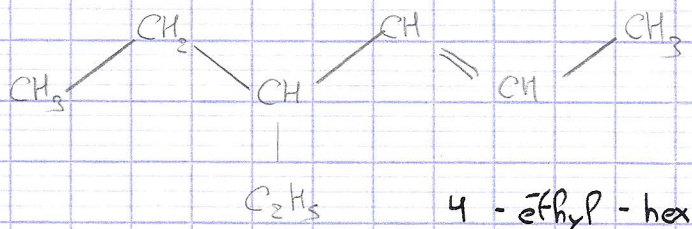
Correction
TD - chimie
orga

Chimie organique

I - Nomenclature

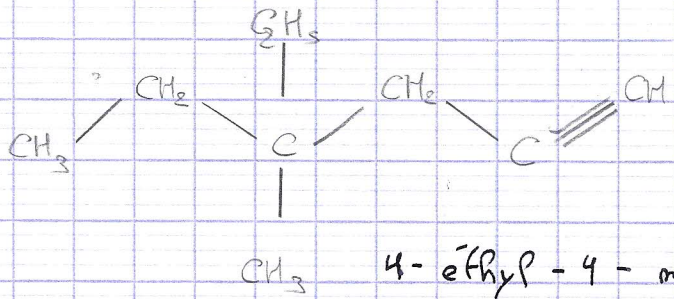
Exercice 1

1)



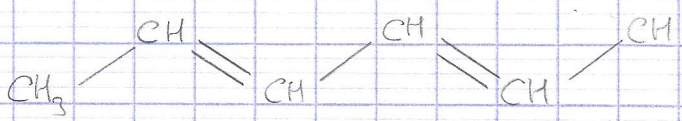
4 - éthyl - hex - 2 - ène

2)



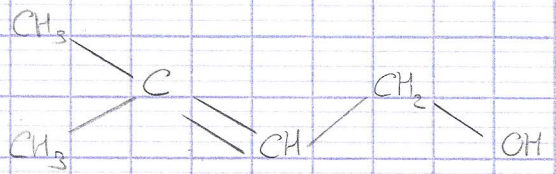
4 - éthyl - 4 - méthyl - 1 - yne

3)



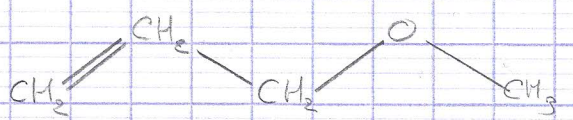
hexa - 2, 4 - diène

4)



3 - méthy - but - 2 - énol

5)

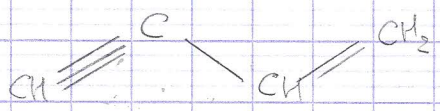


4 - oxapent - 1 - ène

3 - méthyl - but - 2 - énol

3 - methoxy prop - 1 - ène

6)

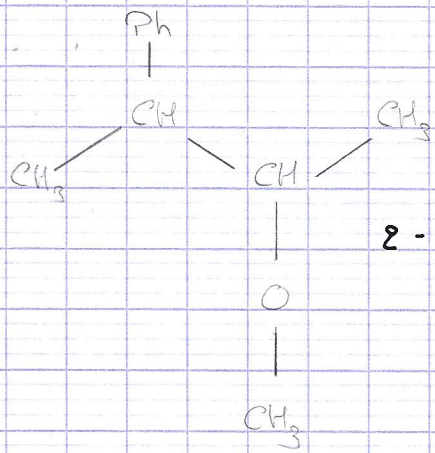


4 - oxapentène

~~3 - méthoxy propène~~

butène - 3 - yne

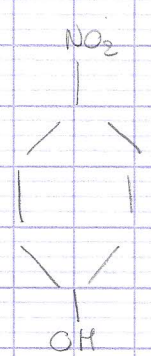
7)



~~butène - 3 - yne~~

2 - méthoxy - 3 - phénylé - butène

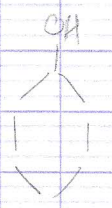
8)



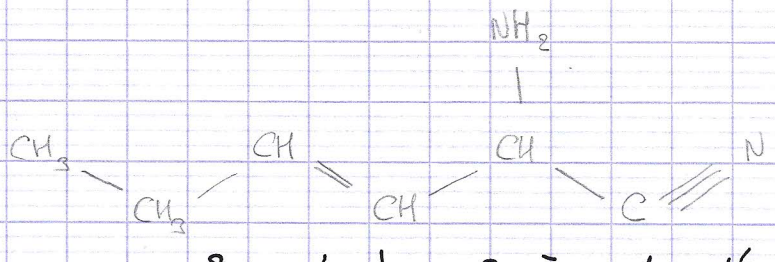
4 - nitro phénol

p - nitrophénol

phénol

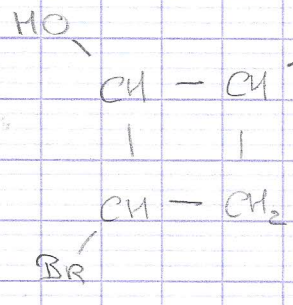


9)



2 - aminohex - 3 - ène - 1 - nitrile.

