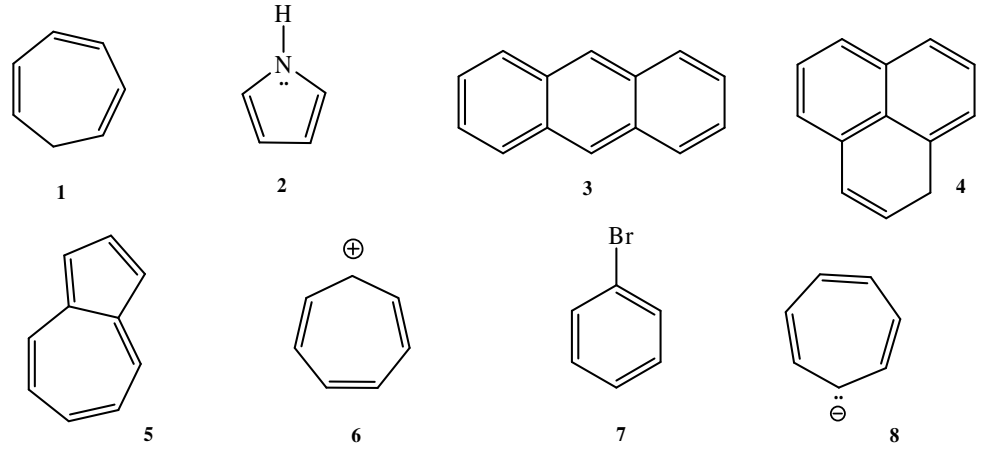
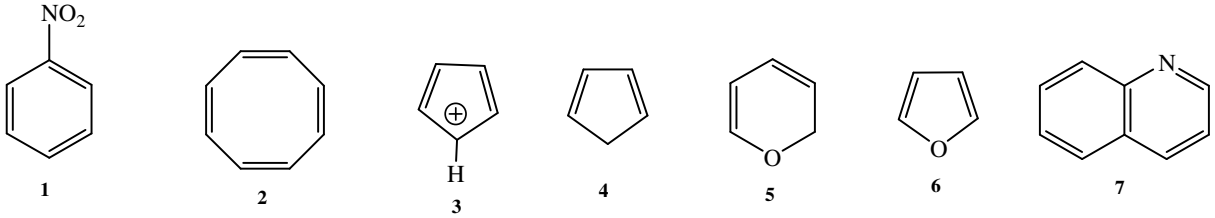
# Carbocycles aromatiques monocycliques

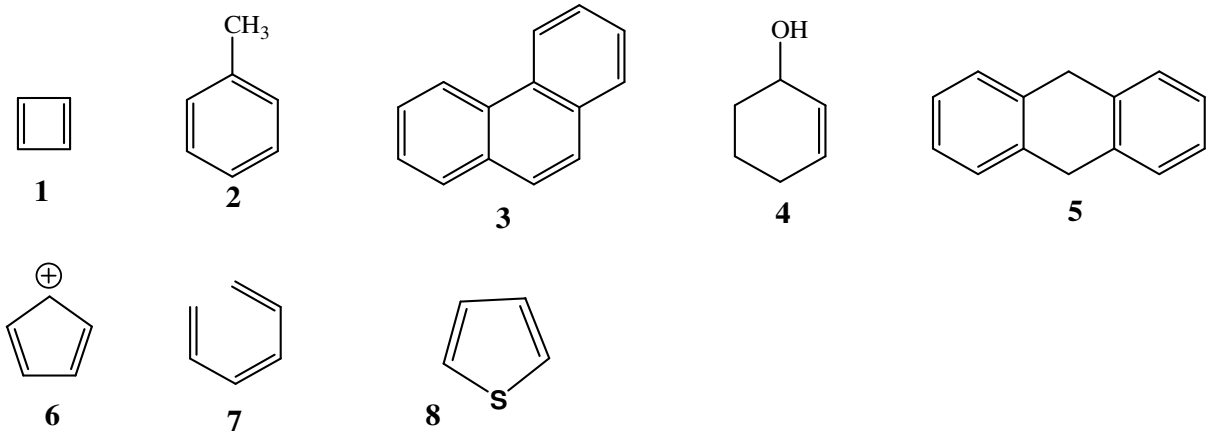
**Exercice 1.** Parmi les composés ou ions suivants, quels sont ceux qui possèdent un caractère aromatique. Justifier votre réponse.




**Exercice 2.** Parmi les composés suivants, quels sont ceux qui possèdent un caractère aromatique ?




**Exercice 3.** Parmi les composés suivants, quels sont ceux qui possèdent un caractère aromatique ?




**Exercice 4.** Soit un dérivé disubstitué du benzène. A combien d'isomères de position peut-on s'attendre ?

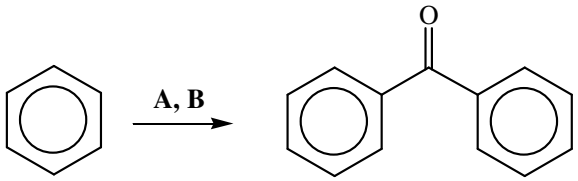
**Exercice 5.** Compléter les réactions suivantes :

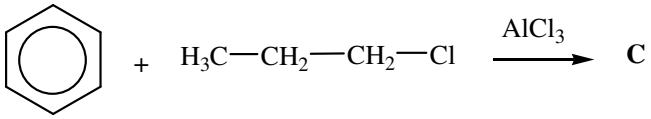
**a**). $C_6H_6 + CH_3\text{-}CH(CH_3)\text{-}CH_2Cl \xrightarrow{AlCl_3}$ **A** (majoritaire)

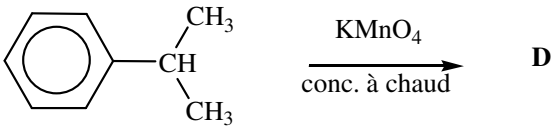
**b**). $C_6H_5Cl + CH_3\text{-}CH(CH_3)\text{-}CH_2Cl \xrightarrow{AlCl_3}$ **B** (majoritaire)

