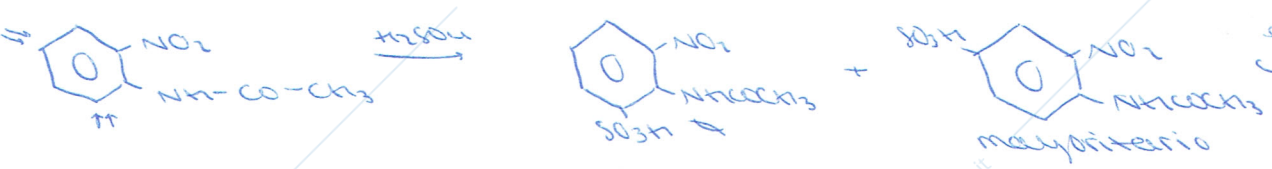
dirige la reacción el grupo activante OH (efecto no cooperativo)

e) o-fluorocetol



Efecto no cooperativo dirige el OCH3 porque es activante

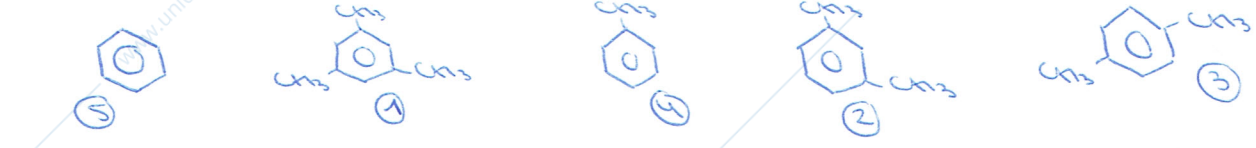
f) o-nitroacetanilida



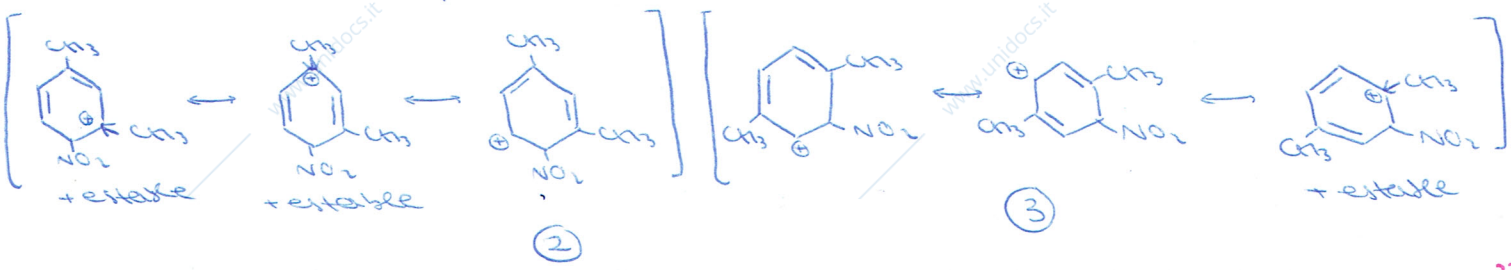
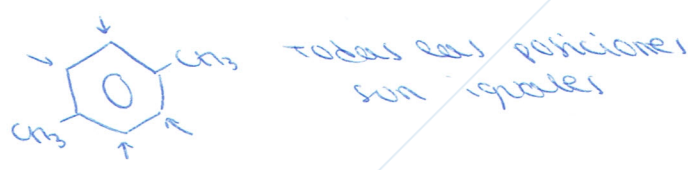
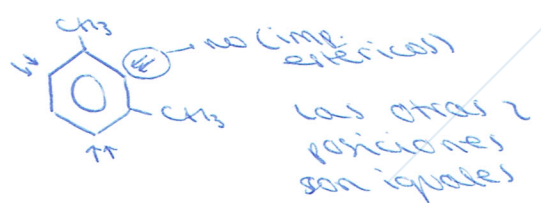
efecto cooperativo

