

TD de Chimie Organique Générale SMP / S3 (2014-15)

Série N° 1

I- 1) Rappeler la définition de la « Valence »

2) En utilisant les cases quantiques déterminer la valence de chacun des éléments suivants :

H (Z=1) ; C (Z=6) ; N (Z=7) ; O (Z=8) ; P (Z=15) ; S (Z=16) ; F (Z=9) et Cl (Z=17).

En déduire le nombre et la nature des liaisons covalentes liés à chaque élément.

II- 1) Représenter les molécules suivantes en formule développée plane :

A : C_2H_4 ; B : $CH_3CHClCN$; C : CH_2CHCH_2 ; D : CH_3N_2H ; E : CH_3CH_2F ; F : $CH_3NHNHC_2H_5$;

G : CH_3CO_2H ; H : C_2H_2 ; I : CH_3CHO ; J : CH_3CH_2OH

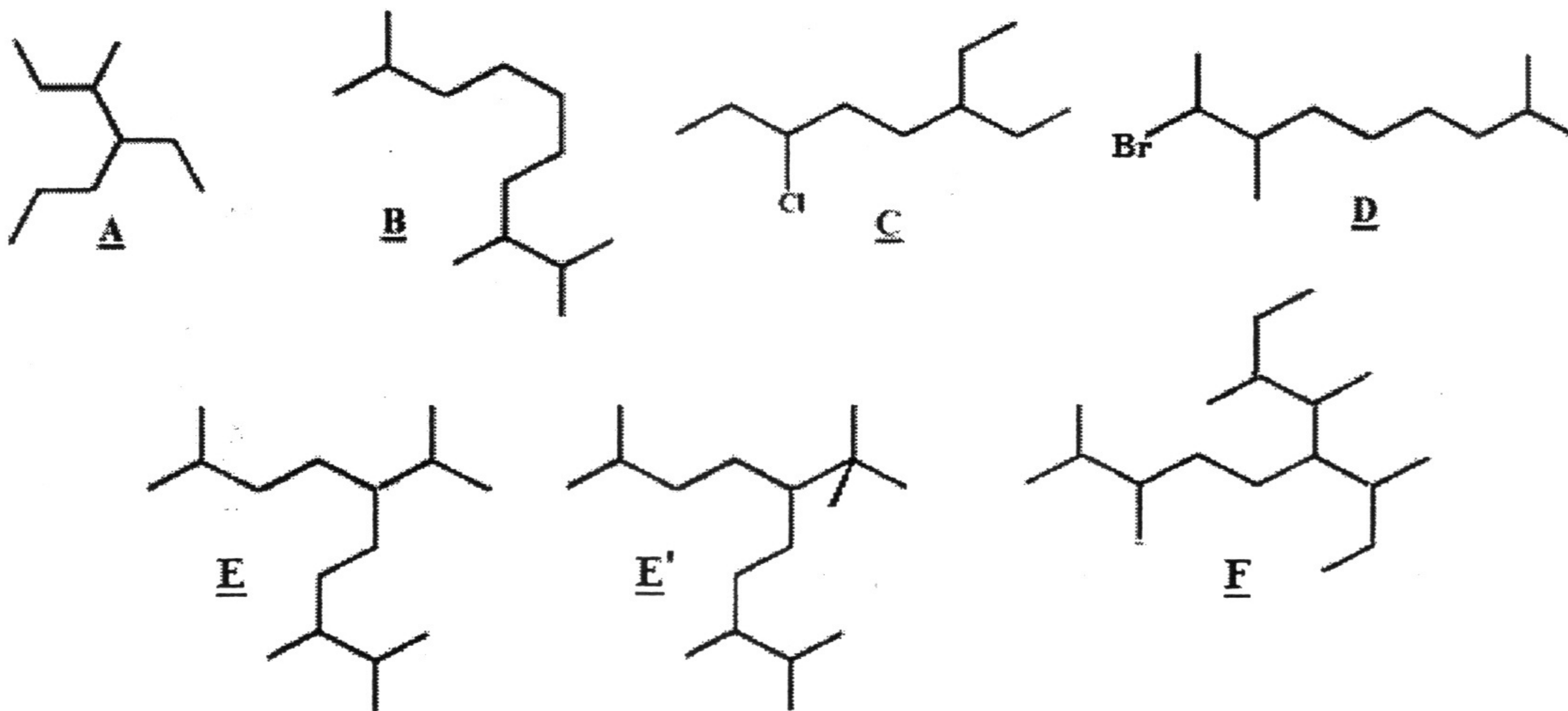
2) Rappeler la définition de l'hybridation (cas de l'élément carbone) et donner l'état d'hybridation des atomes de carbone, oxygène et azote dans les molécules A à J.

3) En déduire la représentation topologique de ces molécules.

4) Retrouver la géométrie des molécules A et H au moyen des recouvrements des orbitales :

III- Nomenclature des alcanes :

1) Donner les noms des composés suivants en nomenclature systématique internationale :



2) – A partir des formules semi-développées, un étudiant a pu déduire les noms suivants :

3,5-Diméthyl-6-propyloctane

4-Ethyl-5-méthylheptane

7-Ethyl-3-méthylnonane

– Cet étudiant a eu une mauvaise appréciation de la part de son professeur. Pourquoi ?

Chimie organique

Serie ①.

EX(1)

1) la valence est le nombre de liaison covalente autour d'un atome.

liaison covalente mise en commun entre un doublet électronique

2/ $H (Z=1) \quad 1s^1 \quad \boxed{\uparrow} \rightarrow 1e^- \text{ célibataire} \quad H - \quad \text{Val } H = 1 \quad \text{II}$

$C (Z=6) \quad 1s^2 2s^2 2p^2 \quad \boxed{\uparrow\downarrow} \boxed{\uparrow} \boxed{\uparrow} \rightarrow C^* \boxed{\uparrow\downarrow} \boxed{\uparrow\uparrow\uparrow} \rightarrow \boxed{\text{Val } C = 4}$
la règle de l'octet est respectée.

$\begin{array}{c} | \\ -C- \\ | \end{array} \quad \begin{array}{c} \diagup \\ C= \\ \diagdown \end{array} \quad -C \equiv$

$N (Z=7) \quad 1s^2 2s^2 2p^3 \quad \boxed{\uparrow\downarrow} \boxed{\uparrow} \boxed{\uparrow} \rightarrow \text{Val } (N) = 3$

$\begin{array}{c} | \\ -N- \\ | \end{array} \quad \begin{array}{c} \diagup \\ N= \\ \diagdown \end{array} \quad N \equiv \quad (R.O.R)$

$O (Z=8) \quad 1s^2 2s^2 2p^4 \quad \boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} \boxed{\uparrow} \rightarrow \text{Val } (O) = 2$

$\begin{array}{c} | \\ -O- \\ | \end{array} \quad \begin{array}{c} \diagup \\ O= \\ \diagdown \end{array} \quad (R.O.R)$

$P (Z=15) \quad 1s^2 2s^2 2p^6 3s^2 3p^3 \quad \boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} \boxed{\uparrow} \quad \text{Val } (P) = 3$

P est N out in str externe $ns^2 np^3$

a l'état fondamental.

$\begin{array}{c} | \\ -P- \\ | \end{array} \quad \begin{array}{c} \diagup \\ P= \\ \diagdown \end{array} \quad P \equiv$

b P peut passer à un état excité

$\boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} \boxed{\uparrow} \rightarrow P^* \quad \boxed{\uparrow} \boxed{\uparrow\downarrow} \boxed{\uparrow} \quad \boxed{\uparrow} \boxed{\uparrow} \boxed{\uparrow}$
 $3s \quad 3p \quad 3d \quad 3s \quad 3p \quad 3d$

$S (Z=16) \quad 1s^2 2s^2 2p^6 3s^2 3p^4$

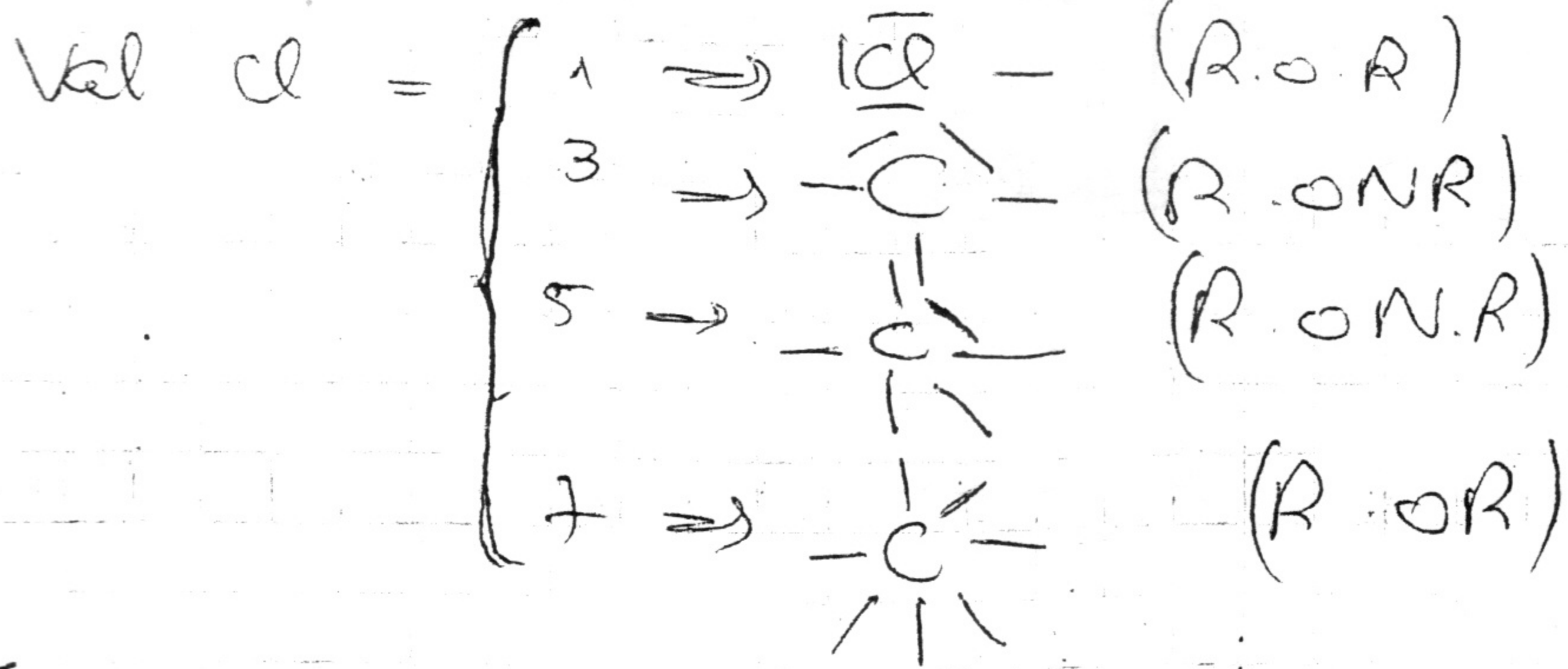
S est à la famille de l'oxygène : les chalcogènes à l'état fond.

$\Rightarrow \text{Val } (S) = 2 \quad \begin{array}{c} | \\ -S- \\ | \end{array} \quad \begin{array}{c} \diagup \\ S= \\ \diagdown \end{array} \quad \boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} \boxed{\uparrow} \quad \boxed{\uparrow} \boxed{\uparrow} \boxed{\uparrow} \quad (R.O.N.R)$
 $3s \quad 3p \quad 3d$

$F (Z=9) \quad 1s^2 2s^2 2p^5 \quad \boxed{\uparrow\downarrow} \boxed{\uparrow\downarrow} \boxed{\uparrow} \quad \text{Val } (F) = 1$

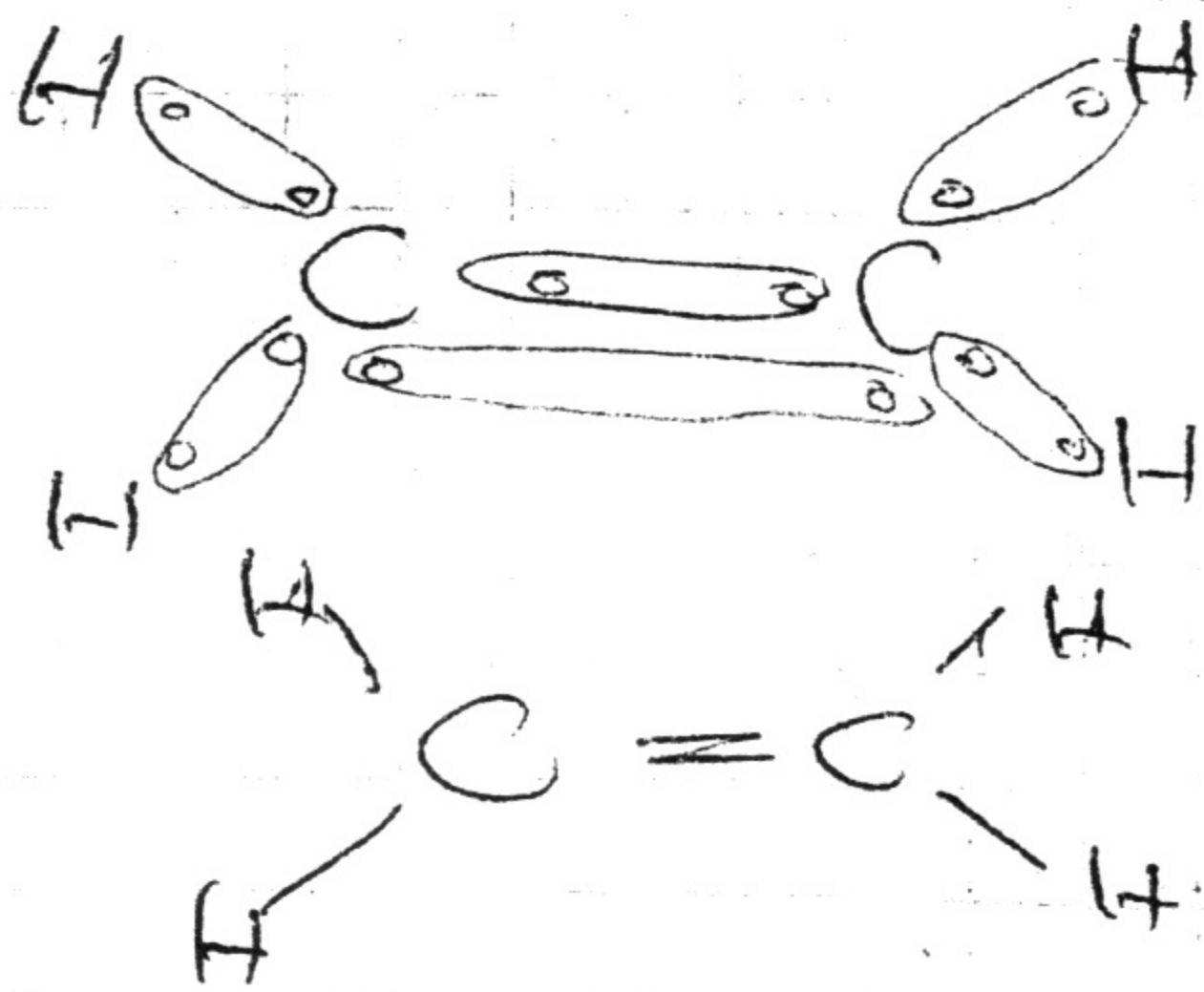
$\begin{array}{c} | \\ -F- \\ | \end{array} \quad F \in \text{aux halogènes } ns^2 np^5 \text{ les halogènes } 6^{\text{e}}$
aux group VII