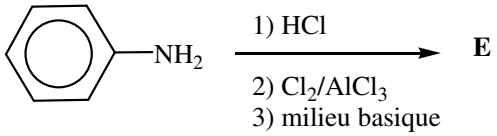
**c**). $C_6H_6 + CH_3COCl \xrightarrow{AlCl_3}$ **C** $\xrightarrow[SO_3]{H_2SO_4 \text{ conc.}}$ **D**

**Exercice 6.** Compléter les réactions suivantes en ne tenant compte que des produits majoritaires :

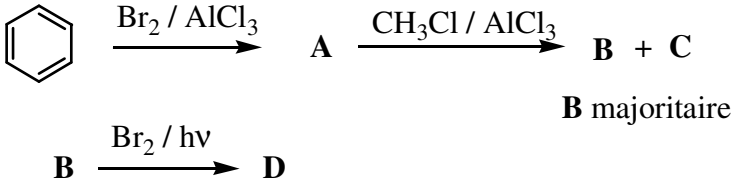
**a).** 


**b).** 


**c).** 


**d).** 


**Exercice 7.** Donner la structure des produits A, B, C et D:




**Exercice 8.** Soit la suite de réactions suivantes. Quelle est la structure de A, B et C. Quels sont les réactifs, et catalyseurs éventuels, utilisés lors de ces quatre étapes.

toluène ⟶ A ⟶ B ⟶ C ⟶ D (acide *ortho*-bromobenzoïque)

**Exercice 9.** Comment peut-on préparer de manière majoritaire les composés suivants à partir du benzène ou du toluène (méthylbenzène) ?

a) acide 3-chlorobenzoïque
b) 3-(1-méthyléthyl)benzonitrile
c) 1-(4-bromophényl)éthanone
d) acide 3-propylbenzène sulfonique

**Exercice 10.** Compléter les réactions suivantes:

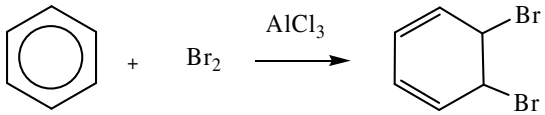
**1.** (1-méthyléthyl)benzène + (2-chloro-1,1-diphényléthyl)benzène $\xrightarrow{AlCl_3}$ Produit majoritaire

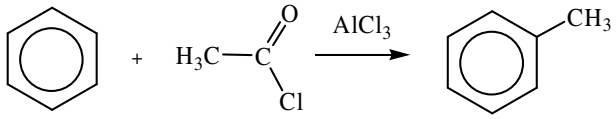
**2.** (1-méthylpropyl)benzène $\xrightarrow[\Delta]{KMnO_4 \text{ concentré}}$

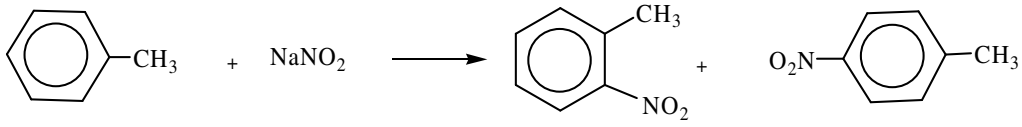
**3.** Acide benzène sulfonique + Chlorométhane $\xrightarrow{AlCl_3}$

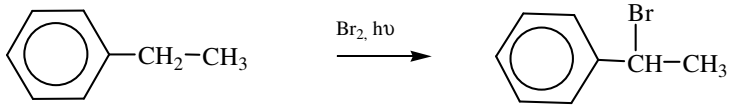
**4.** *o*-Chloronitrobenzène $\xrightarrow[\text{3) Fe/HCl}]{\text{1) } NaNH_2 \text{ dans } NH_3 \text{ liq.}; \text{ 2) } Br_2, AlCl_3}$ <br> 4) NaOH

**Exercice 11.** Indiquer si les réactions suivantes sont vraies. Justifier votre réponse.

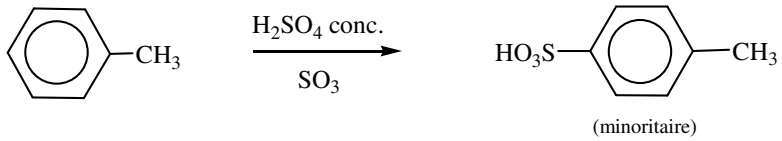
**a).** 


**b).** 

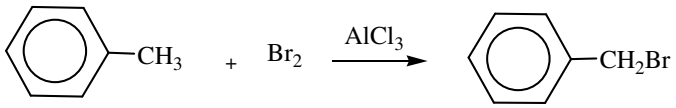

**c).** 

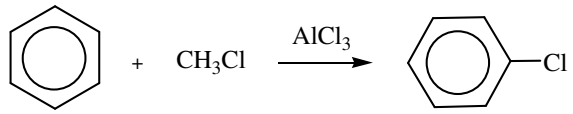

**d).** 

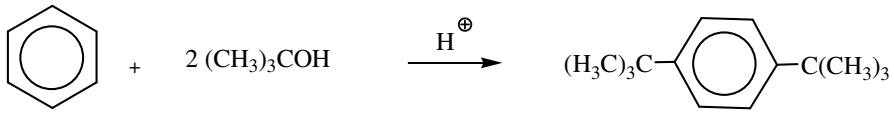
**Exercice 11. (suite)**

e). 

(minoritaire)

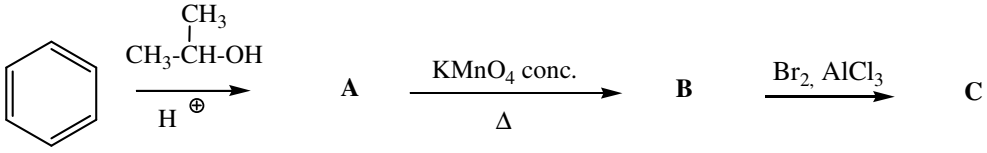
f). 