Mayor a menor reactividad

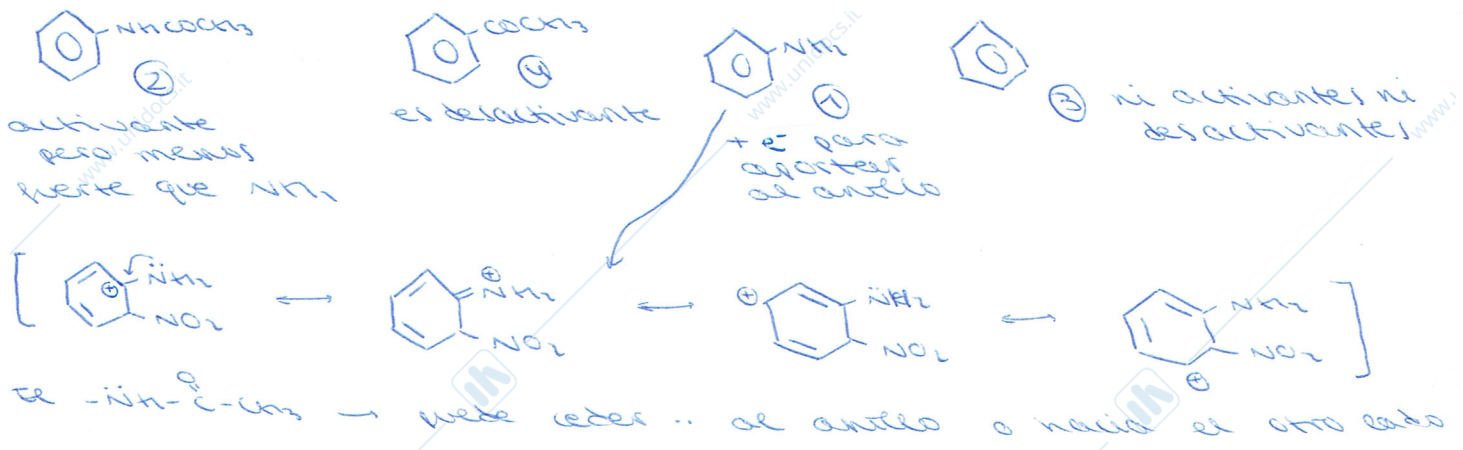
a) benceno, metileno, tolueno, m-xileno, p-xileno



Todos tienen CH3 como grupo activante. A mayor nº de CH3 mayor reactividad. Entre el m-xileno y p-xileno hay que comprobar el mecanismo de reacción



b) Acetanilida, acetofenona, anilina, benceno

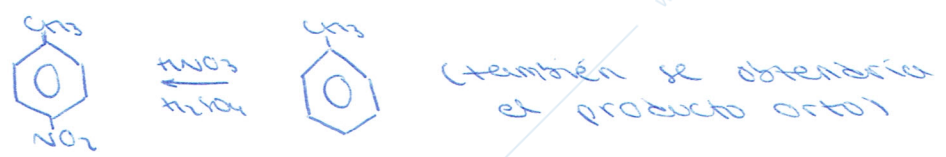


c) 2,4-dinitroclorobenceno, 2,4-dinitrofenol

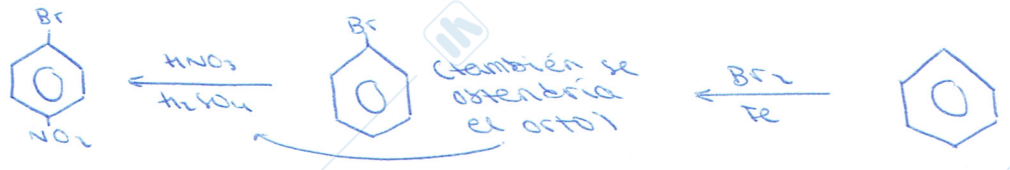


d) A partir de benceno o tolueno → síntesis para:

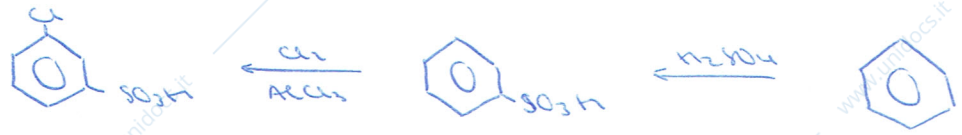
a) p-nitrotolueno



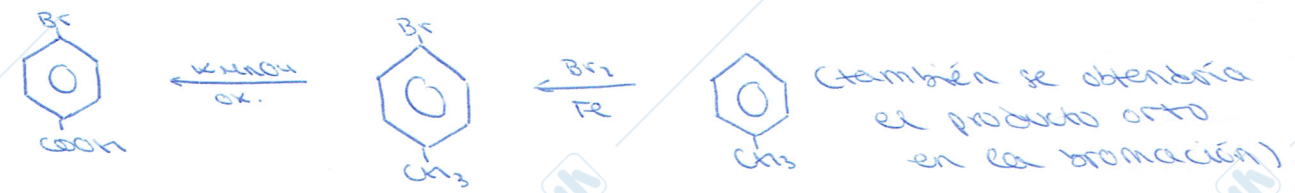
b) p-bromonitrobeneno



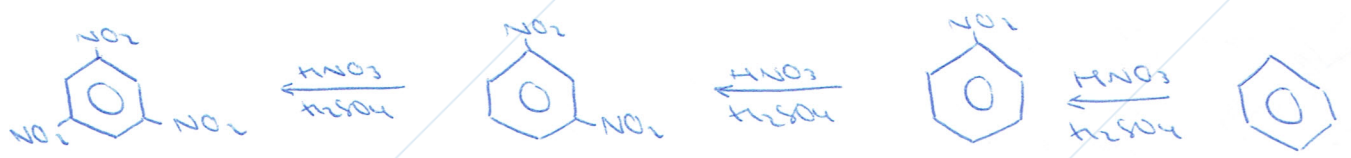
c) ácido m-clorobenenosulfónico



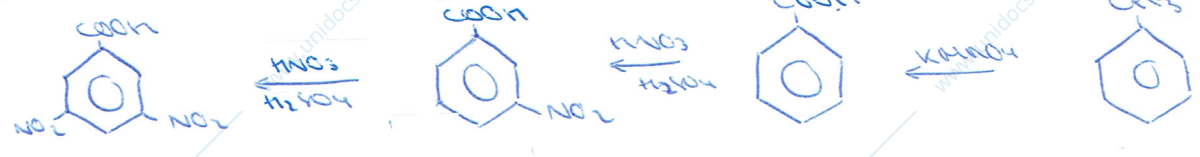
d) ácido p-bromobenzoico



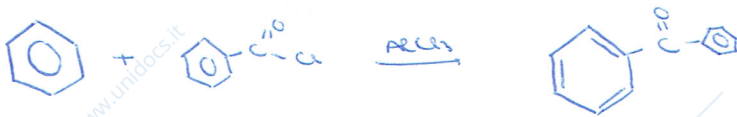
e) 1,3,5-trinitrobeneno



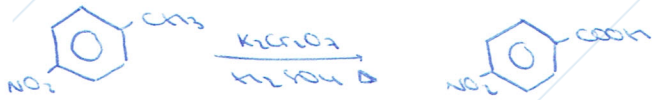
f) ácido 3,5-dinitrobenzoico



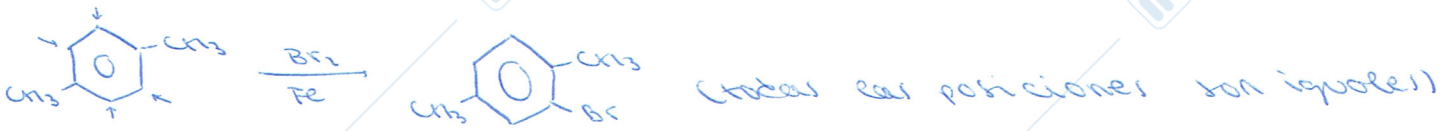
a) benceno + cloruro de benzoylo + AlCl<sub>3</sub>



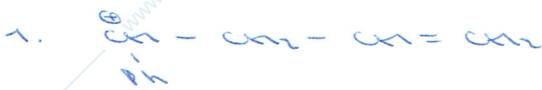
b) p-nitrotolueno + K<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> / H<sub>2</sub>SO<sub>4</sub>



c) p-xileno + Br<sub>2</sub> + Fe

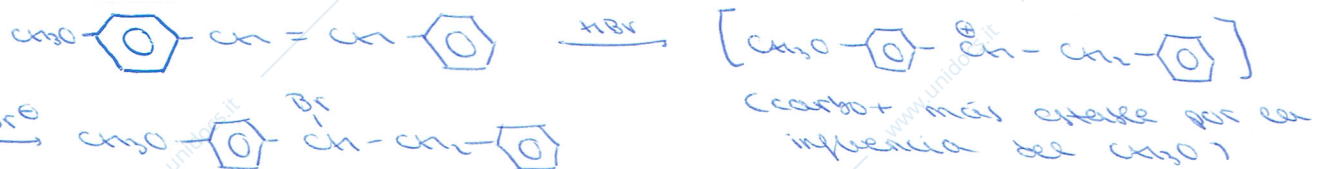


d) 1-fenil-1,3-butadieno + H<sub>2</sub> + Ni (30°C)