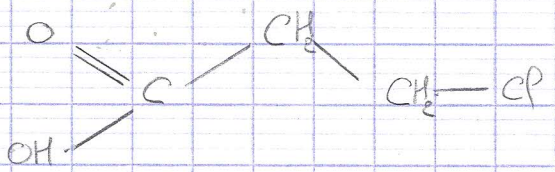
10)

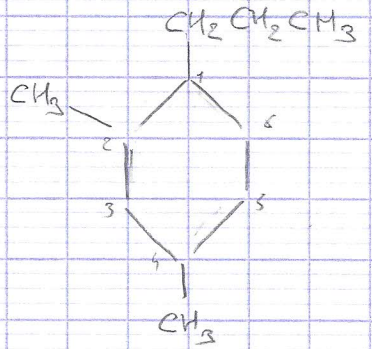


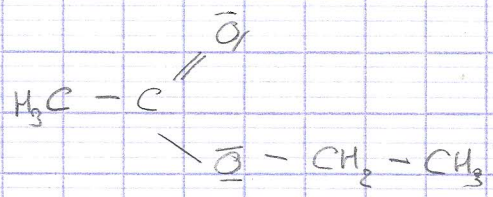
3 - Bromo - 2 - hydroxycyclobutane carbaldéhyde.

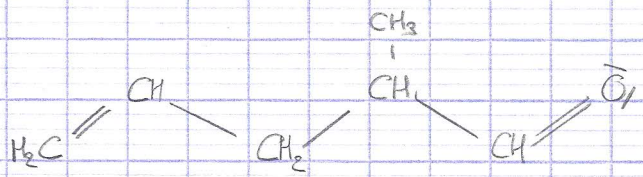
Correction Exercice 2

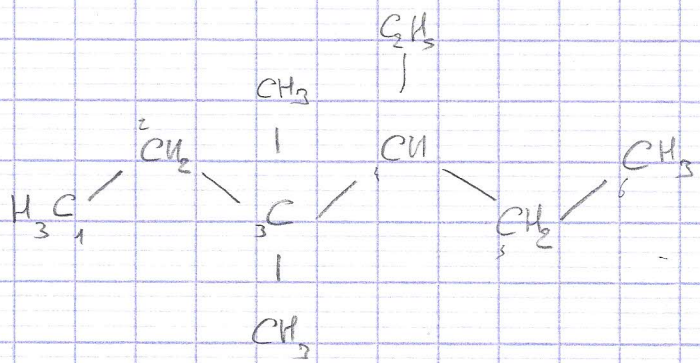
orga

1) 

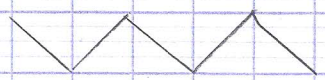
2) 

3) 

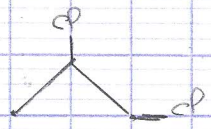
4) 

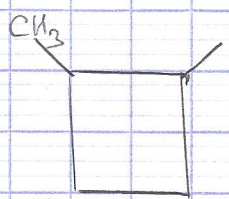
5) 

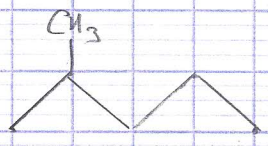
Exercice 3

1)  hexane

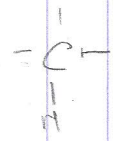
2)  3 - méthyl - pentane

3)  1, 2 - dichloropropane

4)  1, 2 - diméthylcyclobutane

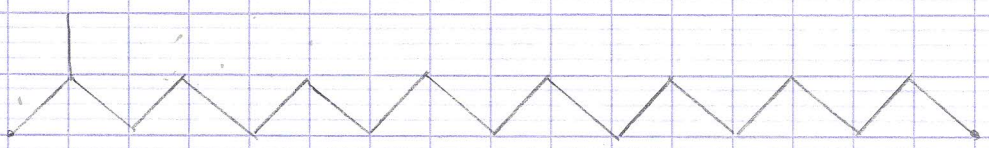
5)  2 - méthyl - propane

amine



C : 12
N : 14
O : 16
H : 1

Exercice 4

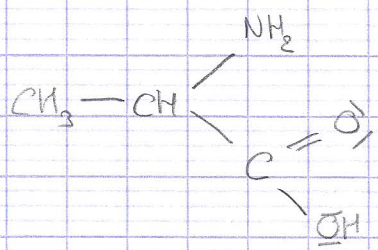


II- Formule brut et degré d'insaturation

Exercice 1

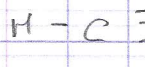
C : 36 g
H : 7 g
O : 32 g
N : 14 g

$C_3H_7O_2N$



Exercice 2

Degré d'insaturation (DI) : soit un cycle soit une liaison pi.



DI = 2

Pour $C_\alpha H_\beta$

On prend l'alcane correspondant : $C_N H_{2N+2}$

$$DI = \frac{2N+2-\beta}{2}$$

Correction TD orga.

Si des atomes autre que ~~C_3H_6~~ C, H: on les remplace par leur équivalence en hydrogène.

$O = CH_2$

$N = CH$

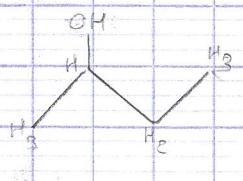
$Cl = CH_3 = H$

Exercice 2

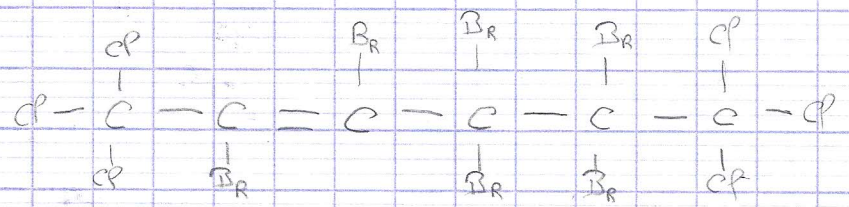
→ = passage alcane correspondant

1) $C_5H_6 \rightarrow C_5H_{12}$ $\quad DI = \frac{12-6}{2} = 3$

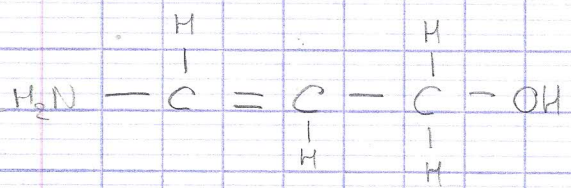
2) $C_5H_{10}O \rightleftharpoons C_5H_{12} \rightarrow C_5H_{12}$ $\quad DI = \frac{12-12}{2} = 0$