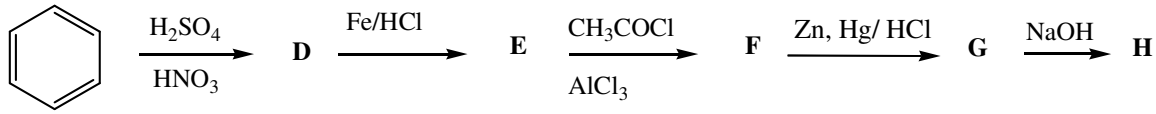

g). 

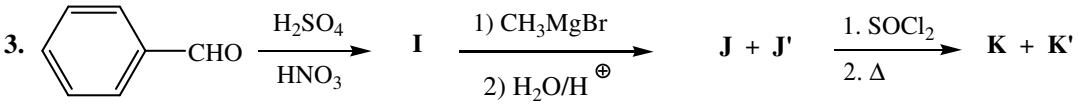

h). 

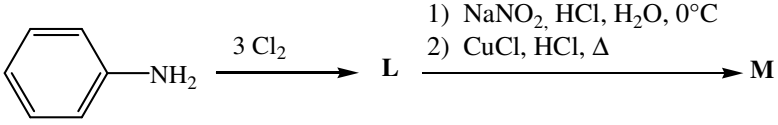
(majoritaire)

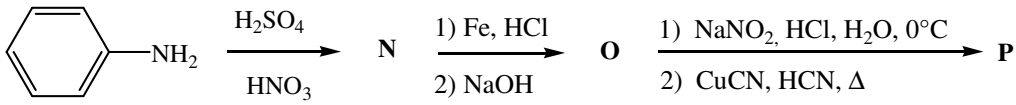
**Exercice 12.** Compléter les séquences réactionnelles suivantes (en ne tenant compte que des produits majoritaires) :

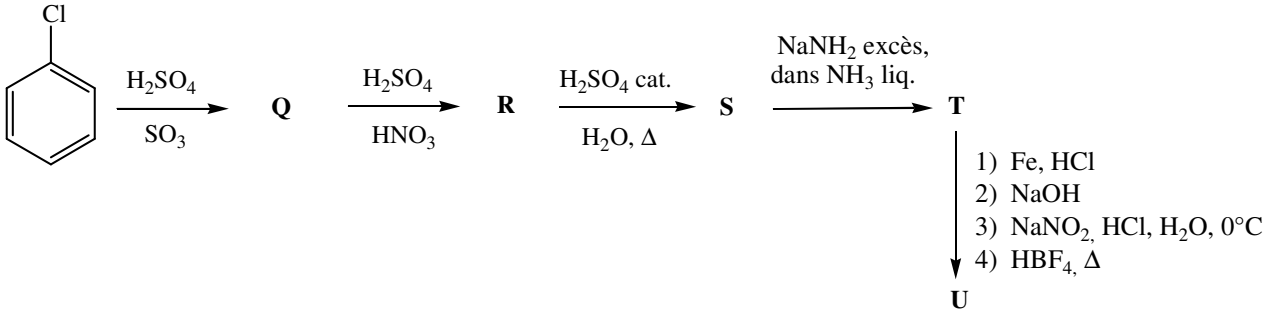
**1.** 


**2.** 


**3.** 


**4.** 


**5.** 

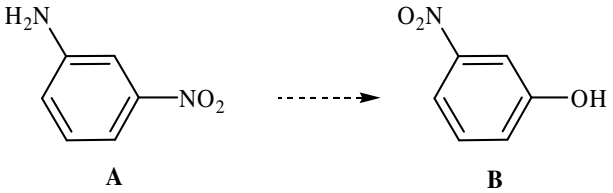

**6.** 

**Exercice 13.** Imaginer une synthèse efficace de l'acide 2-iodobenzoïque à partir du toluène.

**Exercice 14.** Ecrire les réactions de *p*-$CH_3$-$C_6H_4$-$N_2^+$ $Cl^-$ avec :

a) CuCl / Δ
b) NaI / Δ
c) $H_3PO_2$ / $H_2O$ / Δ

**Exercice 15.** Déterminer le procédé de synthèse, en plusieurs étapes, permettant de passer de **A** à **B** :




**A** **B**

**Exercice 16.** Expliquer pourquoi l'acide picrique (2,4,6-trinitrophénol) est plus acide que le phénol.

**Exercice 17.** Préparer les molécules **A** (acide 4-hydroxybenzènesulfonique) et **B** (*o*-nitrophénol*)* à partir du benzène.

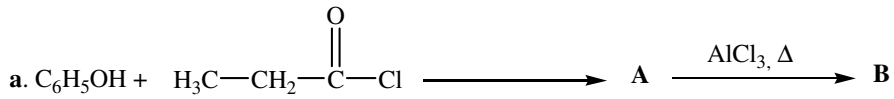
**Exercice 18.** Préparer l'acide 2-hydroxybenzoïque (acide salicylique) à partir des produits de la liste I et des réactifs de la liste II.