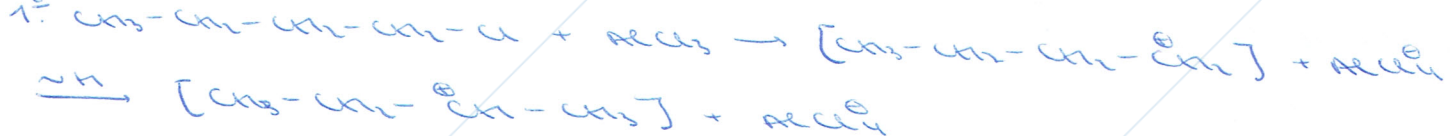
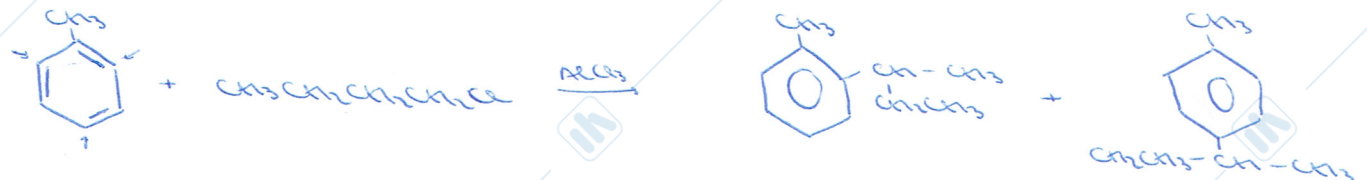


Productos:

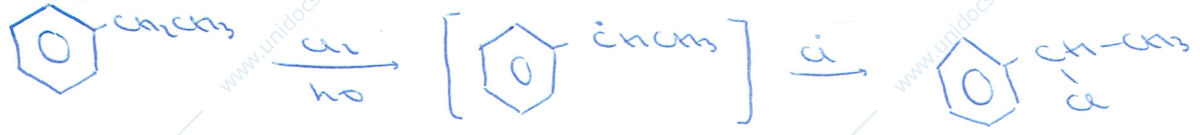
e) p-CH<sub>3</sub>-C<sub>6</sub>H<sub>4</sub>-CH=CH-C<sub>6</sub>H<sub>5</sub> + HBr



f) tolueno + cloruro de n-butilo + AlCl<sub>3</sub>



g) estireno + Cl<sub>2</sub> (h<sub>ν</sub>)

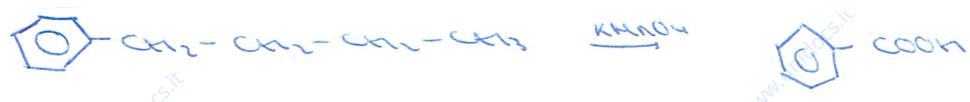


(reacción de alcano)