3) $C_6Cl_6Br_6 \rightleftharpoons C_6H_{12} \rightarrow C_6H_{14}$ $\quad DI = \frac{14-12}{2} = 1$



4) $C_3H_7NO \rightleftharpoons C_5H_{10} \rightarrow C_5H_{12}$ $\quad DI = \frac{12-10}{2} = 1$



5) $C_3H_3S \rightleftharpoons C_4H_9 \rightarrow C_4H_{10}$ $\quad DI = \frac{10-9}{2} = 1/2$

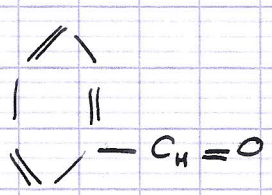
Exercice 3

C_7H_6O

$O \Rightarrow CH_2$

$C_8H_8 \rightarrow C_8H_{18}$

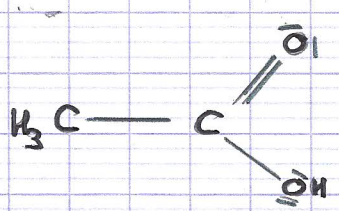
$DI = 5$



III - Stéréoisomérie : conformation

Exercice 1

Acide Acétique :

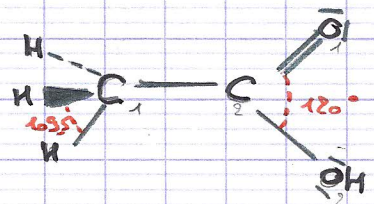


$C_1 = sp^3$

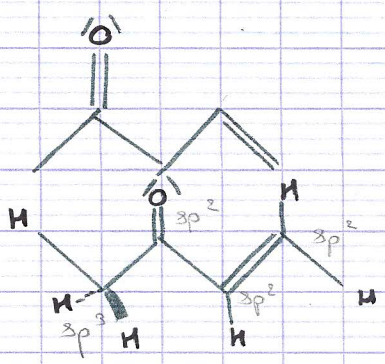
$C_2 = sp^2$

$O_1 = sp^2$

$O_2 = sp^3$

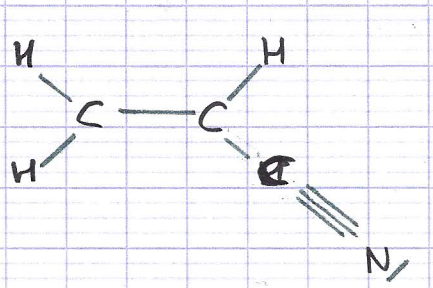


But - 3 - ène - 2 - one

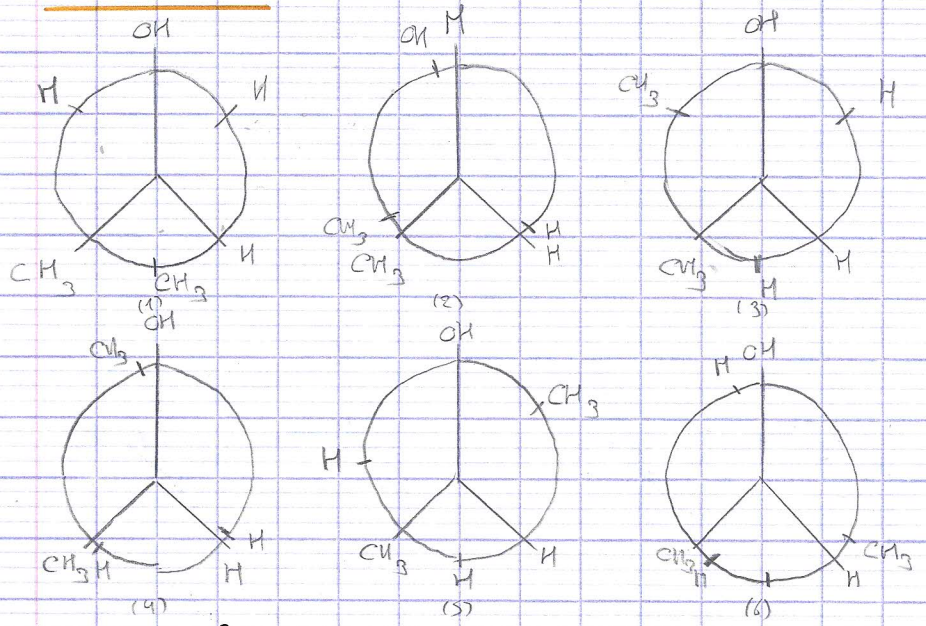


Acrylonitrile