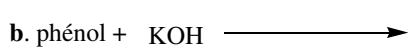
**Liste I :**
**A**. phénol **B**. chlorobenzène **C**. acide benzoïque
**D**. toluène **E**. acide benzènesulfonique
**Liste II :**
**a**. $CO_2$ sous pression à chaud, NaOH **b**. $H_2$, Pd/C **c**. $KMnO_4$
**d**. KOH 350° sous pression **e**. HCl

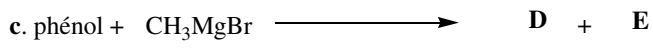
**Exercice 19.** Compléter les réactions suivantes :

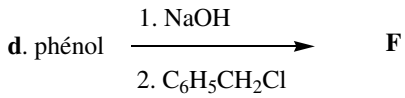
**a**. $CH_3$-$CH_2$-$CH_2$-OH + Na →
**b**. $CH_3$-$CH_2$-$CH_2$-OH + NaOH →
**c**. $C_6H_5$-OH + NaOH →

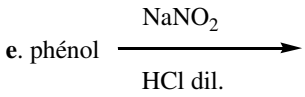
**Exercice 20.** Compléter les réactions suivantes, en ne tenant compte que des produits majoritairement formés :

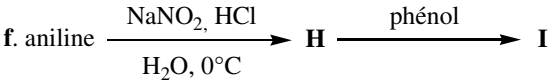


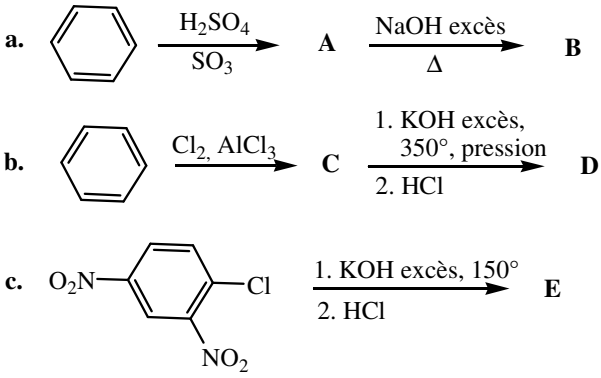



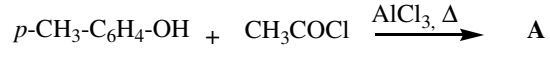



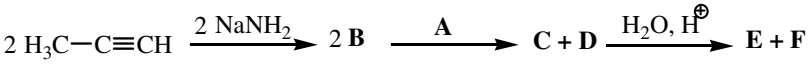




**Exercice 21.** Compléter les réactions suivantes :



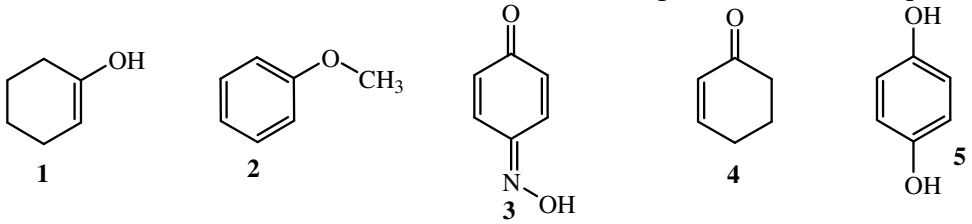

**Exercice 22.** Compléter les réactions suivantes :




Préciser la configuration des composés **E** et **F**.

**Exercice 23.** Ecrire les formes tautomères des composés suivants lorsqu'elles existent.



# Corrections

## Exercices :

**Exercice 1.**

**1.** non, pas entièrement conjuguée **2.** oui **3.** oui **4.** non, pas conjuguée **5.** oui **6.** oui **7.** oui **8.** non, 8 $e^-$

**Exercice 2.**

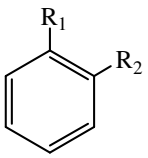
**1.** oui **2.** non, 8 $e^-$ **3.** non, 4 $e^-$ **4.** non, pas entièrement conjugué, 4 $e^-$ **5.** non, pas entièrement conjugué **6.** oui **7.** oui

**Exercice 3.**

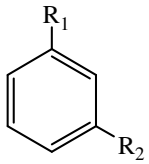
**1.** non, 4 $e^-$ **2.** oui **3.** oui **4.** non, pas conjugué **5.** non, pas entièrement conjugué, 12 $e^-$ **6.** non **7.** non **8.** oui

**Exercice 4.**

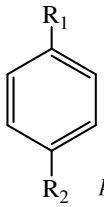
3 isomères :