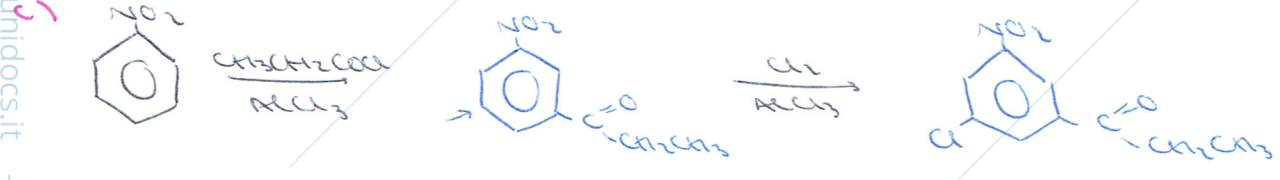
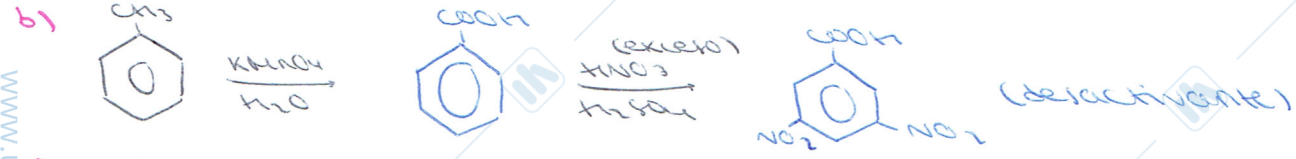
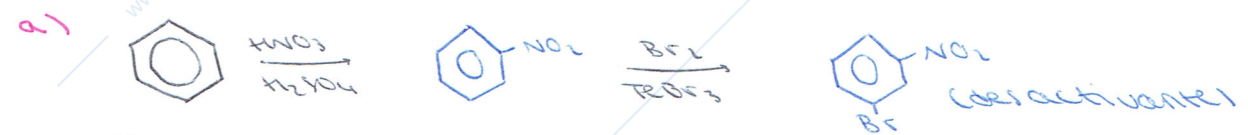
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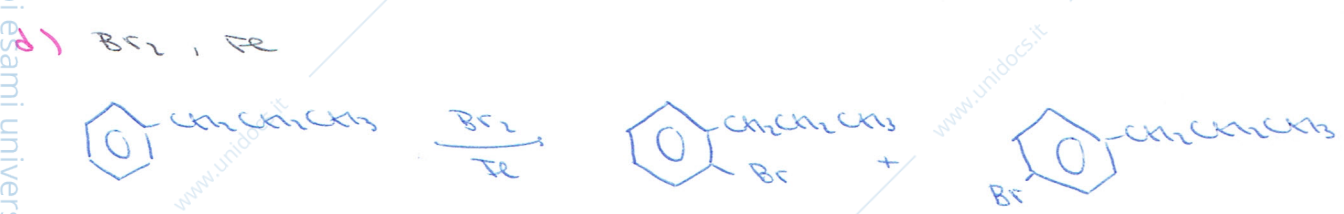
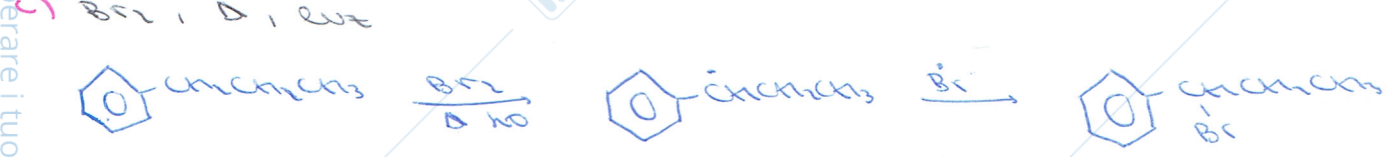
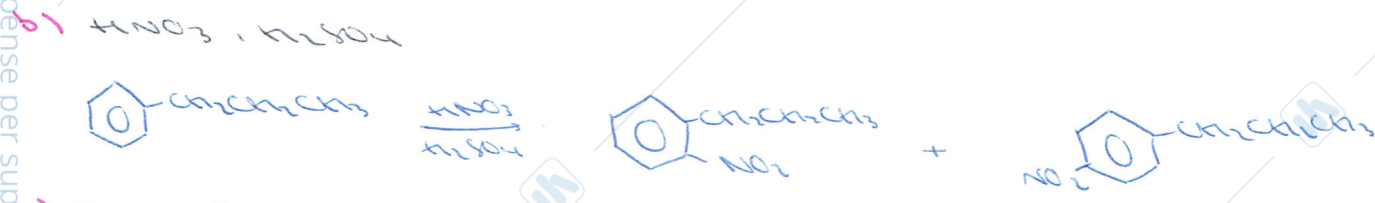
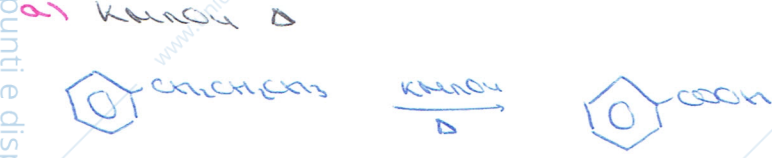
7) n-butylbenzene +  $KMnO_4$   $\Delta$