$H_2C = CH - C \equiv N$



Exercice 2



Décalées

OH - H = 0,4

H - H = 0

CH_3 - H = 1,2

CH_3 - OH = 2,5

CH_3 - CH_3 = 4,2

(1) 7,4 KJ. mol^{-1}

(2) 30,1 Kj. mol^{-1}

(3) 8,3 Kj. mol^{-1}

(4) 25,1 Kj. mol^{-1}

(5) 6,5 Kj. mol^{-1}

(6) 17,6 Kj. mol^{-1}

Eclipsées

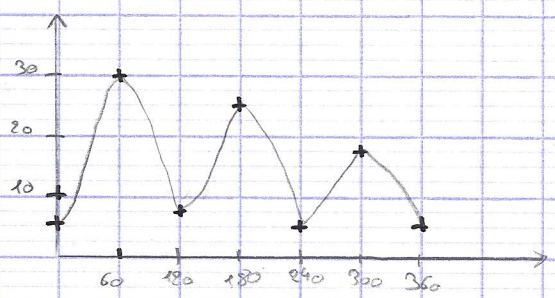
CH_3 - CH_3 = 20,9

CH_3 - OH = 14,6

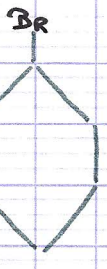
CH_3 - H = 6,3

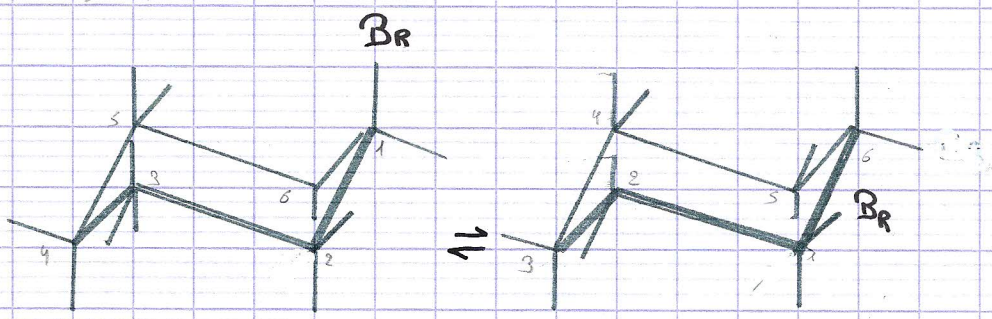
OH - H = 5,0

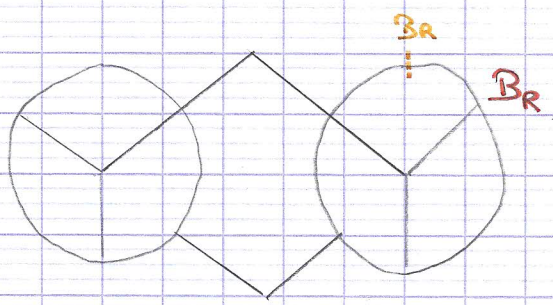
H - H = 4,2



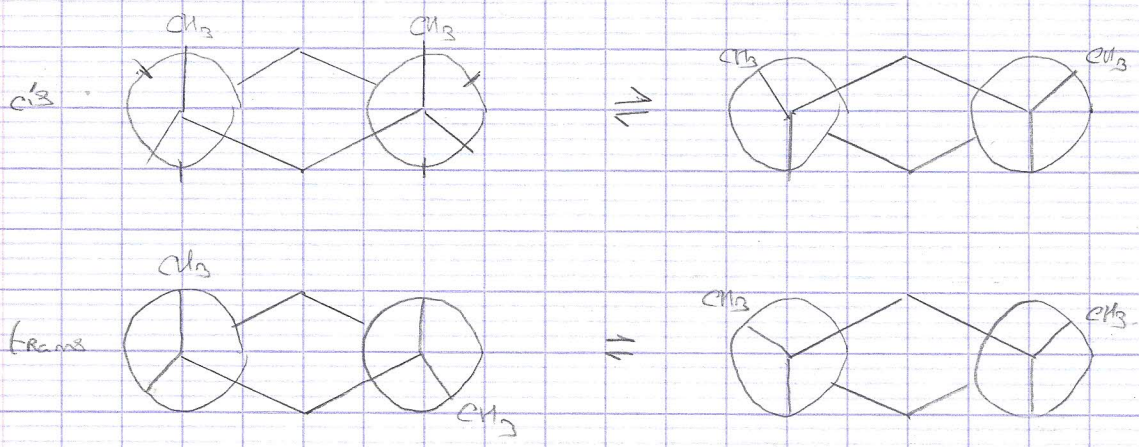
Exercice 3





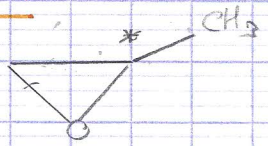


Exercice 4

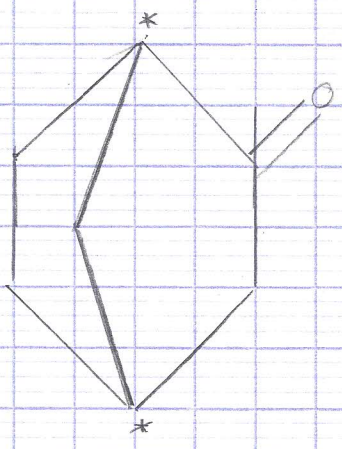


IV - Configuration Énantiomérie

Exercice 1

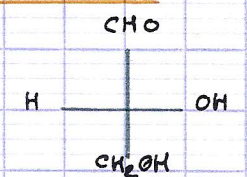
(a) 

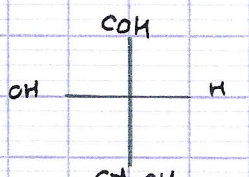
(b) 