*ortho*

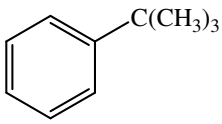



*méta*



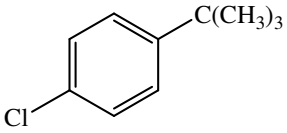

*para*

**Exercice 5.**



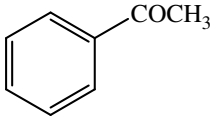

**A**

majoritaire

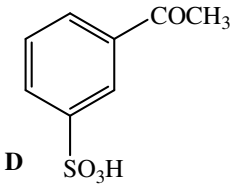



**B**

majoritaire

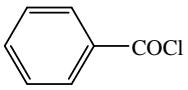



**C**




**D**

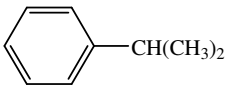
**Exercice 6.**



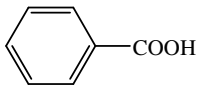

**A**

$AlCl_3$

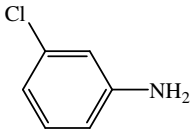
**B**




**C**

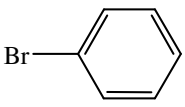



**D**

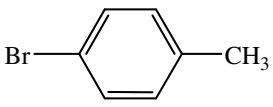



**E**

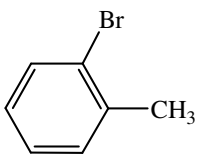
**Exercice 7.**



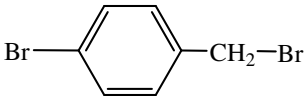

**A**




**B**

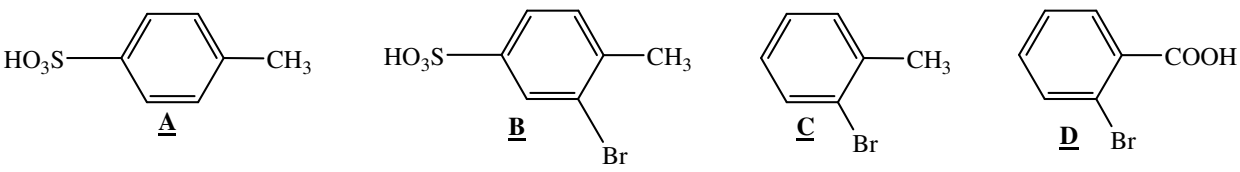



**C**

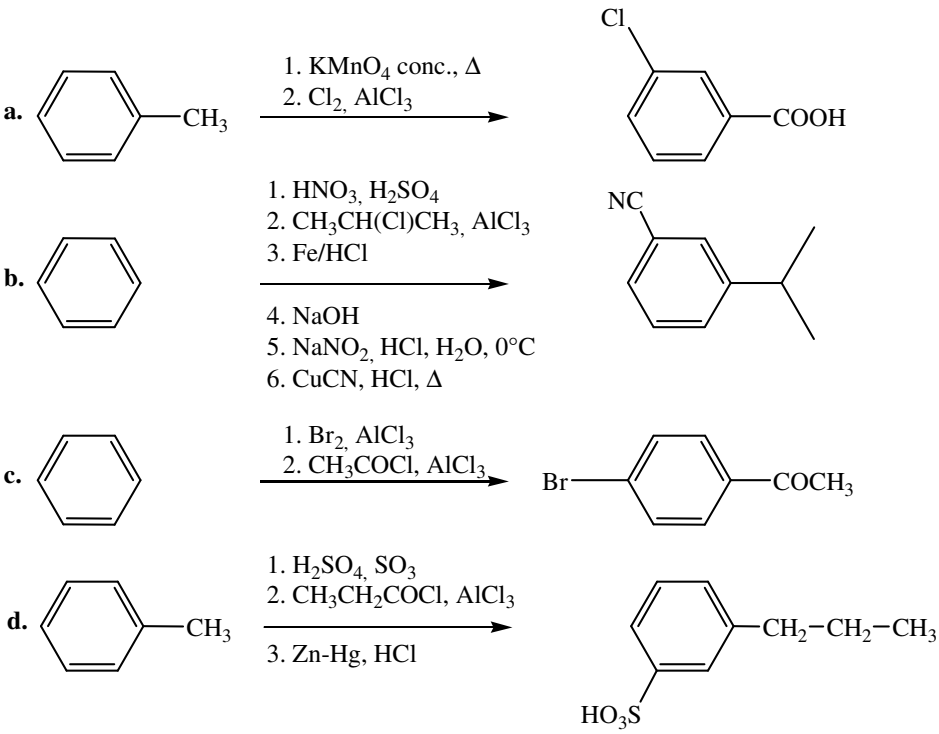



**D**

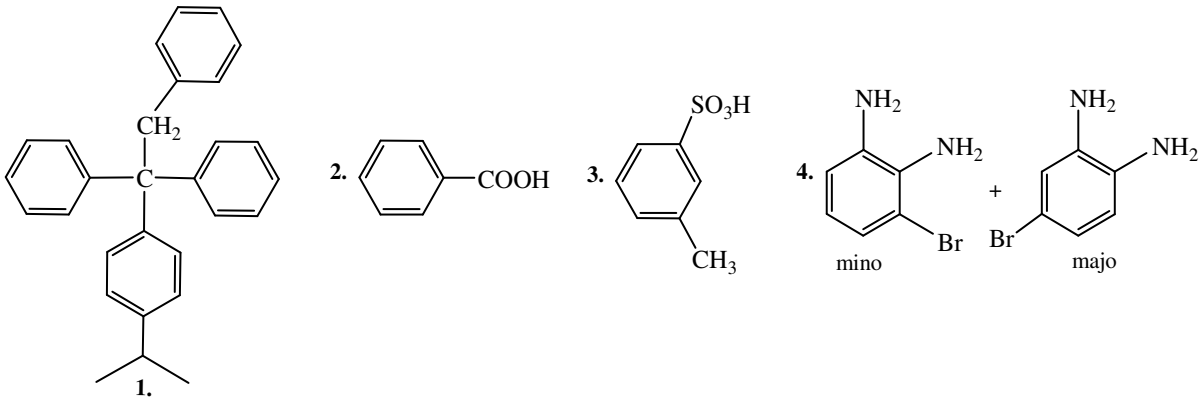