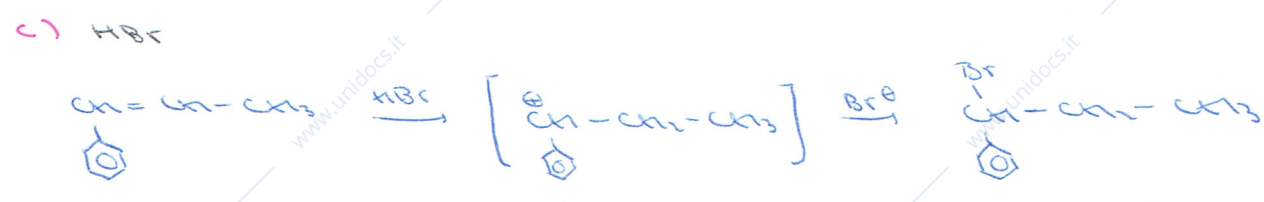
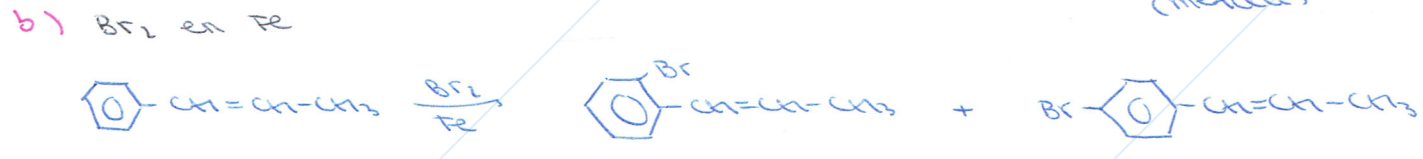
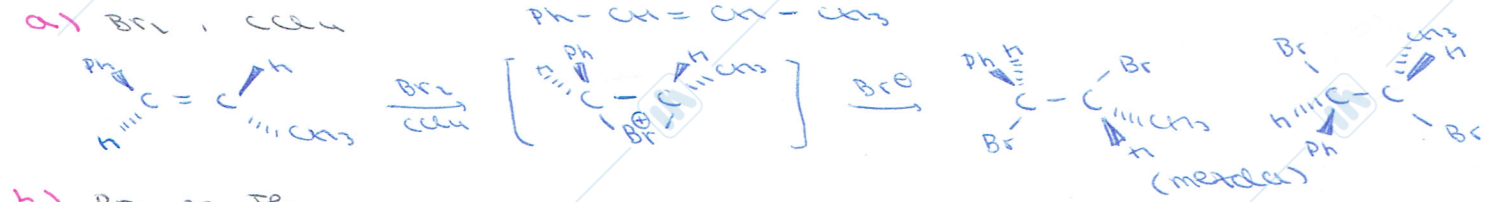
8. Completar



9. Productos de n-propilbenzene con:



10. Productos de trans-1-fenil-1-propeno con:

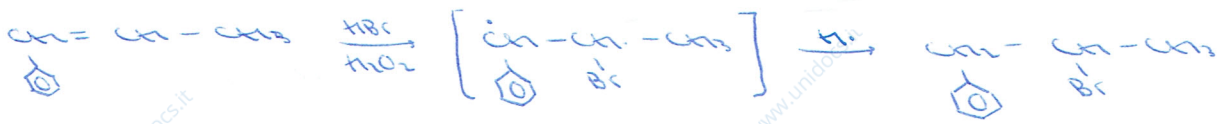


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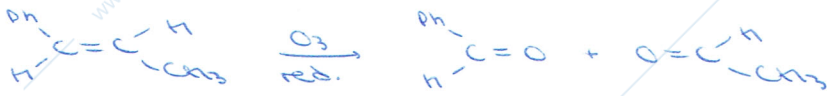
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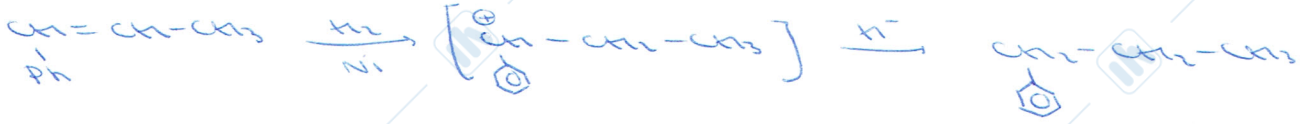
d)  $HBr + H_2O$



e)  $O_3$ , luego  $H_2O$  /  $H^+$



f)  $H_2$ ,  $Ni$



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