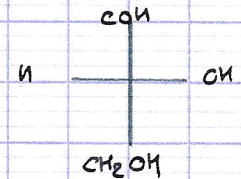
(c) 

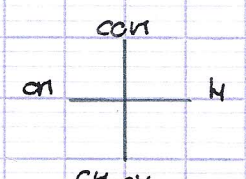
(d) 1, 6a, 5a, 3a

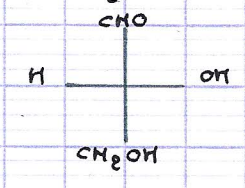
Exercice 3

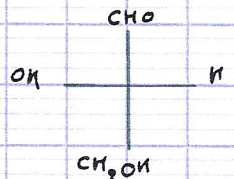
(a) 

(b) 

(c) 

(d) 

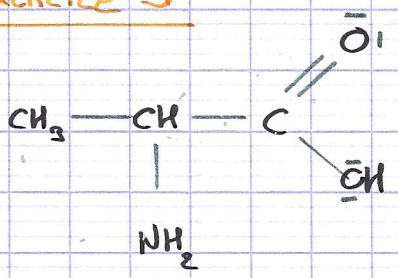
(e) 

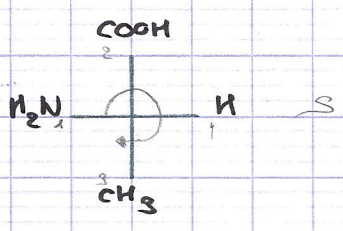
(g) 

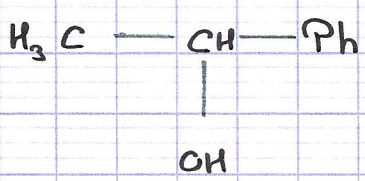
(a) ⇔ (c) ⇔ (e) } énantiomères

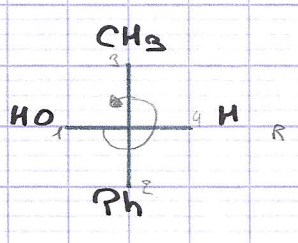
(b) ⇔ (d) ⇔ (g)