**Exercice 8.**




**Exercice 9.**

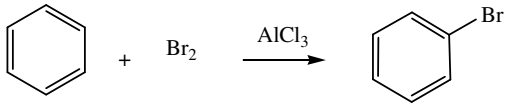



**Exercice 10.**

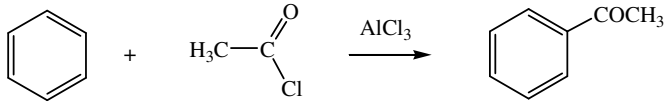


## Exercice 11.

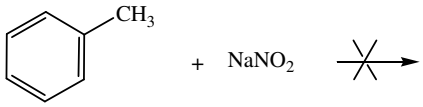
**a).** faux




**b).** faux

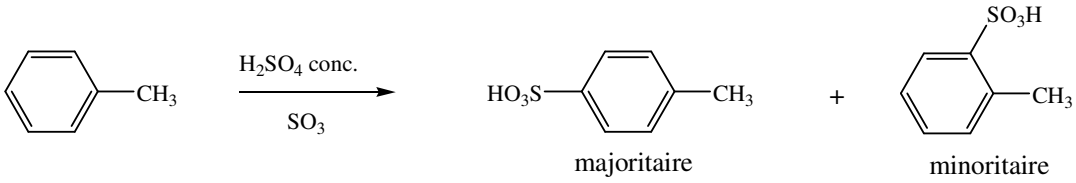



**c).** faux

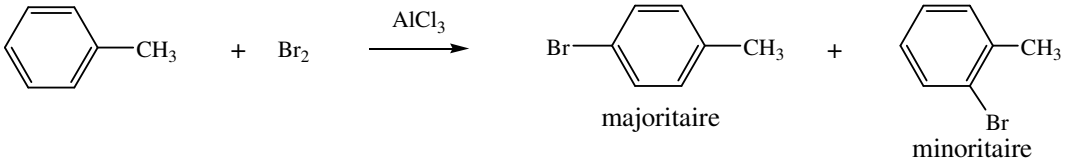



**d).** vrai

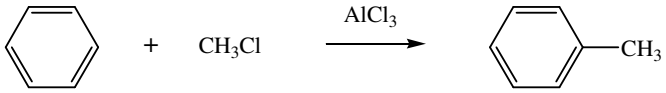
**e).** faux




**f).** faux



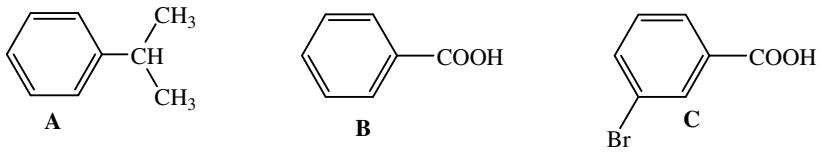

**g).** faux



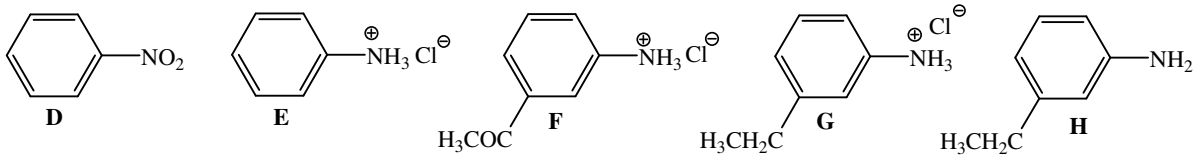

**h).** vrai

## Exercice 12.

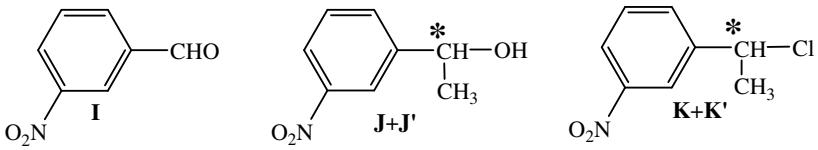
**1.**



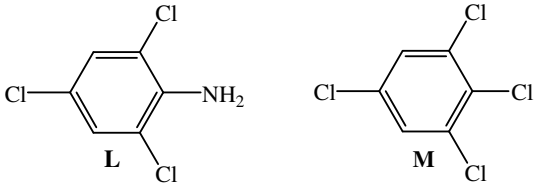

**2.**



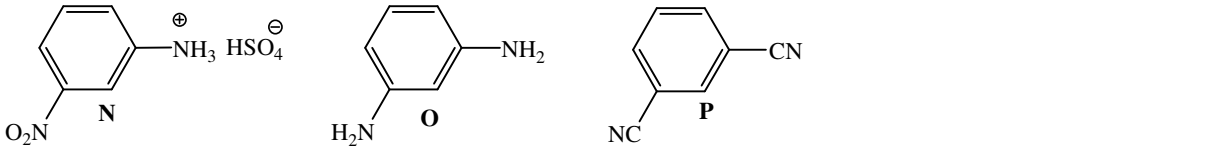

**3.**

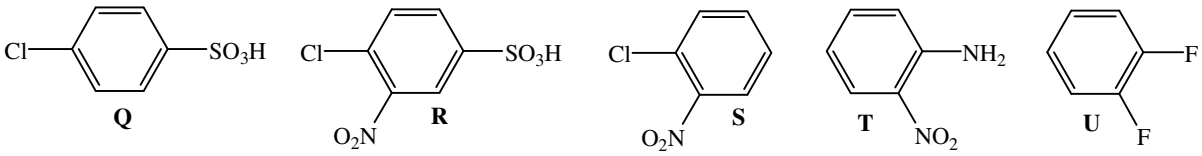



**4.**

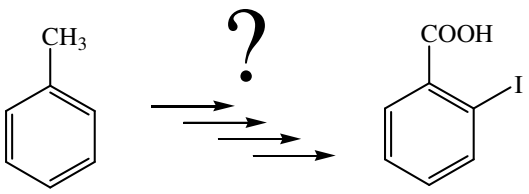


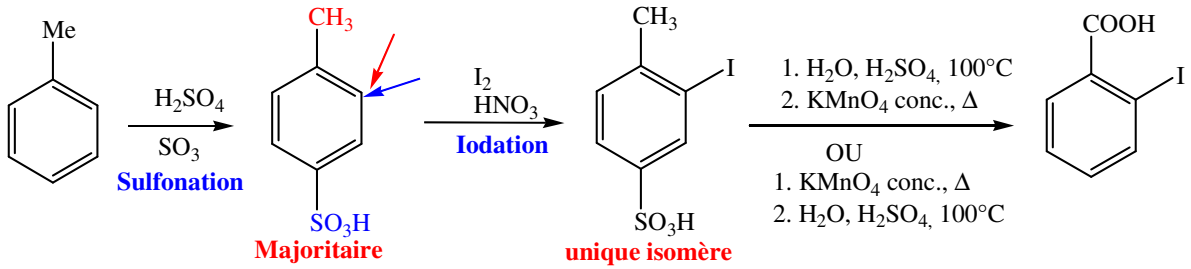
## Exercice 12. (suite)

5. 