Cl ($\Sigma = 17$) VII VII VII VII

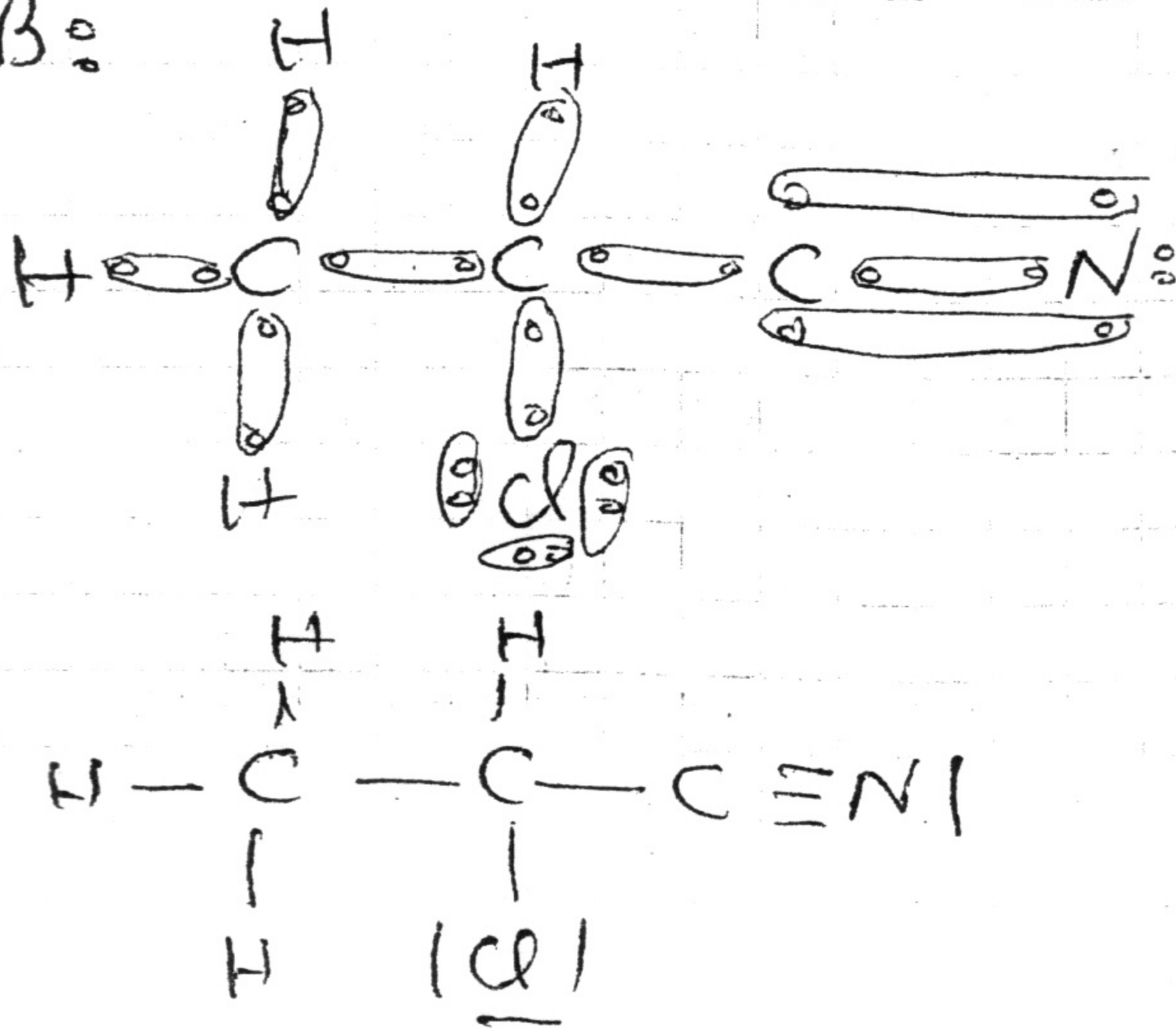


II C_2H_4

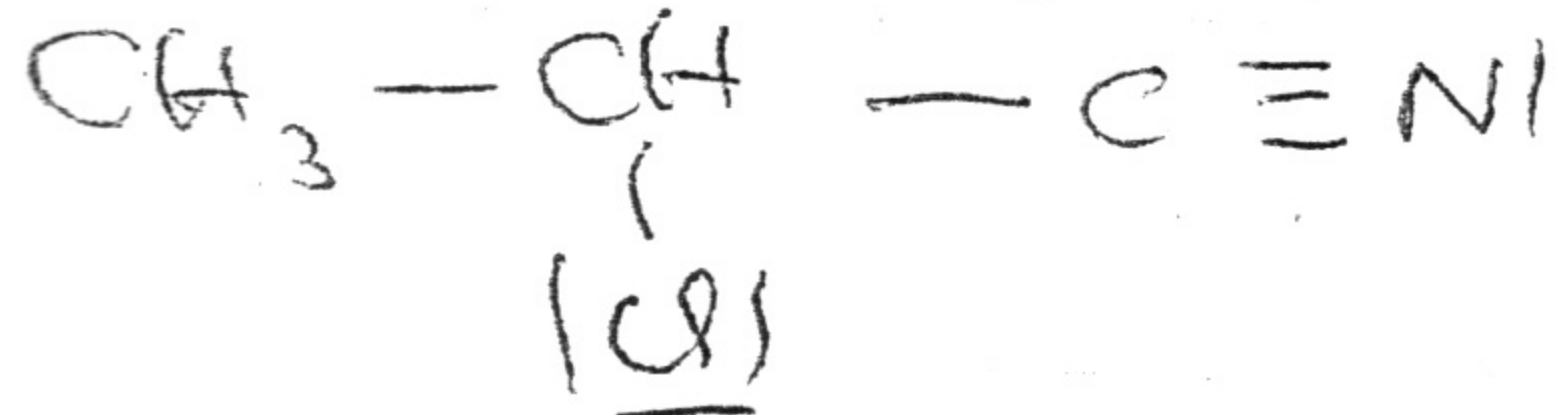
A:



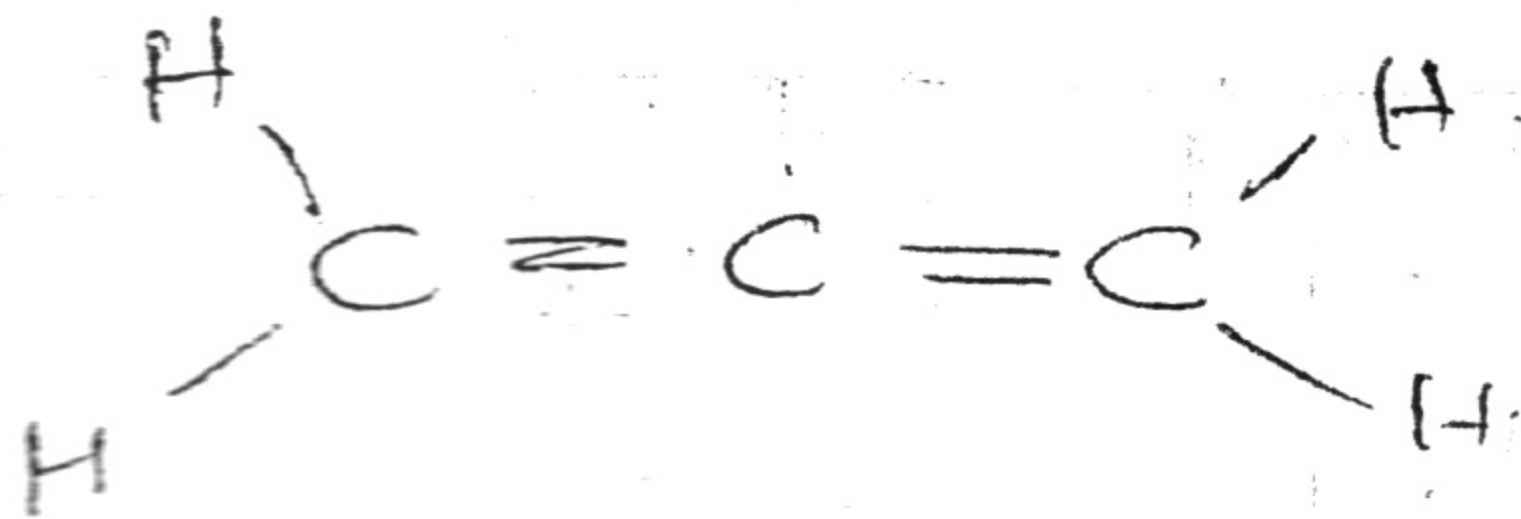
B:



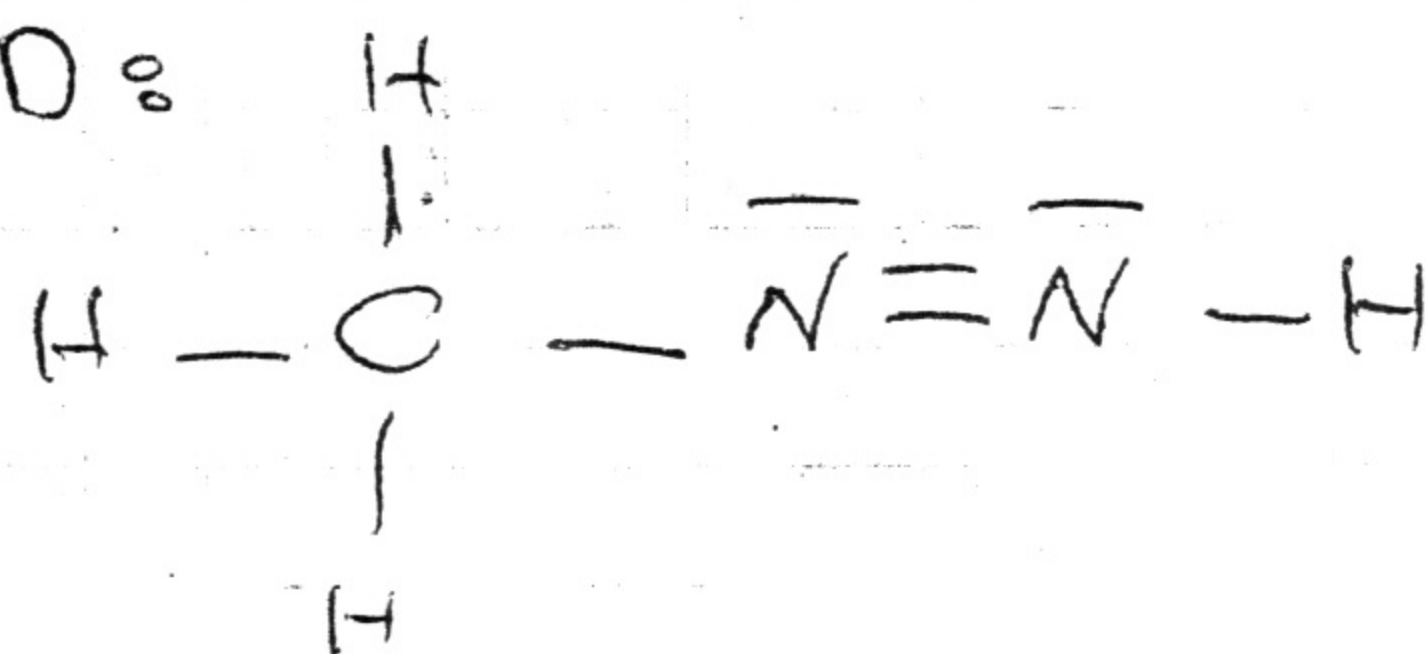
Semi Developpé plan



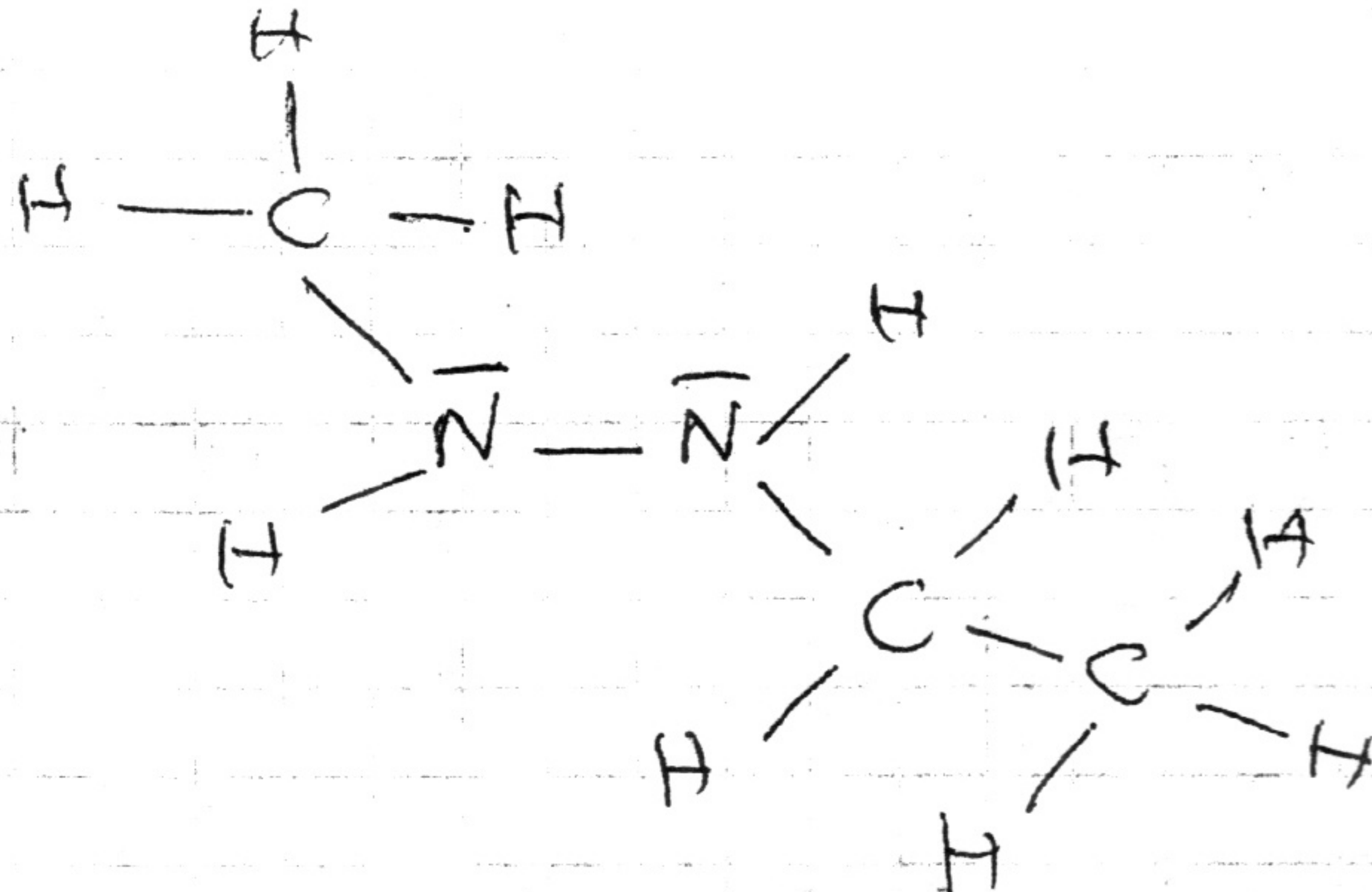
C:



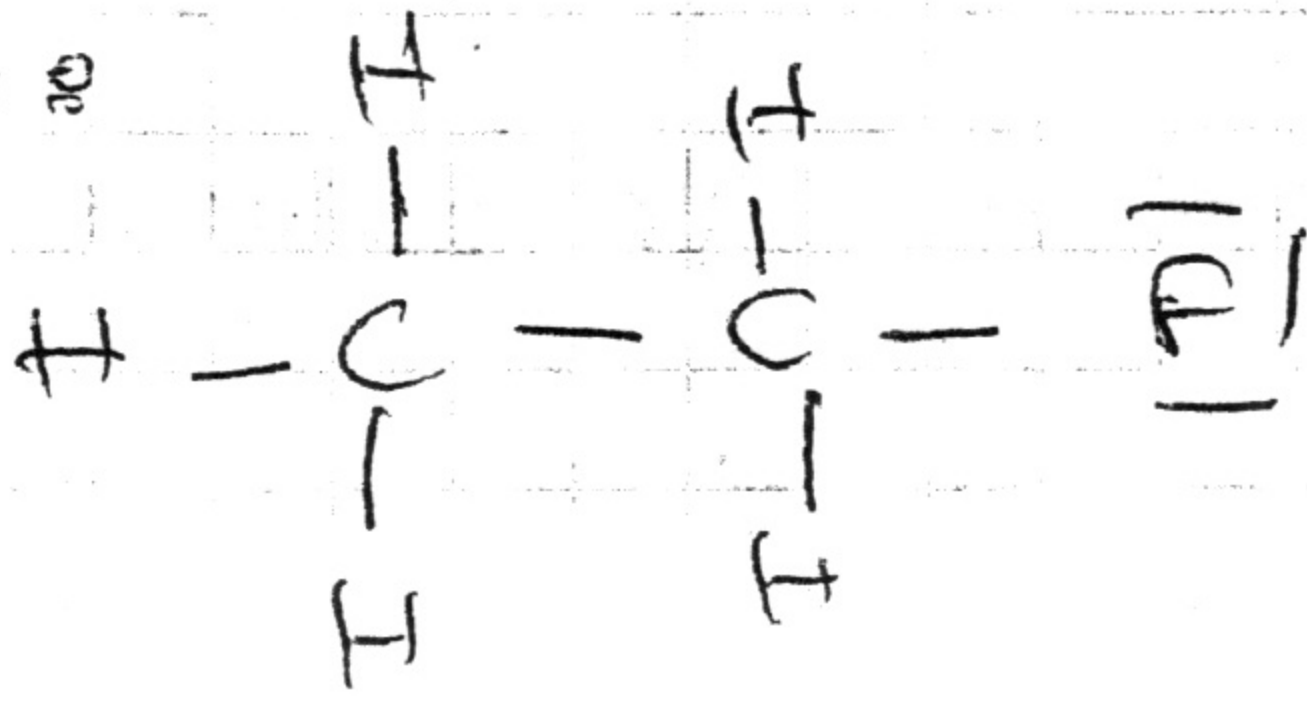
D:



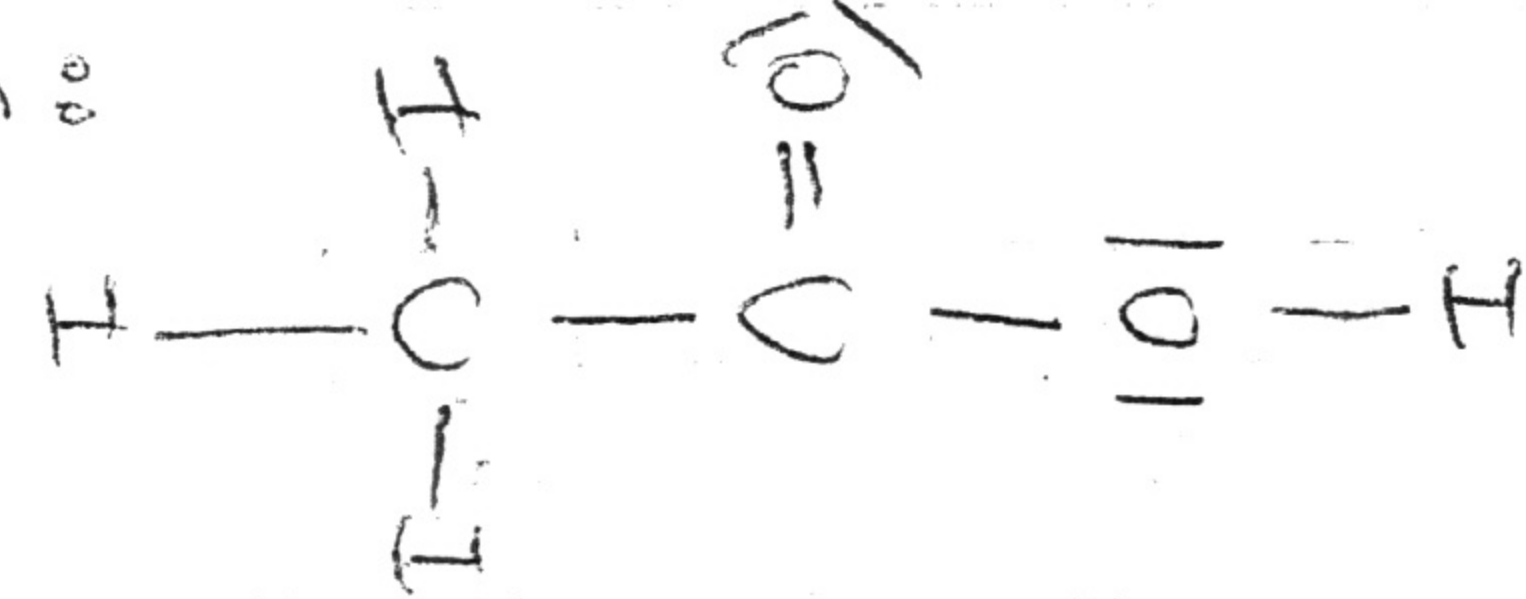
E:



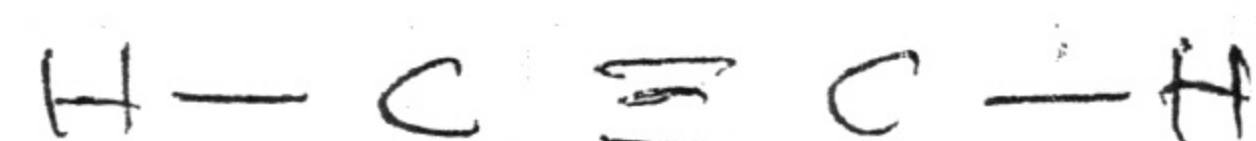
F:



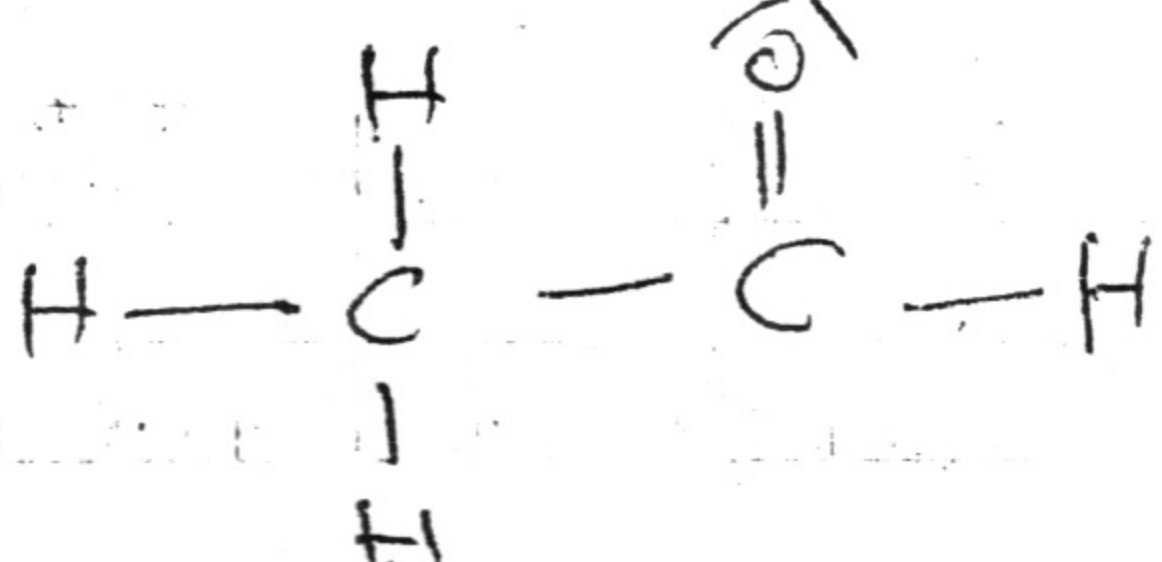
G:

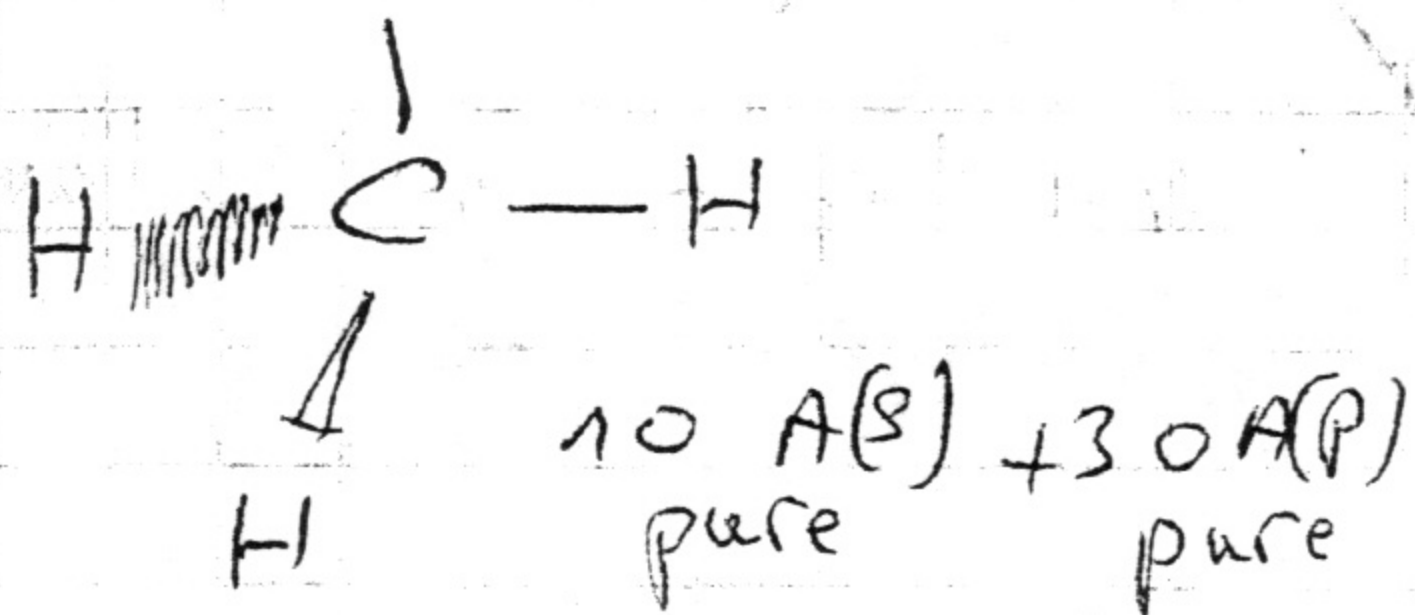
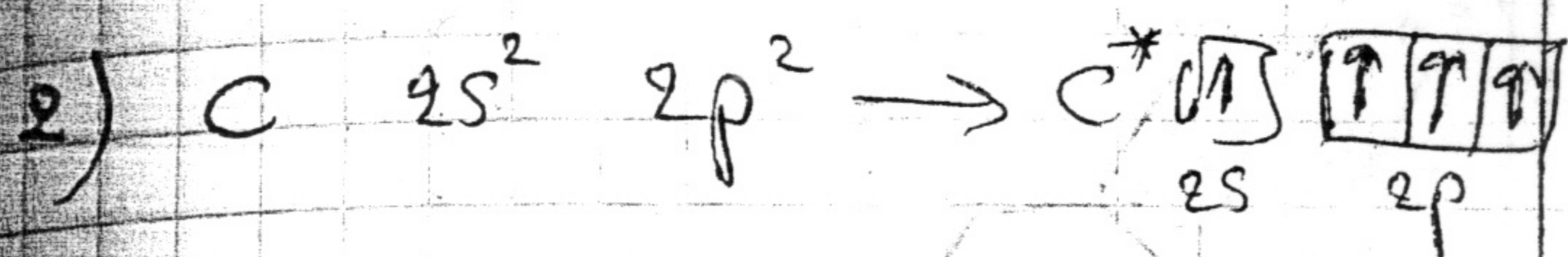
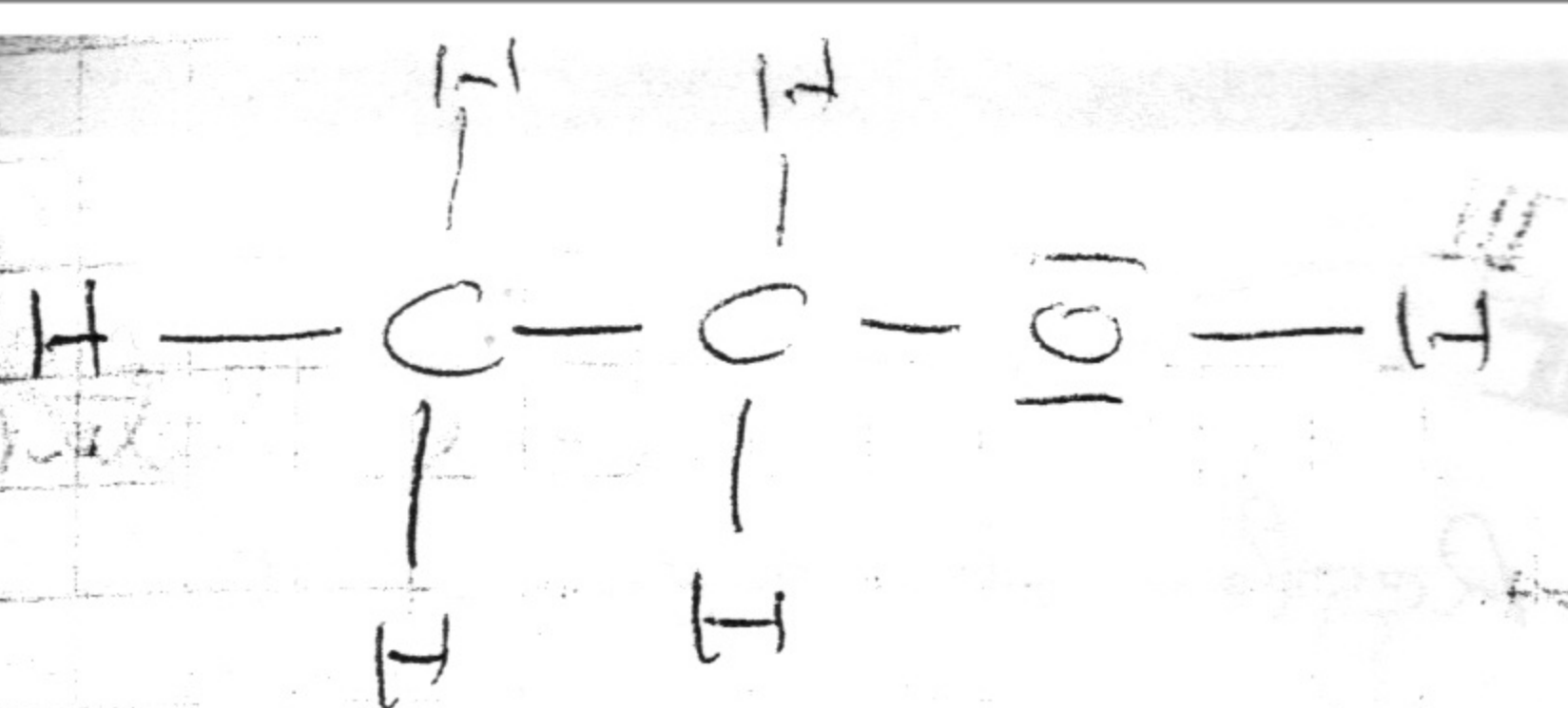


H:



I:



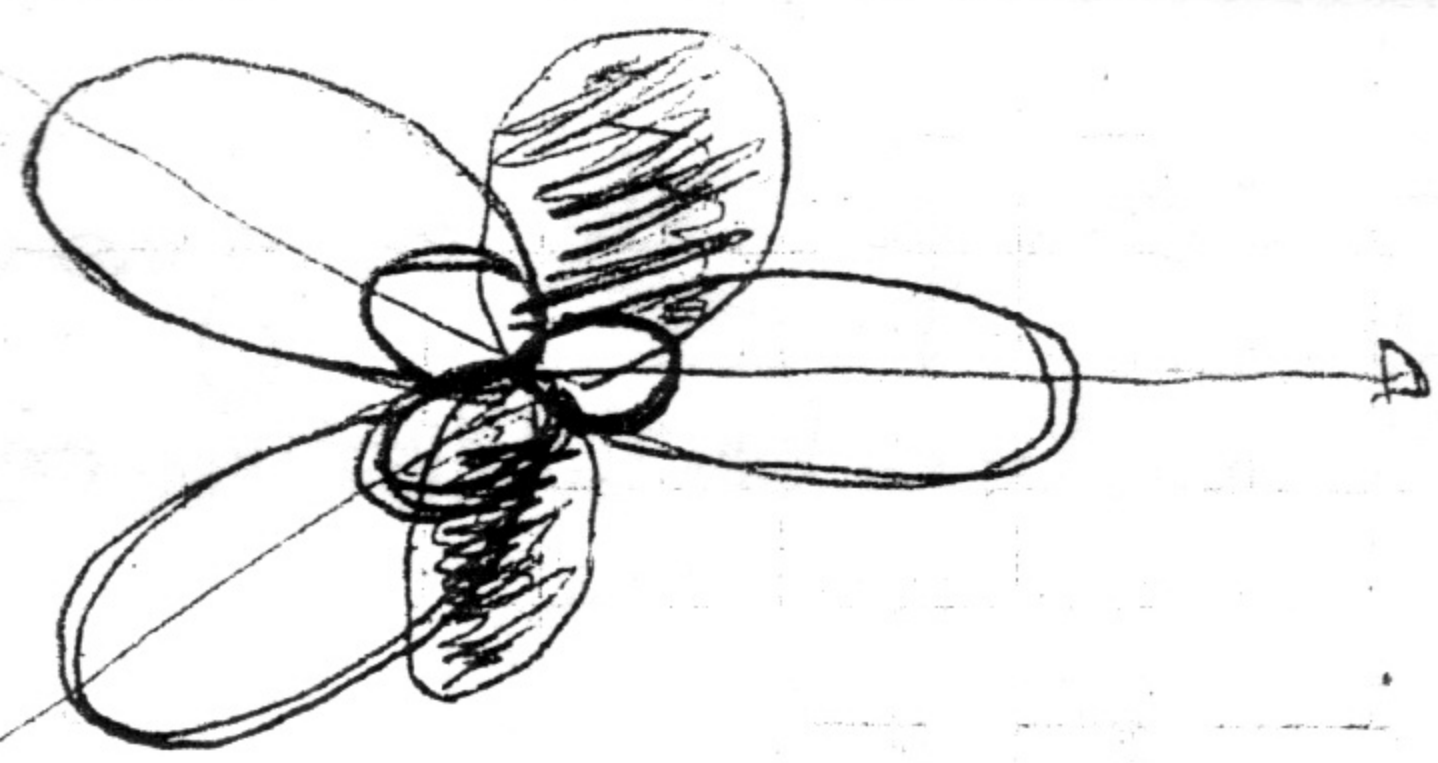


hybridation est une Théorie
Base sur la combinaison
orbital atomique pure (s, p, d...)
pour conduire à les orbitale
hybride (sp^3 , sp^2 , sp , d')
de symétrie s
et de orientations on
bien déterminer elle permet
ainsi permet et leur géométrie

Soit $N = N_b$ de liaison σ
⊕

N_b de doublets libre
 $N \Rightarrow 4$ hybridation sp^3
 $N \Rightarrow 3$ " sp^2
 $N \Rightarrow 2$ " sp

sp^3
 $10 \text{ A pure (s)} + 30 \text{ A pure (p)}$
↓
 40 hybrides
↓
géométrie tétraédrique

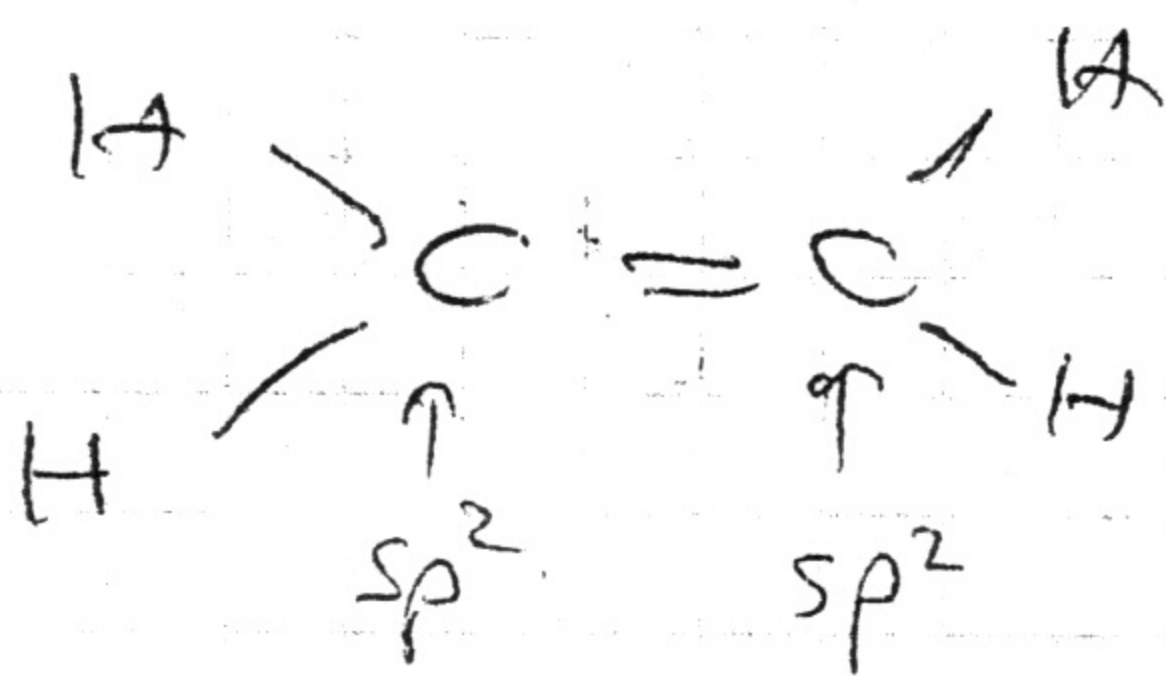
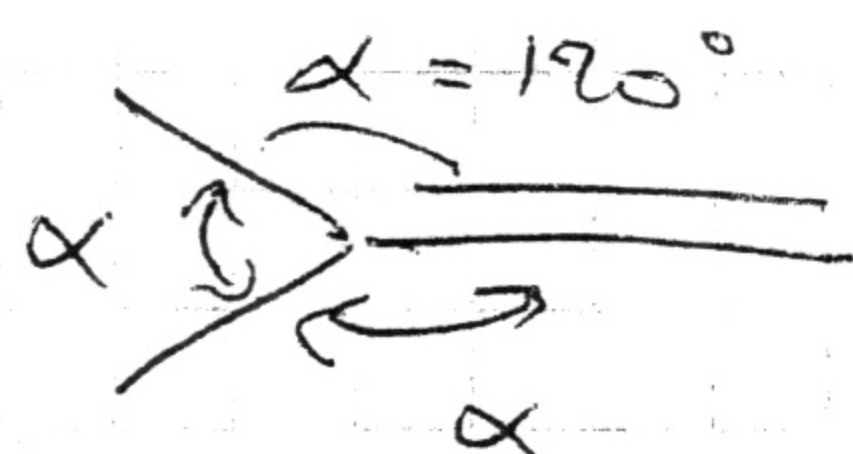