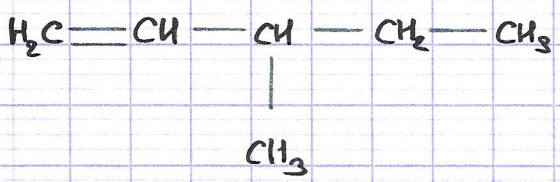
Exercice 3

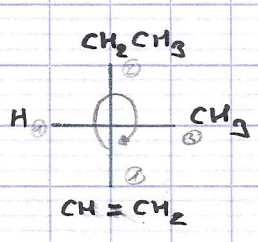






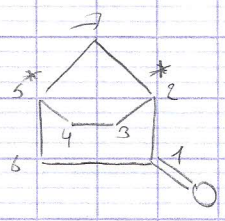


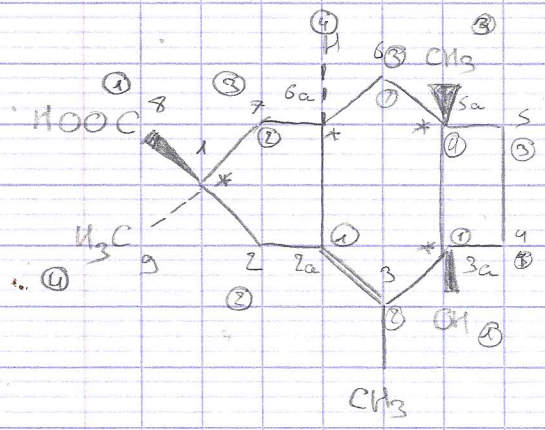


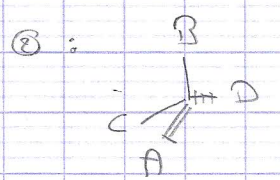


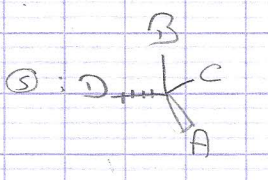
IV - Configuration absolue

Exercice 4









① : S

6a : R

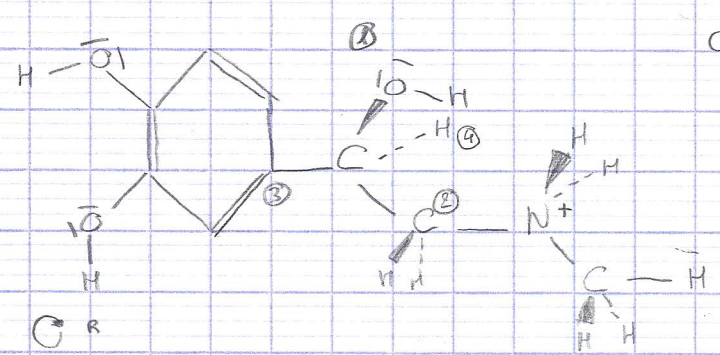
5a : S

3a : R

Exercice 5

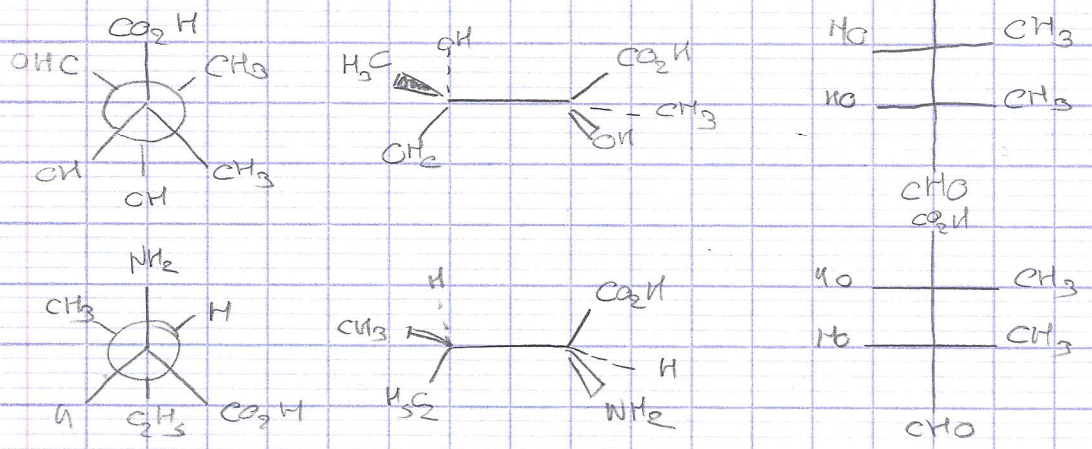
$$[\alpha]_D = \frac{\alpha}{\ell . C} = +62^\circ$$

Exercice 6

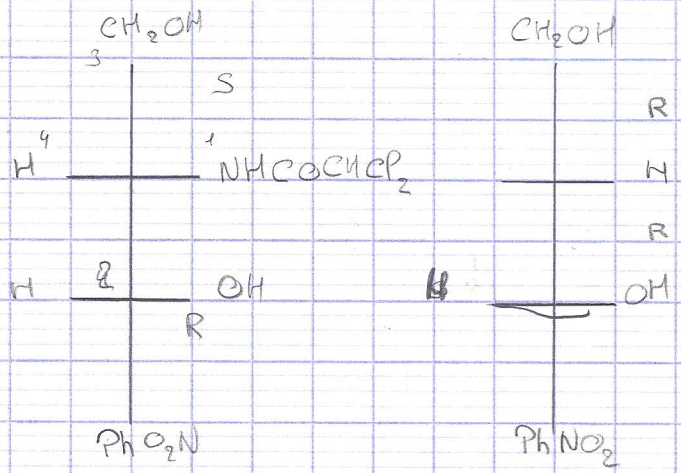


V - Diastéréoisomérie

Ex 1

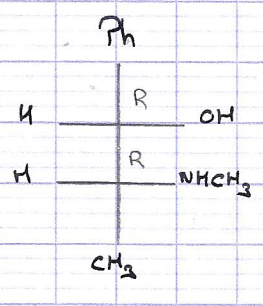


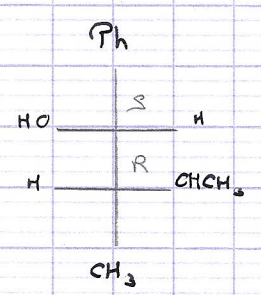
Exercice 3

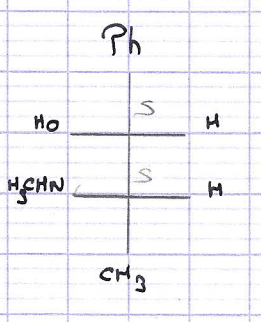


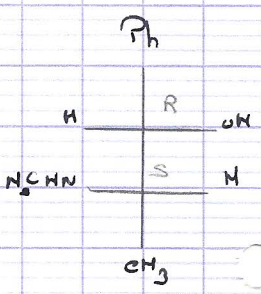
Exercice 4

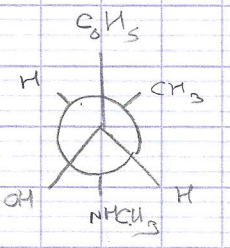
$CH_3 - CH(NHCH_3) - CHOH - Ph$



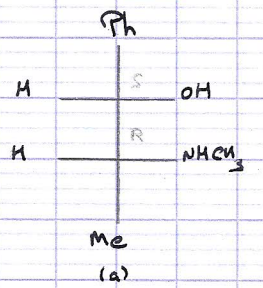


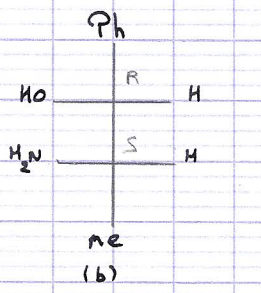


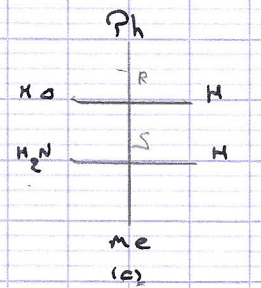


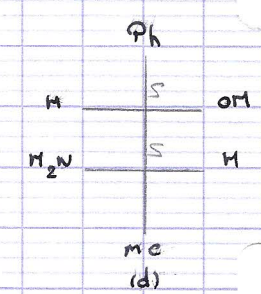


Exercice 5









(a) et (b) énantiomères

(b) et (c) identiques

(a) et (c) énantiomères

(a), (b), (c), (d) diastéréoisomères

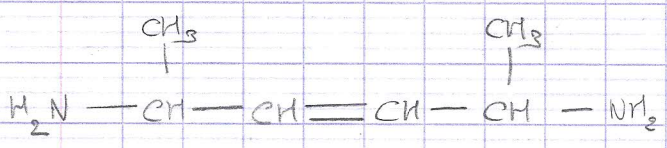
Exercice 6

(a) E

(b) Z

(c) E

(d) Z



Exercice 7

(a) 4

(b) 3 (forme méso)