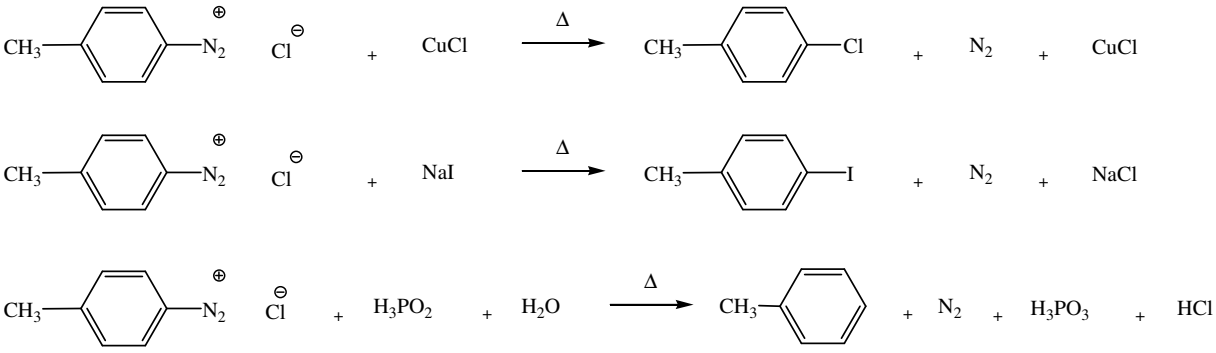

6. 


## Exercice 13.

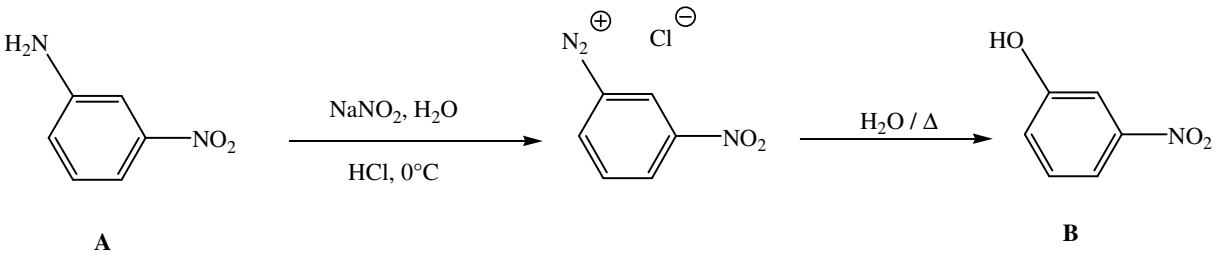



## Exercice 14.




## Exercice 15.

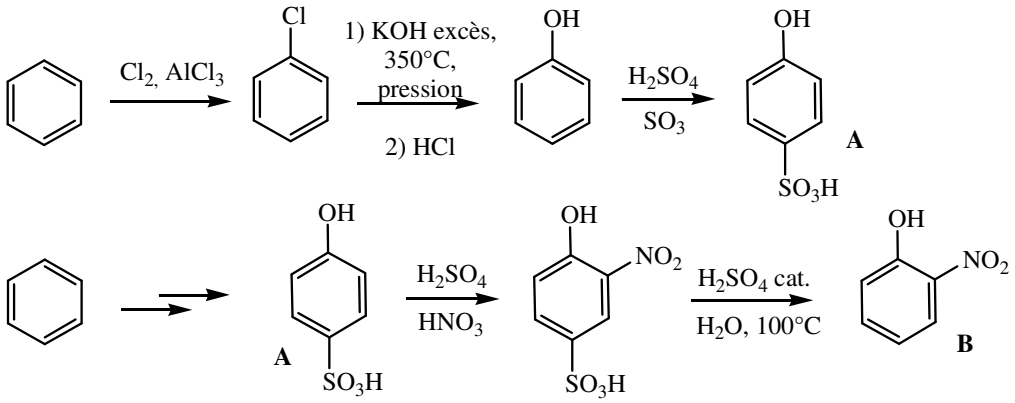



**A** **B**

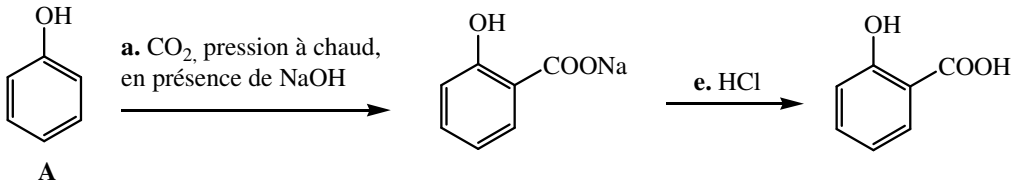
**Exercice 16.**

Effet (–I, –M) des groupements nitro.