sp^2

$10 \text{ A pure (s)} + 20 \text{ A pure (p)}$

↓
 30 hybrides + $10 \text{ A } p_z$ pure

↓
géométrie triangle
 $p_z \perp$ au Triangle

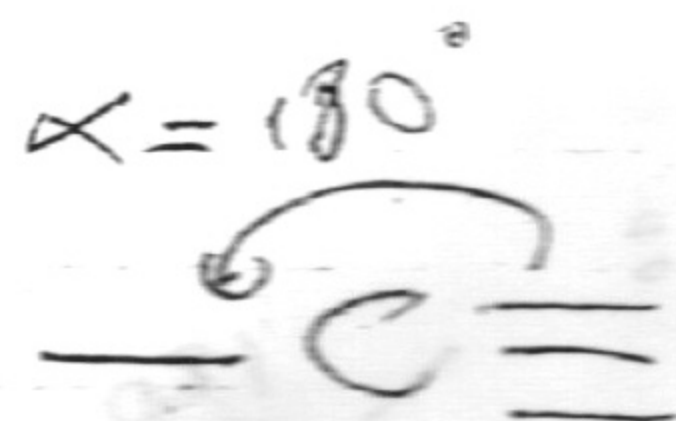
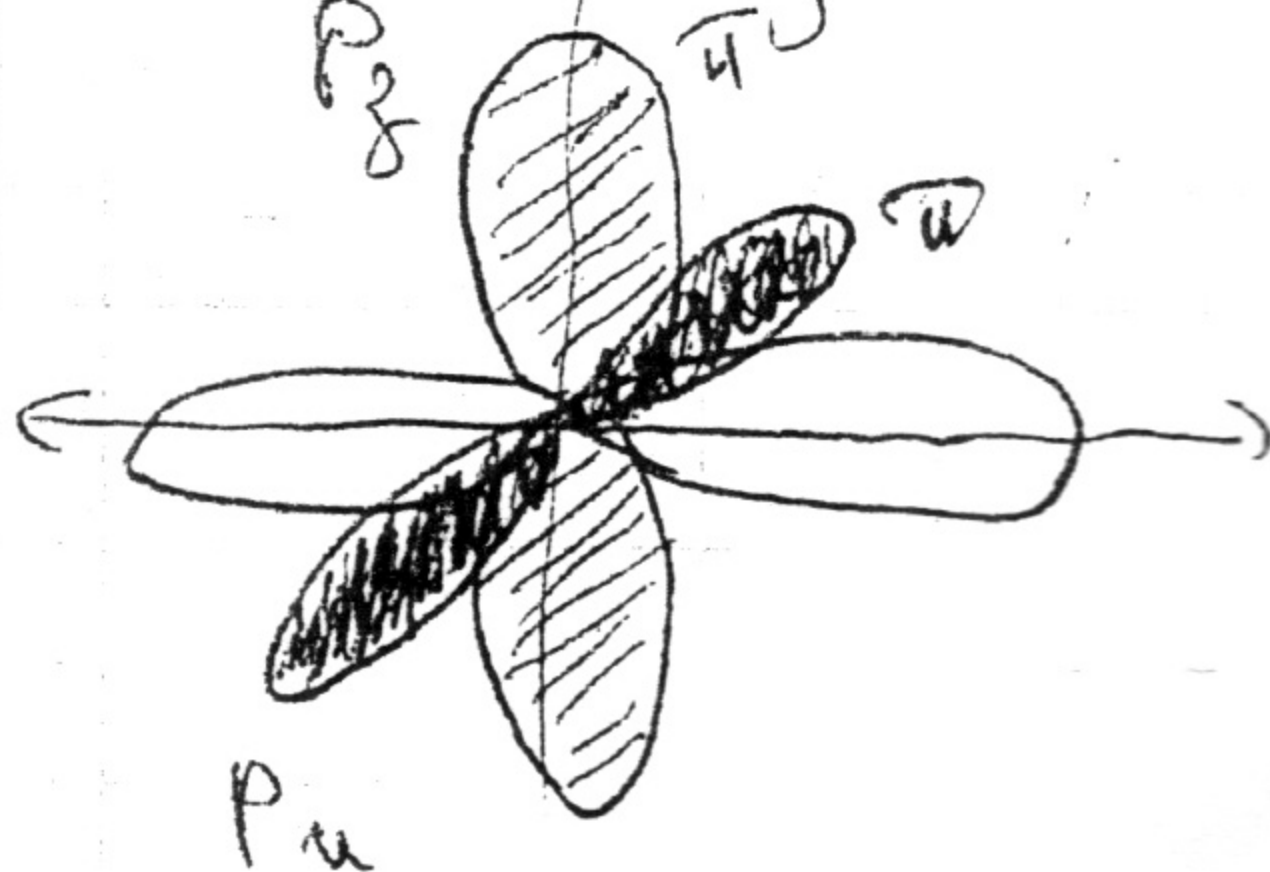


sp

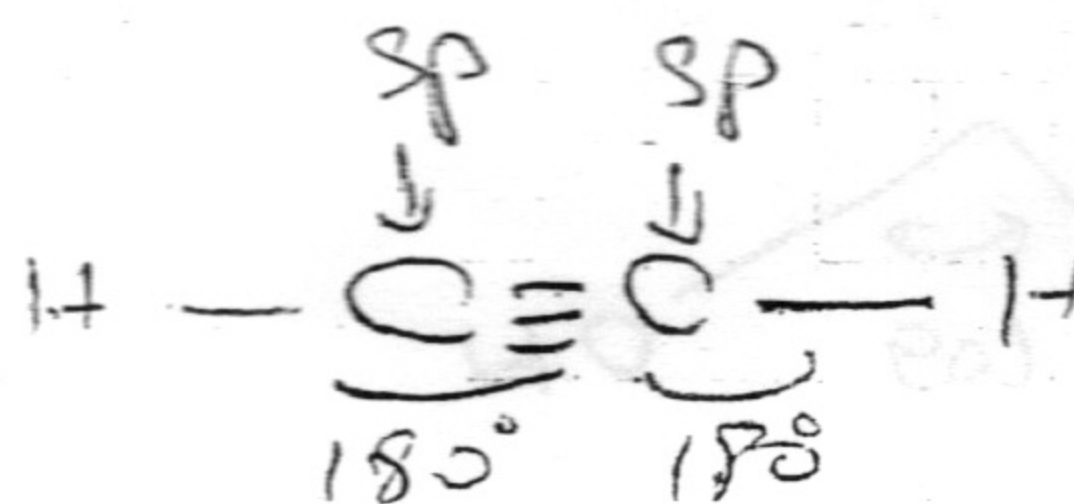
$10 \text{ A pure} + 10 \text{ A pure (p)}$

↓
 20 hybrides + $20 \text{ A } p_z \text{ et } p_x$

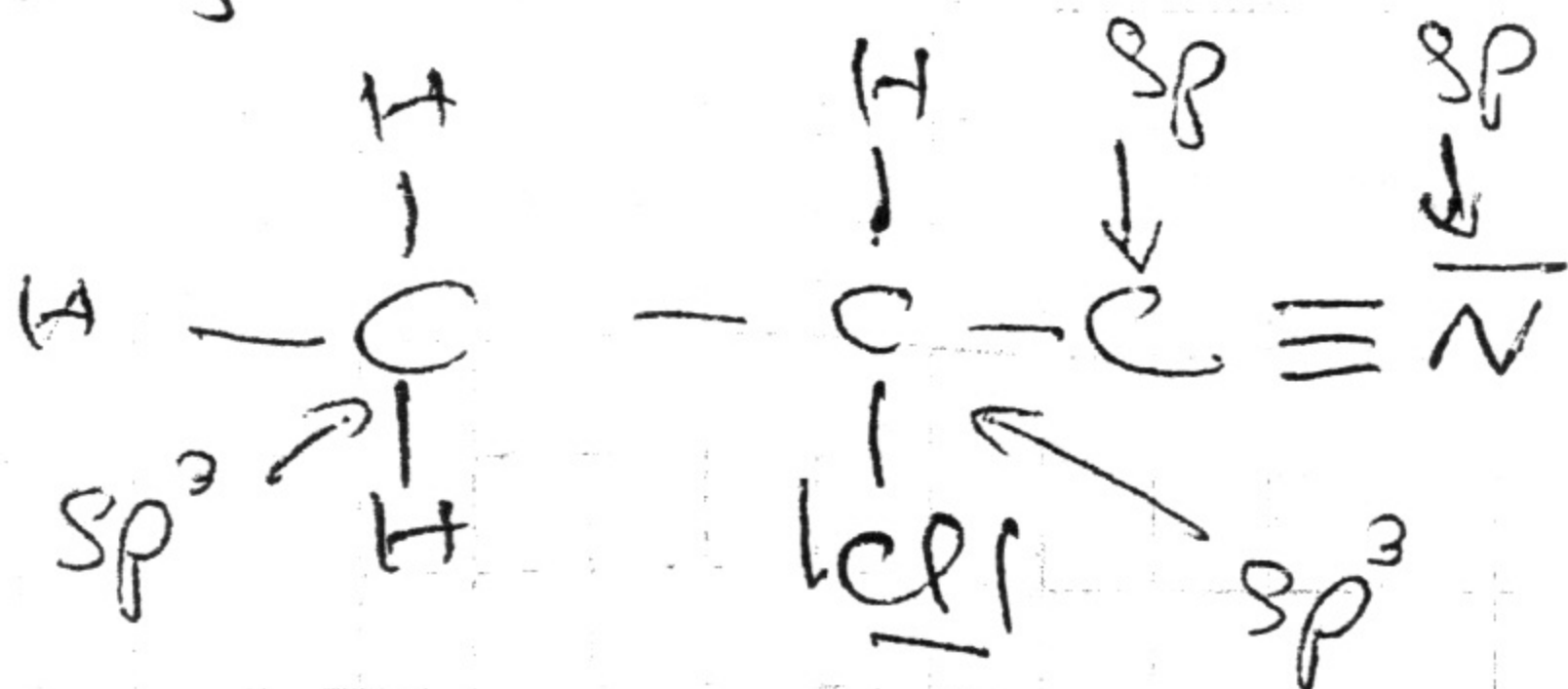
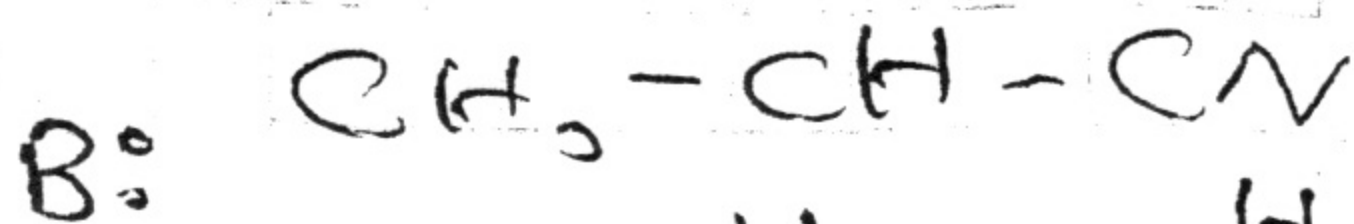
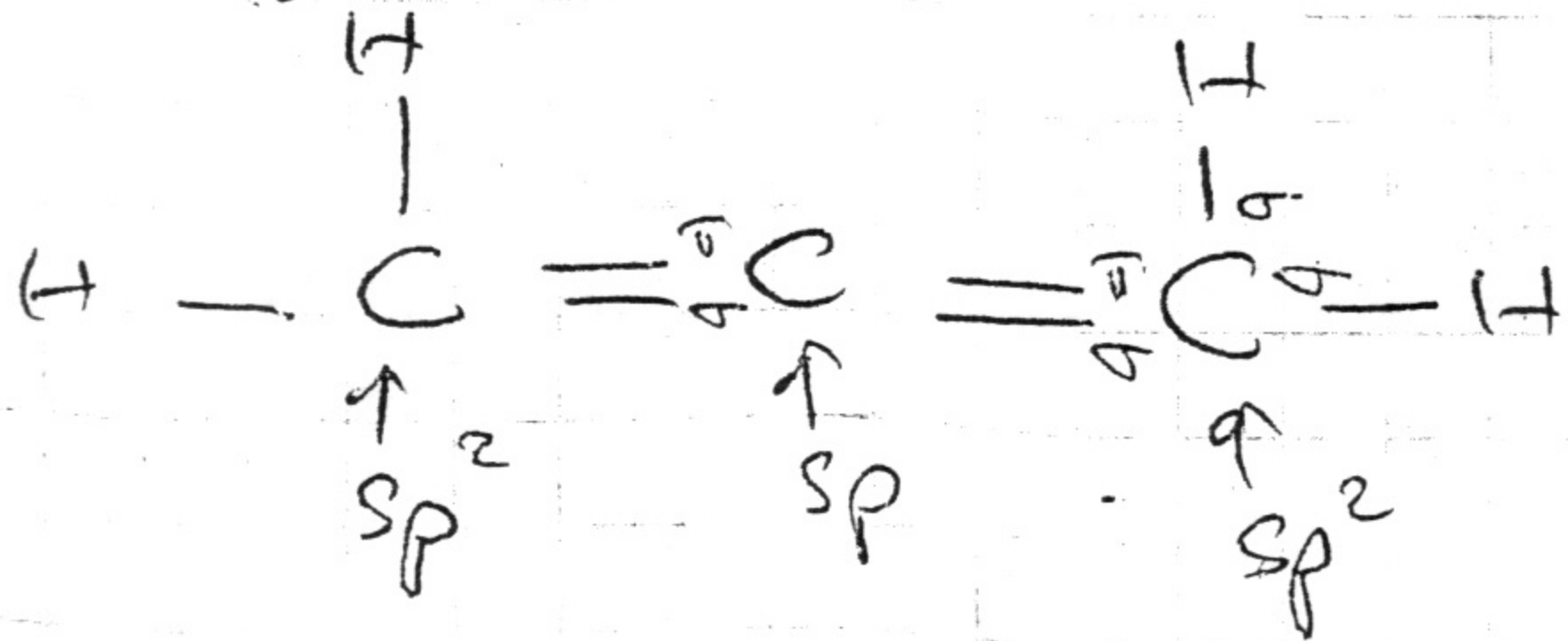
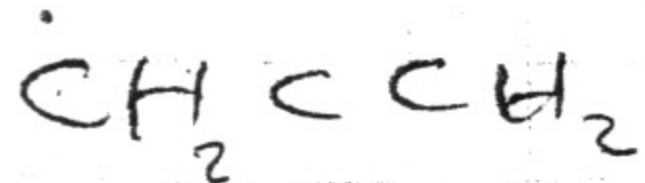
↓
géométrie linéaire