(c) 4

(d) 8

B R Z

B R E

S S Z

S S E

R R Z

R R E

R S Z

R S E

Alcanes : Substitution radicalaire

Exercice 1

$\frac{1}{2} + \frac{1}{3} + \frac{1}{6}$

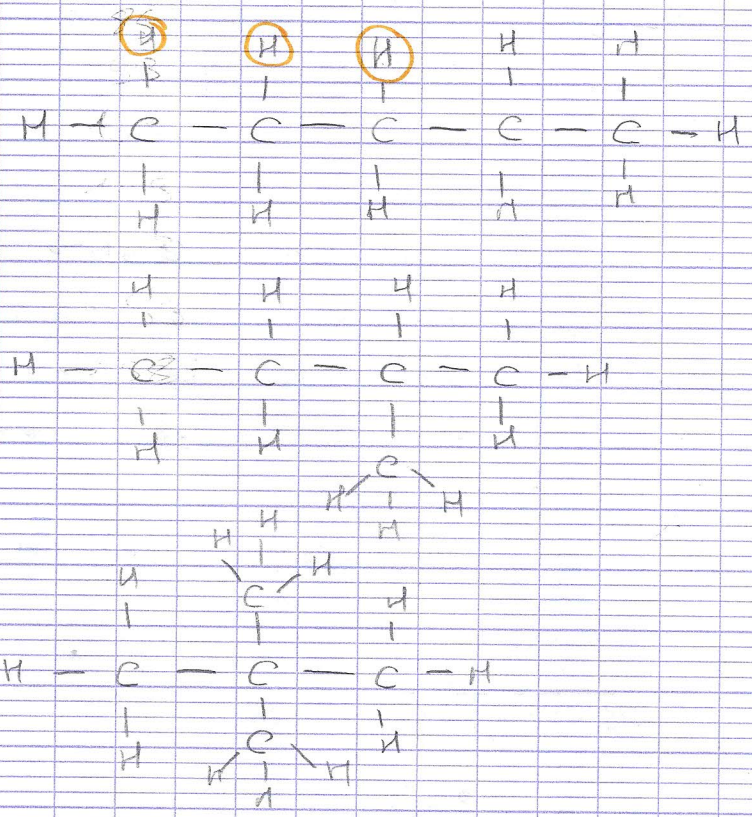
$\frac{3+2}{6}$

A → 3 monochloropentanes

B → 1 monochloropentane

C → 4 monochloropentanes

Pentane C_5H_{12}

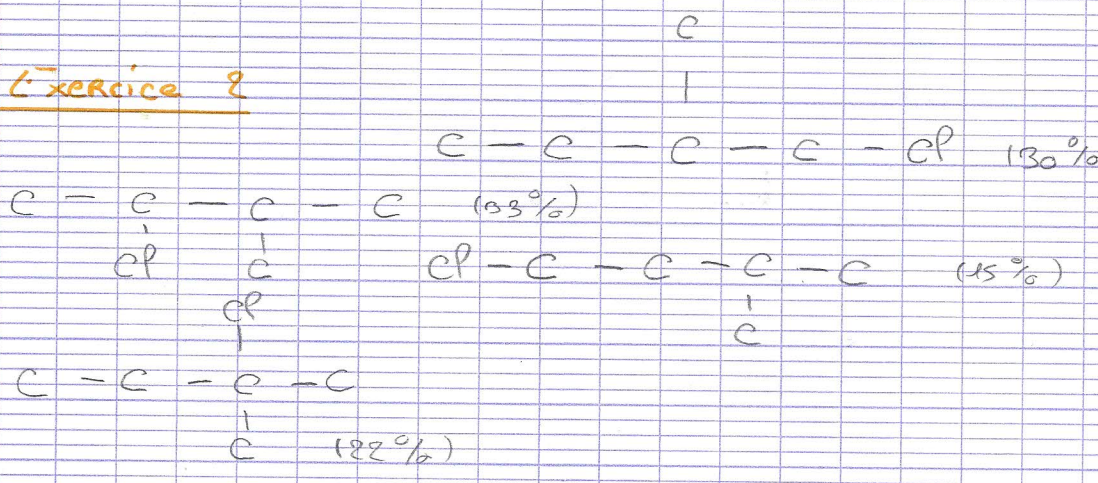


(A)

(C)

(B)

Exercice 2



15 + 6,4 + 4,6
24 26

Initiation $Cl_2 \xrightarrow[\Delta T]{h\nu} Cl^\bullet + Cl^\bullet$

Propagation

$R - CH_3 + Cl^\bullet \rightarrow R - \dot{C}H_2 + HCl$

$R - \dot{C}H_2 + Cl - Cl \rightarrow R - CH_2Cl + Cl^\bullet$

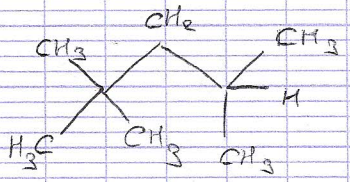
Terminaison :

$Cl^\bullet + Cl^\bullet \rightarrow Cl_2$

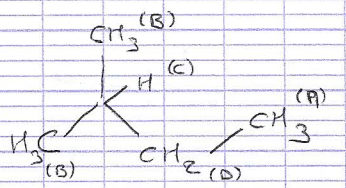
$CH_3^\bullet + CH_3^\bullet \rightarrow C_2H_6$