**Exercice 17.**




**Exercice 18.**

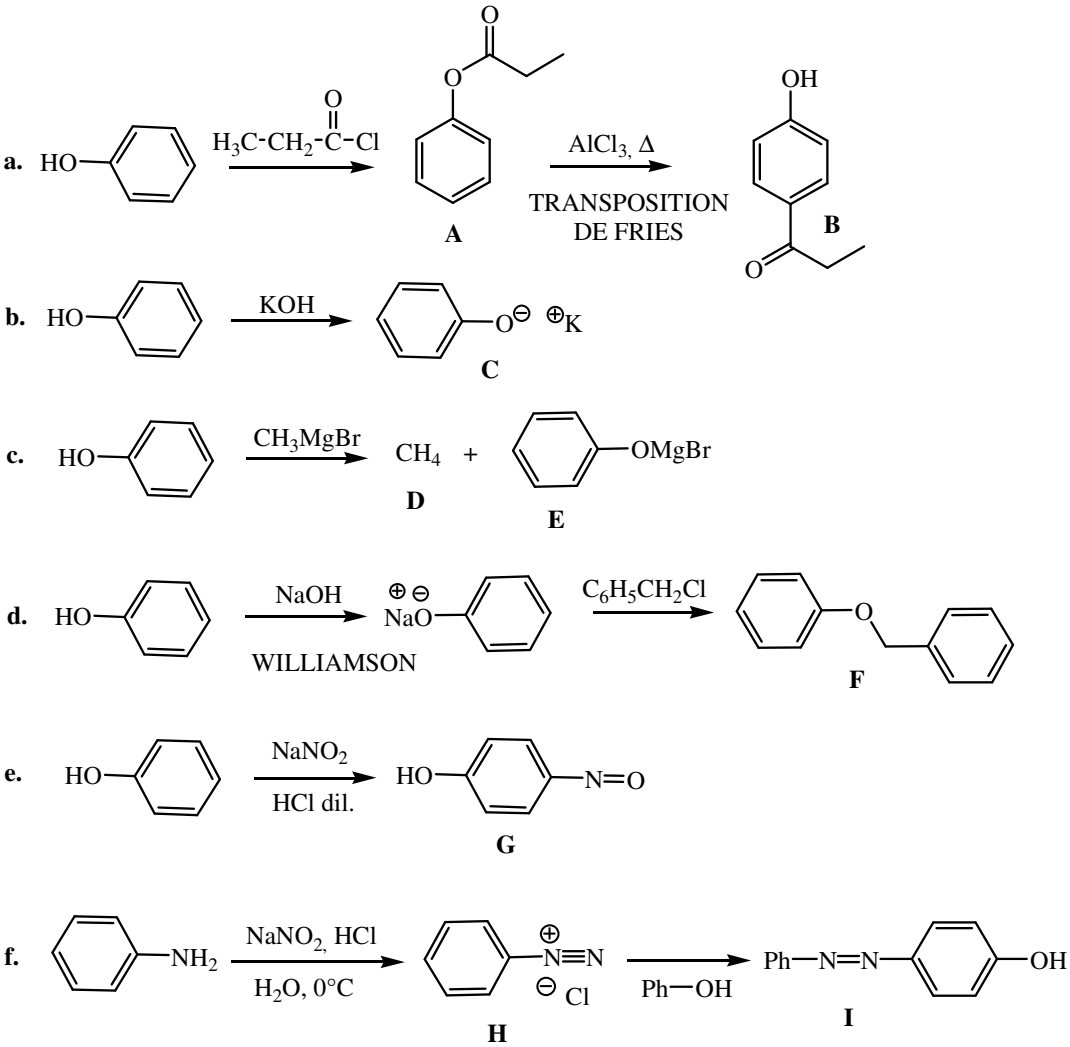



SYNTHESE DE KOLBE

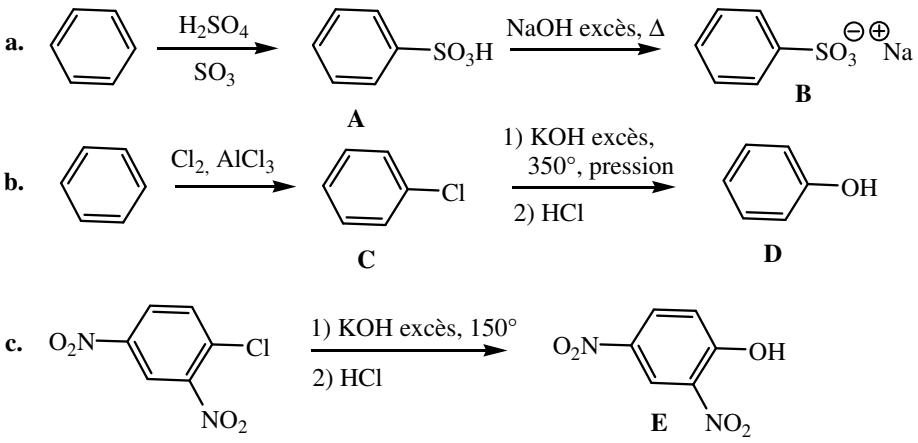
**Exercice 19.**

**a**. $CH_3$-$CH_2$-$CH_2$-$O^{-}{}^{+}Na$ + ½ $H_2$
**b**. rien
**c**. $C_6H_5O^{-}{}^{+}Na$ + $H_2O$

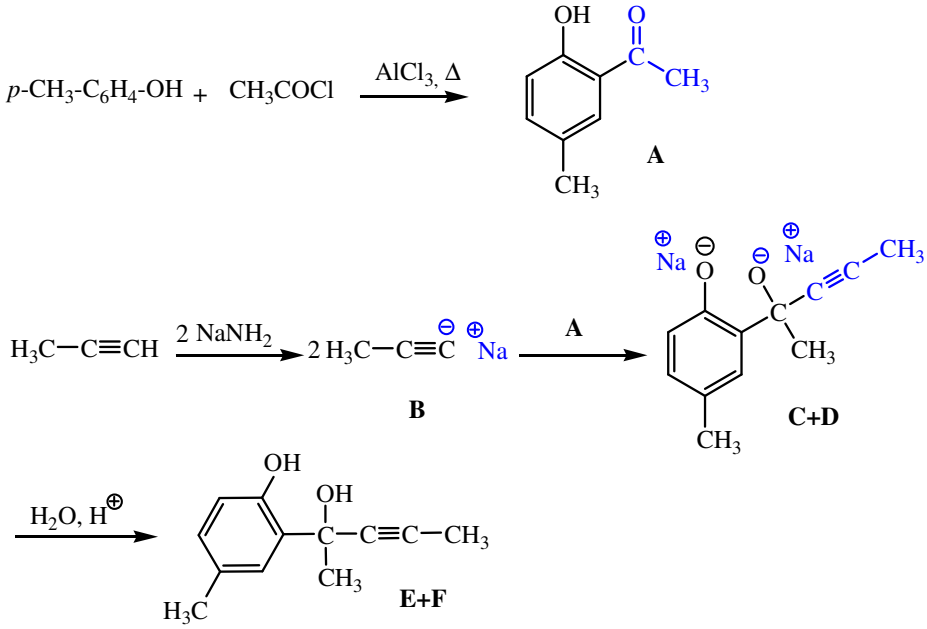
**Exercice 20.**




**Exercice 21.**



## Exercice 22.




Racémique, R + S

## Exercice 23.