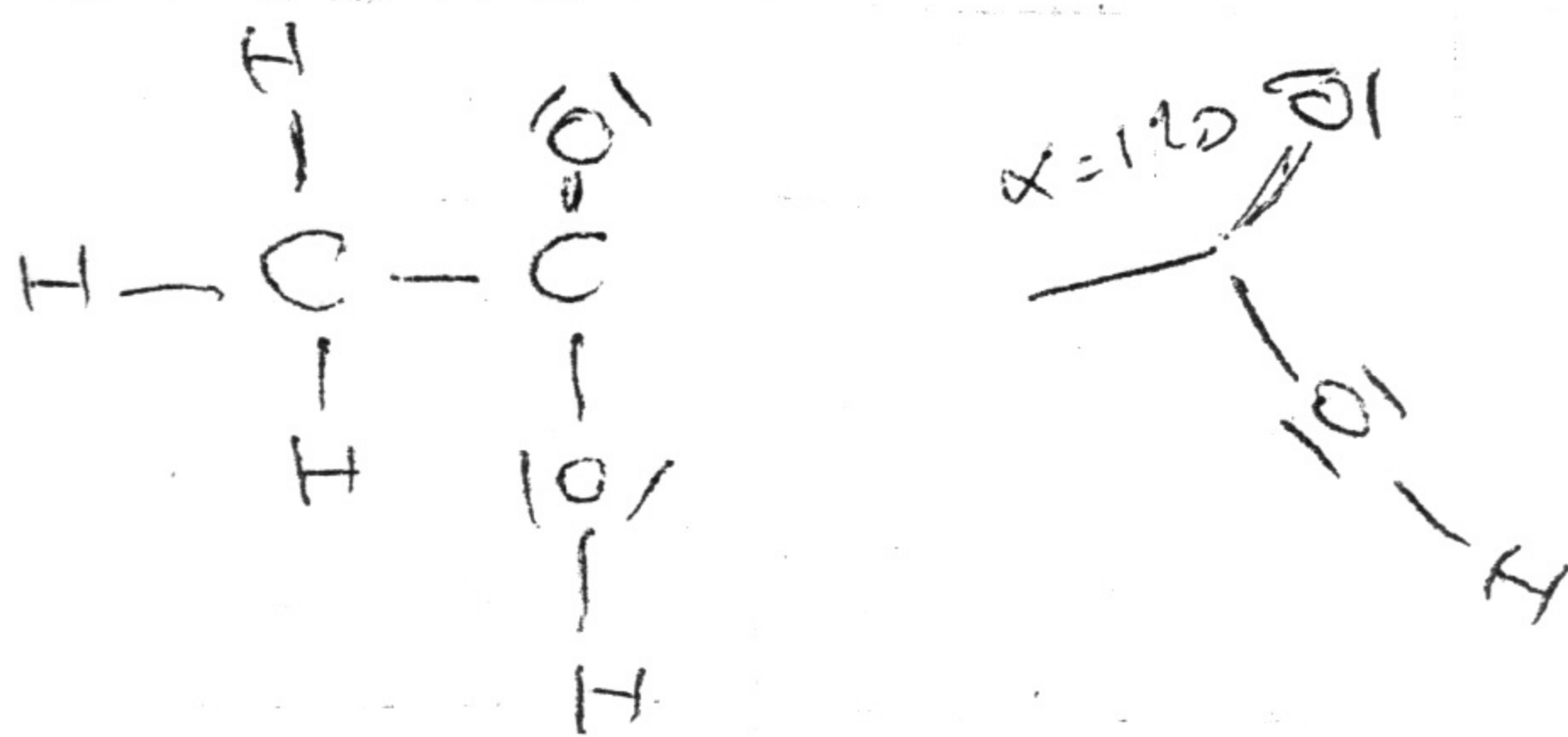
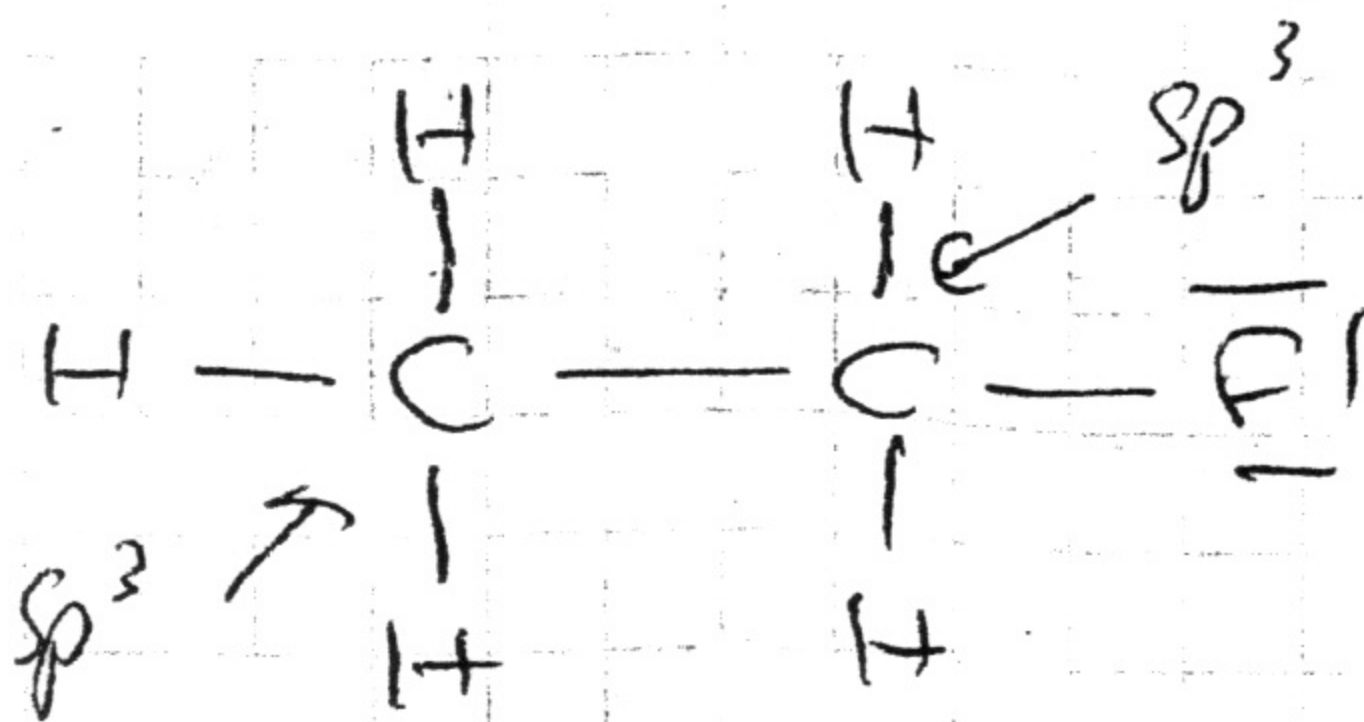
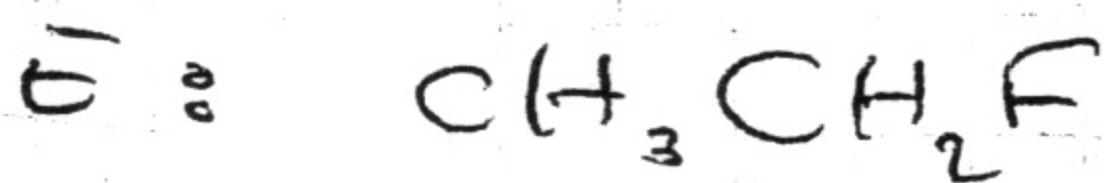
Ex:
 C_2H_2



tient compte de la géométrie
de la molécule - est représentée
par la molécule CH.



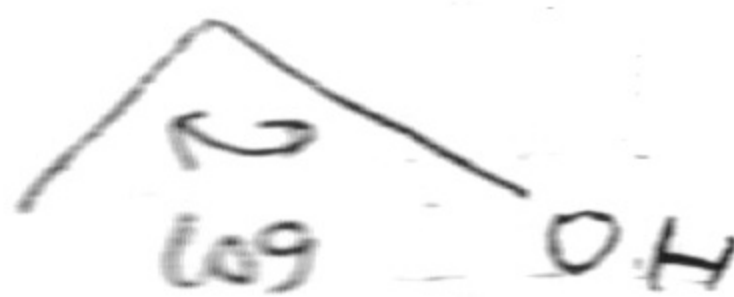
3)



I:



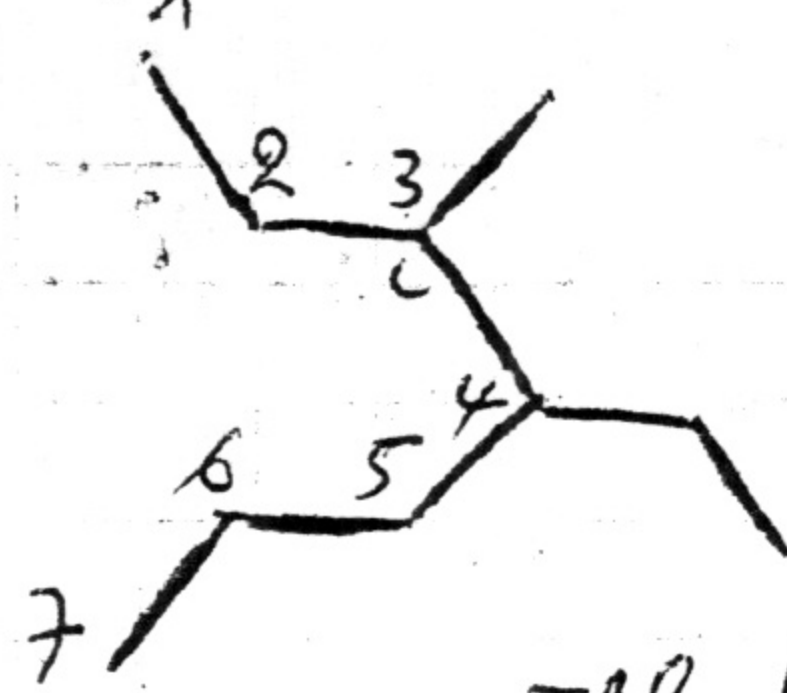
J:



III

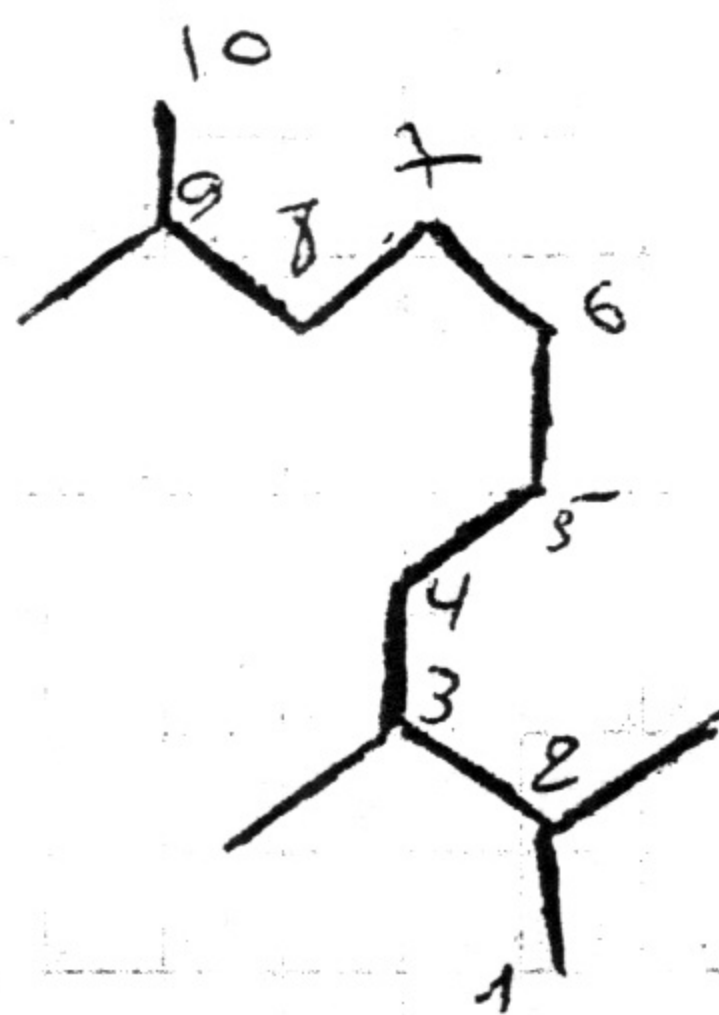
1) Règles de Nomenclatures

A:



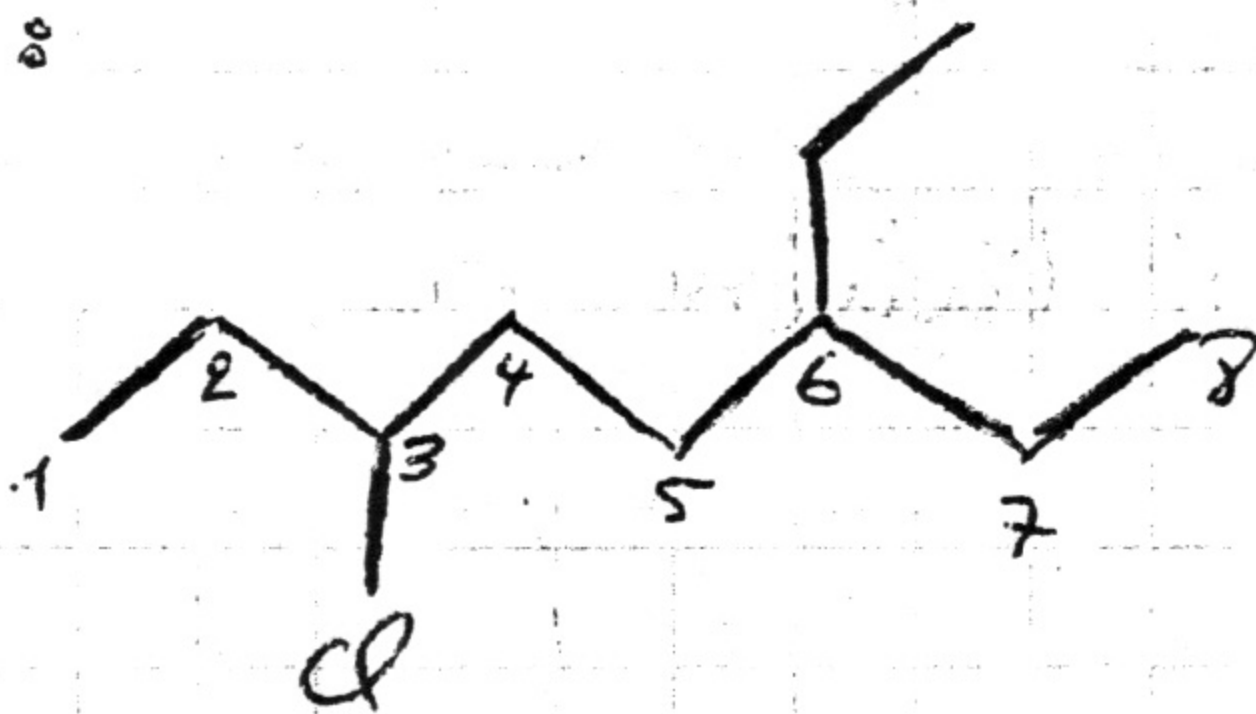
4-ethyl-3-methylheptane

B:



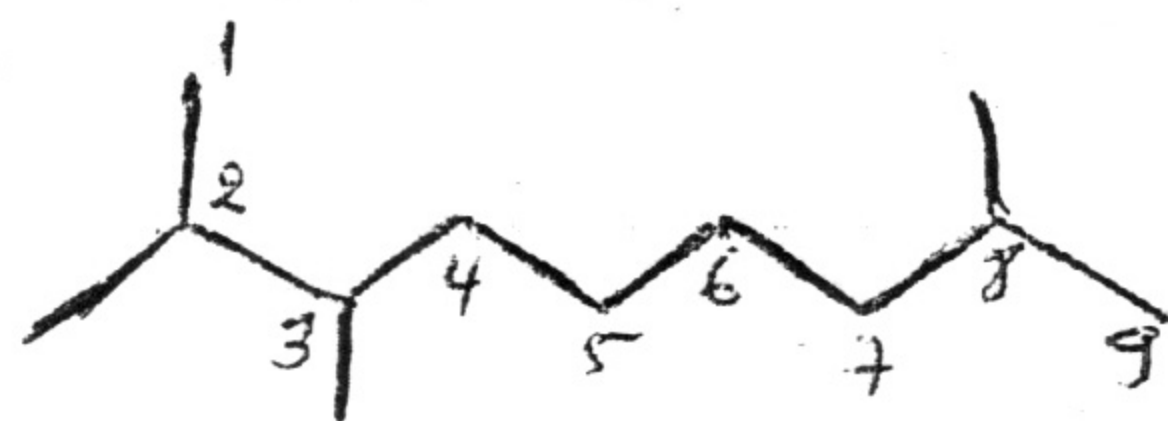
2,3,9-trimethyldecane

C:

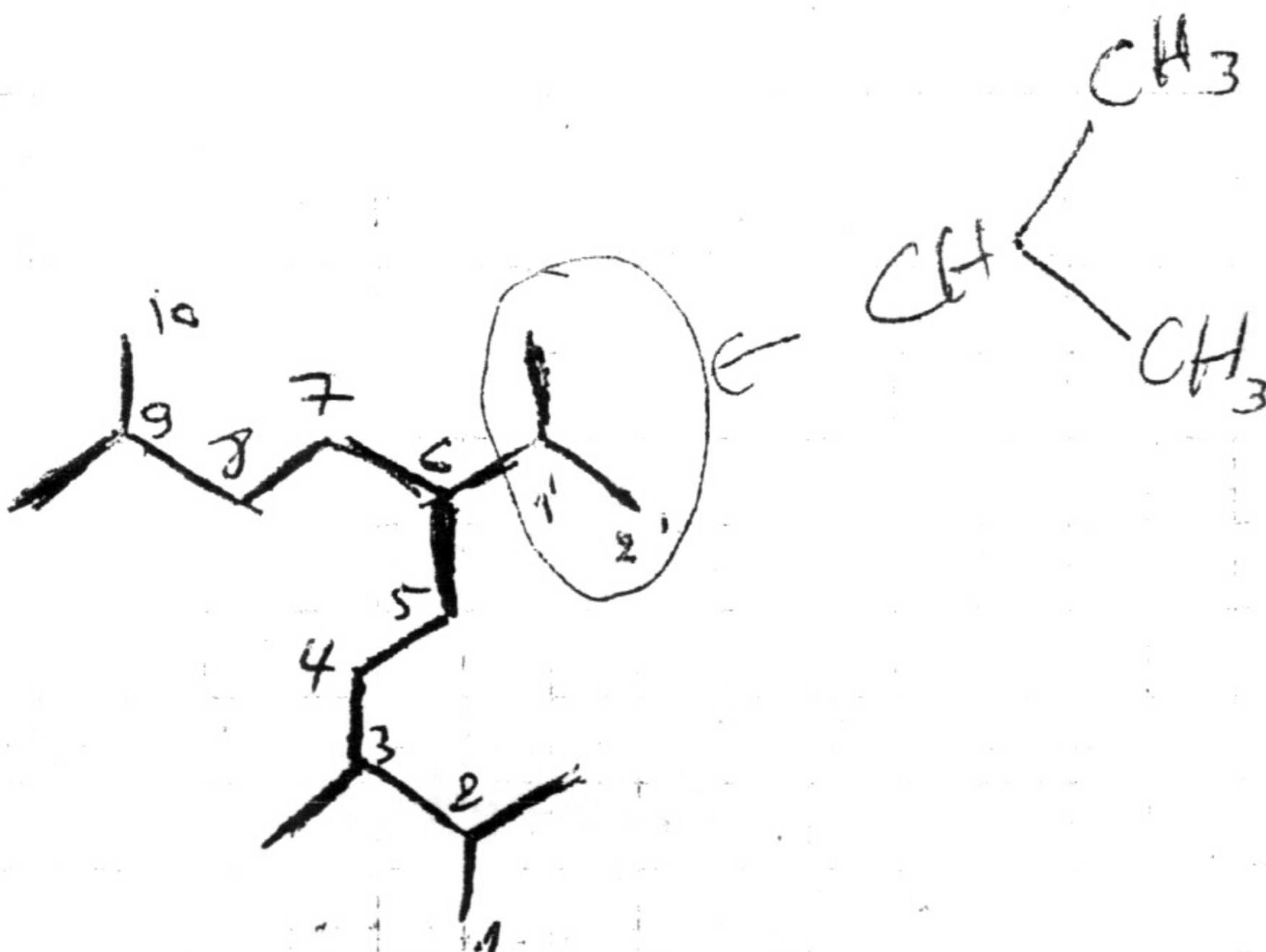


3-chloro-6-ethylhexane

D:

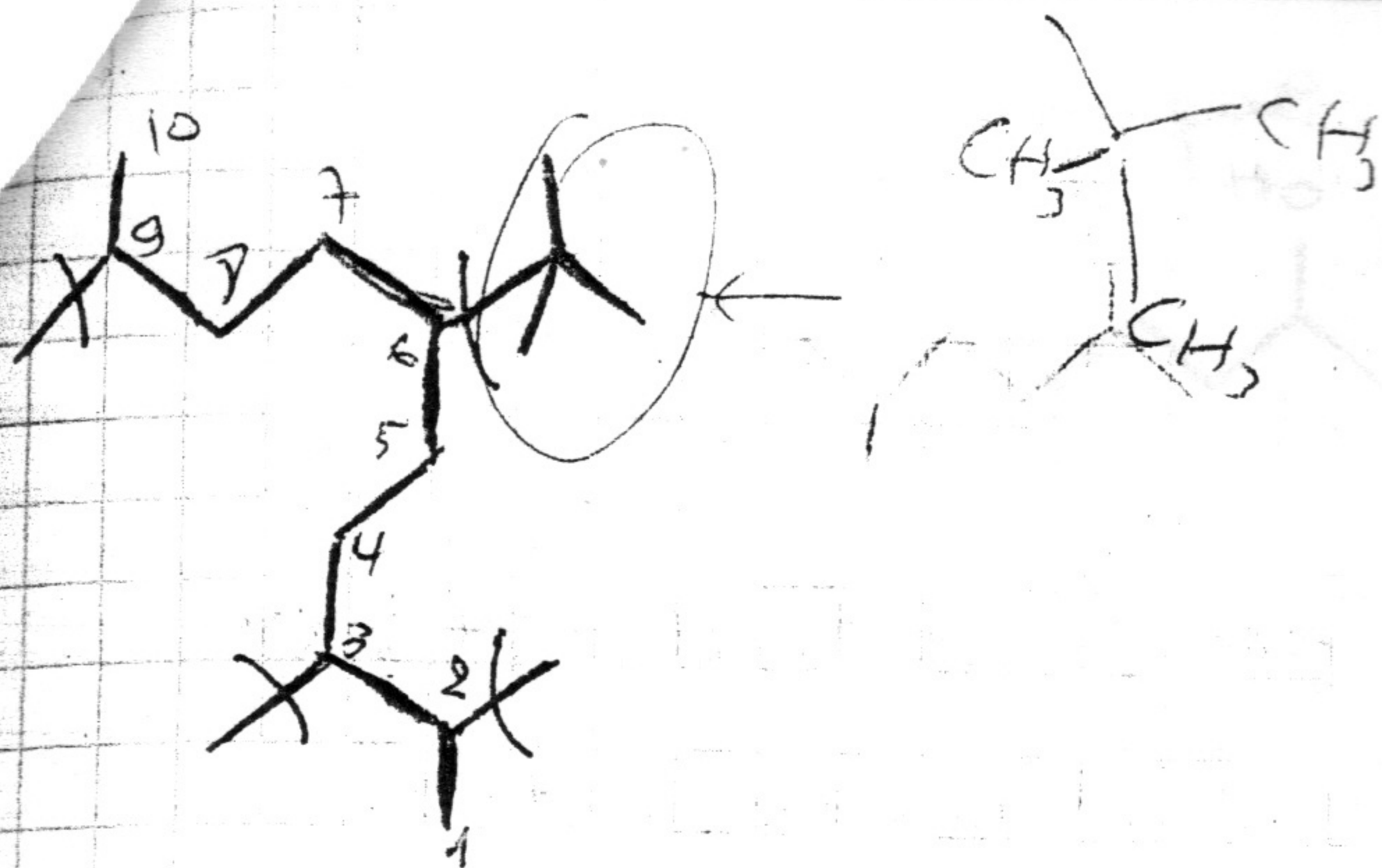


E:

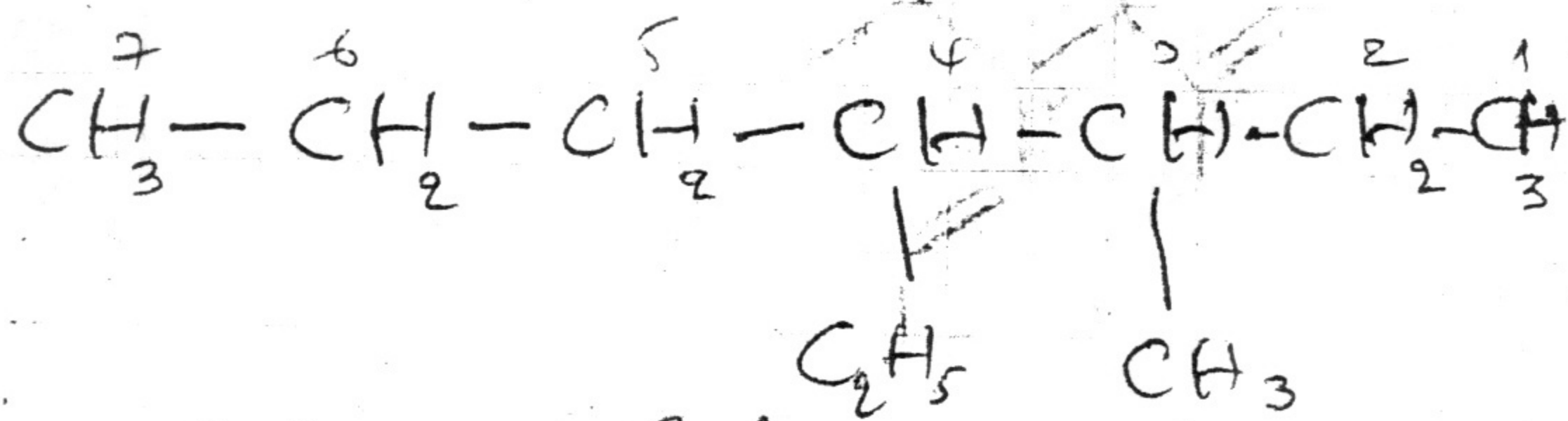


2,3,9-trimethyldecane

6-isopropyl-2,3,9-trimethyldecane

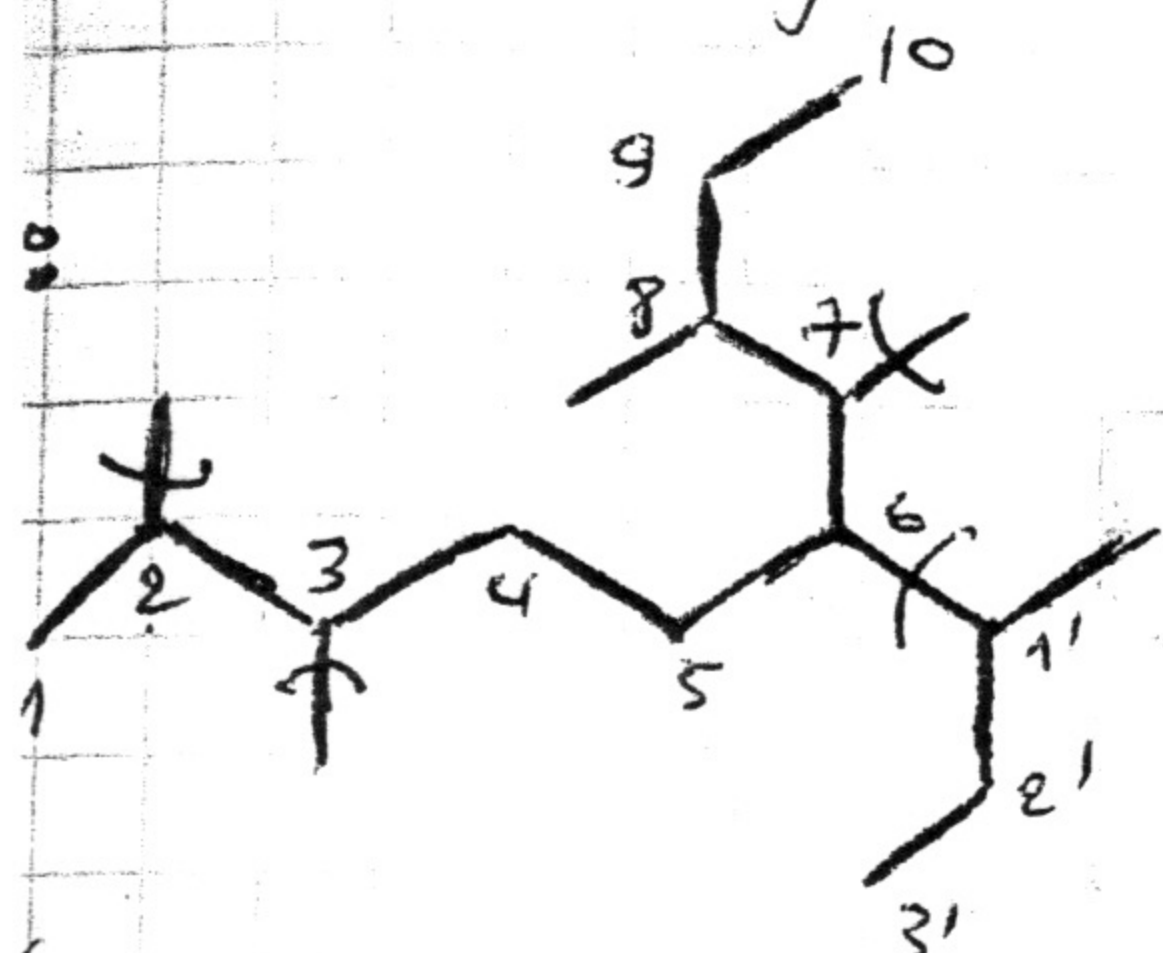


2/
4-ethyl-5-methylheptane

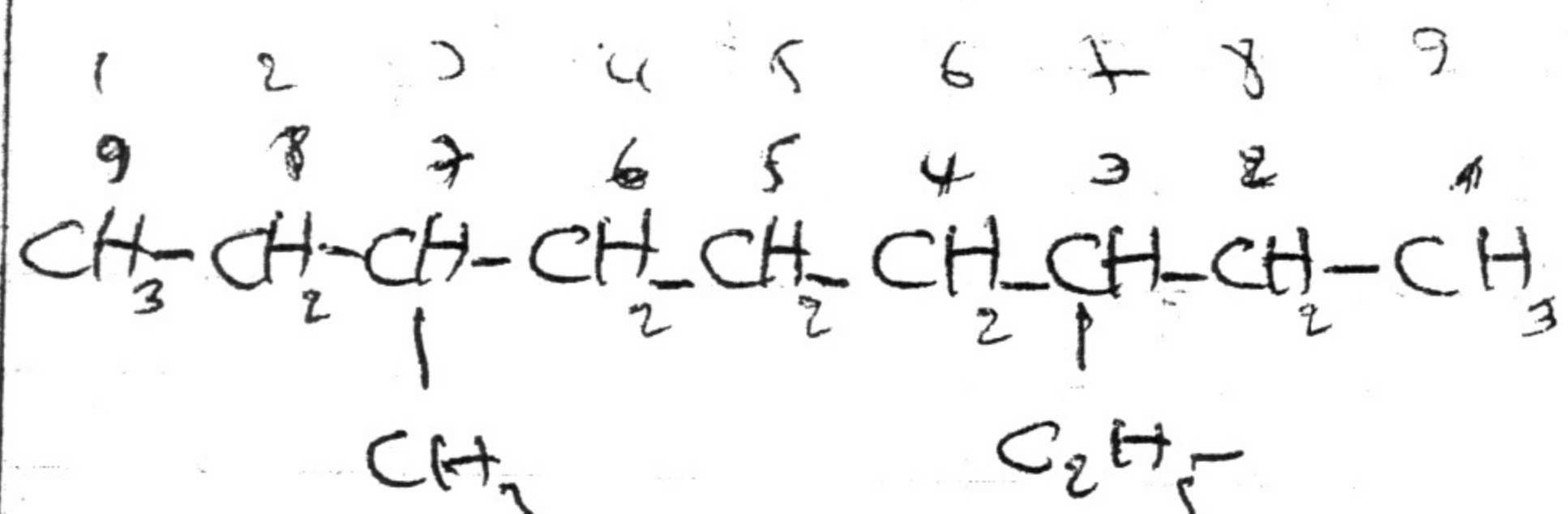


3. 3,9-trimethyl-6-tert-butyldecane.

4-ethyl-3-methylpentane.



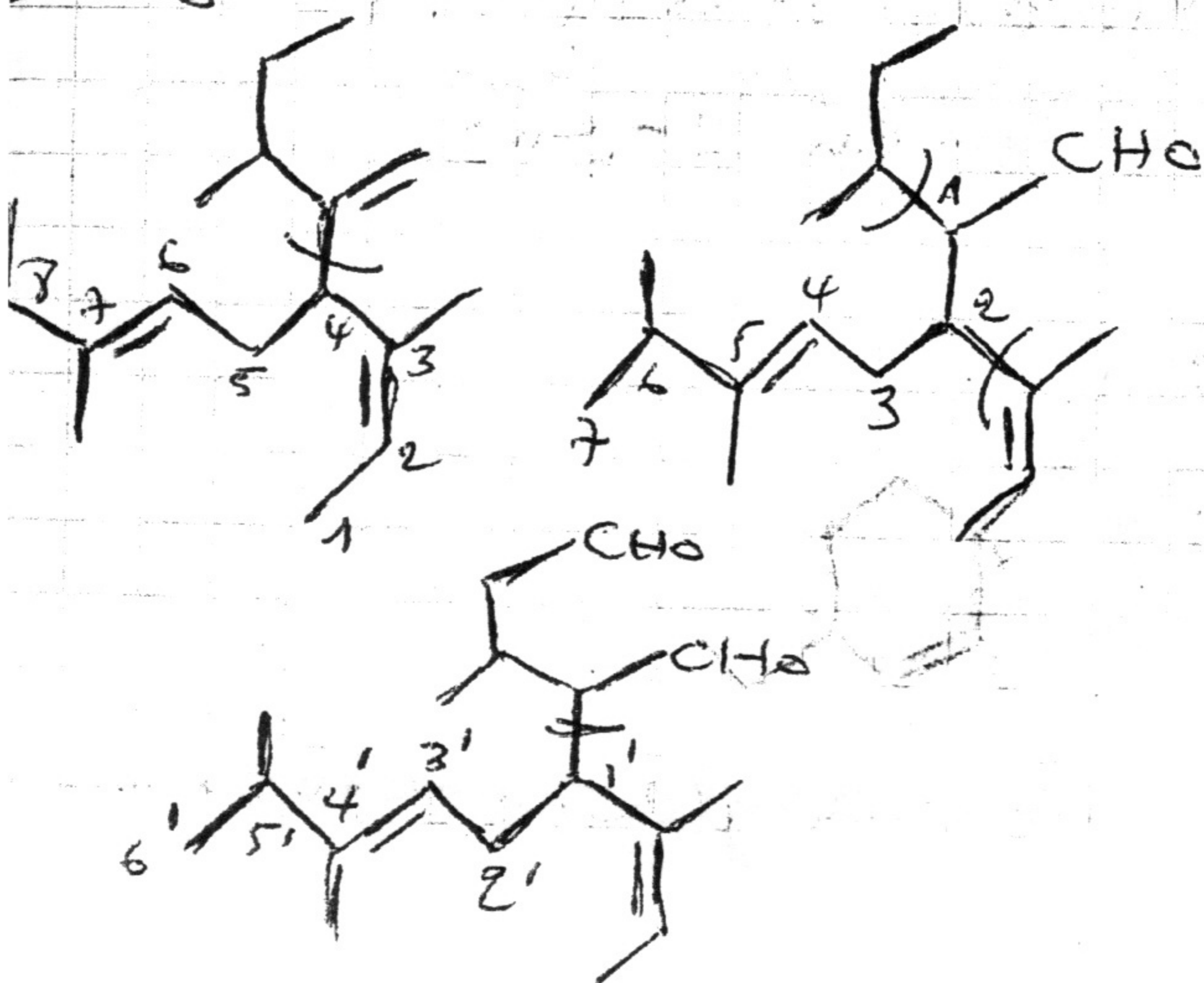
* 7-ethyl-3-methylnonane.



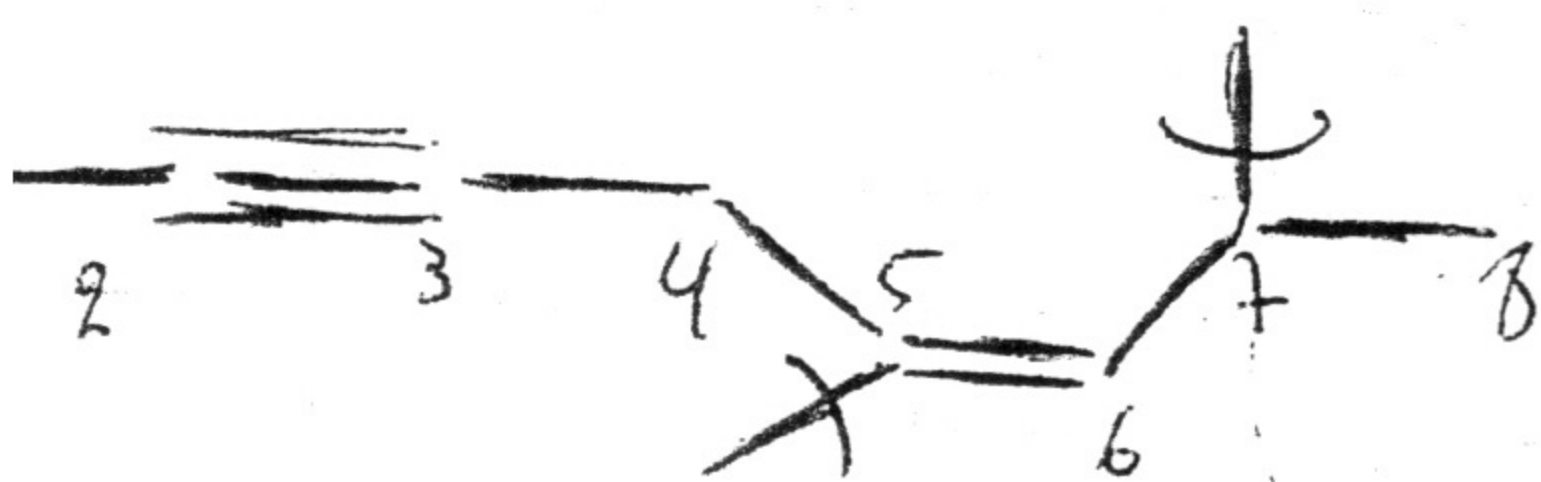
3-ethyl-7-methylnonane.

-(1'-methylpropyle)decane - 2,3,7,8-

8-tetramethyl-6-(1'-methylpropyle)decane.
D Isobutyl (isobutyl)



2



Dimethyl-5-en-2-yne



ethyl-2-en-5-yne



Mouhssine KOUSSOUR



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