$Cl^\bullet + CH_3^\bullet \rightarrow CH_3Cl$

(*)



On regarde si les H sont primaires - secondaires - tertiaires



			normalisé
25% A	3/12	(25%)	→ 0,6 → 1
50% B	6/12	(50%)	→ 0,6 → 1
8% C	1/12	(8%)	→ 2,75 → 4,6
17% D	2/12	(17%)	→ 0,6 → 1,9 → 3,2

Pour trouver les pourcentages de (*)

Pour C : $\frac{4,6}{15 + 2 \times 3,2 + 4,6} = \frac{4,6}{26} = 17\%$

Pour A : $\frac{6}{26} = 23\%$

Pour B : $3,2 \times \frac{2}{26} = 24,6\%$

Pour D : $\frac{9}{26} = 34,6\%$

Exercice 3

a) $CH_4 + F_2 \rightarrow CH_3F + HF$ $\quad \Delta H = -400$ kJ/mol

$-1811 \qquad -2232$ $\quad$ exothermique

$CH_4 + Cl_2 \rightarrow CH_3Cl + HCl$ $\quad \Delta H = -106$ kJ/mol

$-1898,5 \qquad -2004,5$ $\quad$ exothermique

$CH_4 + I_2 \rightarrow CH_3I + HI$ $\quad \Delta H = +40$ kJ/mol

Polymères

Exercice 1

I $\quad H_3C - CH = CH_2 \xrightarrow{HBr}$ $CH_3 - \overset{\oplus}{C}H - CH_3$

$CH_3 - CH_2 - \overset{\oplus}{C}H_2$

$\downarrow$

$CH_3 - CH - CH_3$

$\quad\quad Br$

II $\quad$ Initiation : $\quad RO - OR \rightarrow 2\,RO^{\bullet}$

$RO^{\bullet} + H - Br \rightarrow ROH + Br^{\bullet}$

Propagation :

- $H_3C - CH = CH_2 + Br^{\bullet} \rightarrow H_3C - \dot{C}H - CH_2 - Br$
- $H_3C - CH - CH_2 - Br + H - Br \rightarrow H_3C - CH - CH_2 - Br + Br^{\bullet}$

Terminaison $\quad 2\,Br^{\bullet} \rightarrow Br_2$

Exercice 2

1) a) $CH_3-\underset{\displaystyle CH_3}{\overset{|}{C}}=CH_2 \xrightarrow{H^+Br^-} CH_3-\overset{\displaystyle CH_3}{\overset{|}{C}}_{\oplus}-CH_2$ + stable

$CH_3-\underset{\displaystyle CH_3}{\overset{|}{CH}}-\overset{\displaystyle H}{\overset{|}{CH_2}}$

b) B : $CH_3-\underset{\displaystyle Br}{\overset{\displaystyle CH_3}{\overset{|}{\underset{|}{C}}}}-CH_3$

C : CH_3-CO_2H acide acétique

$\emptyset$: H_2SO_4 acide sulfurique

$C_6H_{12}O_2$

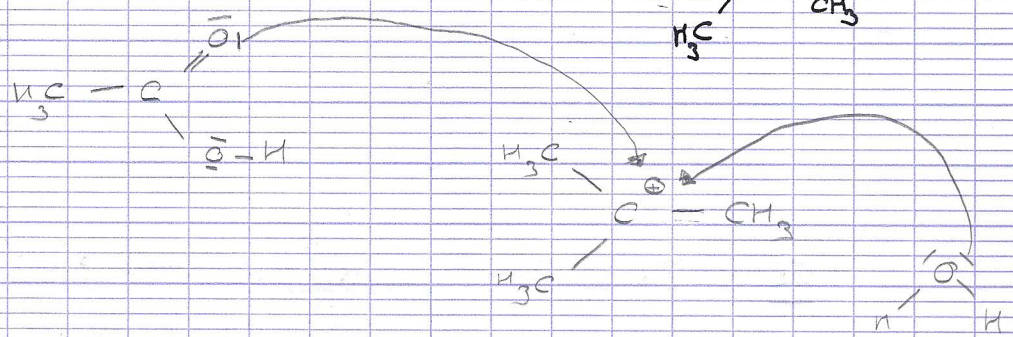
1) a) Par Hydratation

$H_3C-\underset{\displaystyle H_3C}{\overset{\displaystyle H_3C}{C}}=CH_2 + H_3C-CO_2H + HOH \xrightarrow[H^+]{H_2SO_4}$

$H_3C-\underset{\displaystyle H_3C}{\overset{\displaystyle H_3C}{C}}(-O-C(=O)-CH_3)-CH_3$

$C_4H_{10}O$

$H_3C-\underset{\displaystyle H_3C}{\overset{\displaystyle H_3C}{C}}(-\overset{\oplus}{O}H)-CH_3$



b) On joue sur les proportions d'eau et d'acide acétique

3) a) $\begin{matrix} H_3C \\ H_3C \end{matrix}\!\!>\!=CH_2$ et H^+/H_2O on veut H_2O

Par hydroboration

$\begin{matrix} H_3C \\ H_3C \end{matrix}\!\!>\!=CH_2 + \underset{\displaystyle R}{\overset{|}{BH}}-R \xrightarrow[CH^-]{H_2O_2}$

$H_3C-\underset{\displaystyle H_3C}{\overset{\displaystyle CH_3}{\overset{|}{C}}}H-CH_2-OH$