

IV.2. Nomenclature of functional compounds :

Polyfunctional compounds are compounds which contain two or more than two functional groups in an organic compound. Some of the examples of polyfunctional compounds are : $\text{CH}_3\text{-CO-CH}_2\text{-COOH}$, $\text{NH}_2\text{-(CH}_2\text{)}_3\text{-NH}_2$, CCl_4 .

Whenever we do the IUPAC naming of polyfunctional group, we categorise the functional group as primary and secondary functional group according to their priority.

Procedure for naming functional groups :

✚ Rule 1 : Select of principal functional group :

In the IUPAC nomenclature system, organic molecules are grouped into specific classes of compounds determined by the main functional group present in the structure. A system of priorities is used to determine the main functional group, which determines the identity of the compound. All other functional groups are treated as substituents. n, the

Whenever we select the principal group, we select it according to the priority. In a polyfunctional compound, the functional group which has the highest priority is selected as the principal functional group.

Order of Priority of Functional Groups in Polyfunctional Compound

The order of decreasing priority for some functional groups is given below:

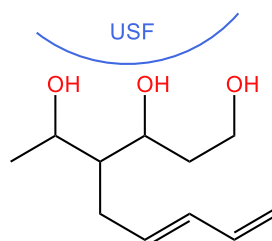
$-\text{COOH}$, $-\text{SO}_3\text{H}$, $-\text{COOR}$ (R=alkyl group), COCl , $-\text{CONH}_2$, $-\text{CN}$, $-\text{HC}=\text{O}$, $>\text{C}=\text{O}$, $-\text{OH}$, $-\text{NH}_2$, $>\text{C}=\text{C}>$ $-\text{C}\equiv\text{C}-$ $>\text{R-O-R}'>$ $-\text{X}>$ $-\text{NO}_2$.

The functional groups other than the principal functional groups in a polyfunctional compound are called substituent or secondary functional groups. Example $\text{OH-CH}_2\text{-CH}_2\text{-COOH}$

In this polyfunctional compound OH is substituent and COOH is the principal functional group.

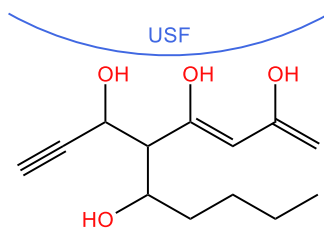
Rule 2 : Select the principal carbon chain

- The chain must contain the maximum number of the principal functional groups, then :

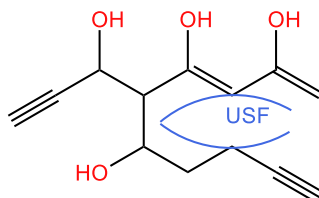


- It must must contain the maximum number of the multiple bonds, then

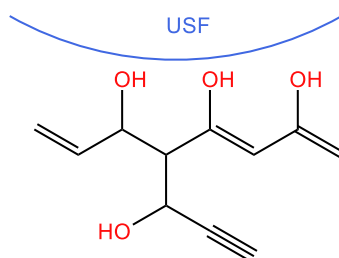
Nomenclature of functional compounds



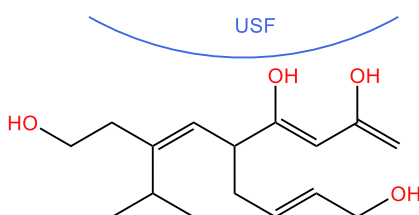
- It must contain the maximum number of carbon atoms, then



- It must contain the maximum number of the double bonds, then



- It must contain the maximum number of substituents



✚ Rule 3 : numbering the principal chain :

- The principle functional groups must be given the lowest possible number,



then :

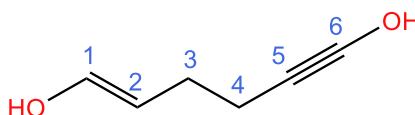
- The multiple bonds must be given the lowest possible number,



then :

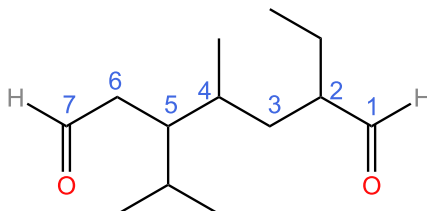
Nomenclature of functional compounds

- The double bonds must be given the lowest possible number,



then :

- The substituents must be given the lowest possible number.



✚ Rule 4 : Write the name

✚ prefixe prefixe PCC suffixe1 suffixe2

✚ Prefixe1 : substituents and secondary functionals (remaining functional)

✚ Prefixe : cyclo

✚ PCC : principle carbon chain

✚ Suffixe1 : multiple bonds

✚ Suffixe2 : principle functional group

Highest priority groups : 1- carboxylic acids

2- anhydride acids

3- esters

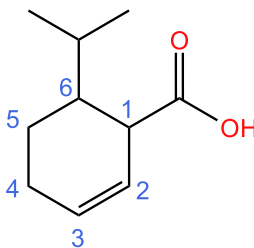
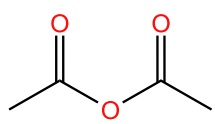
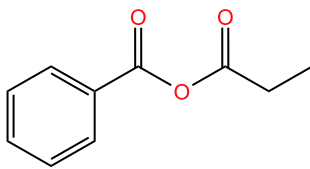
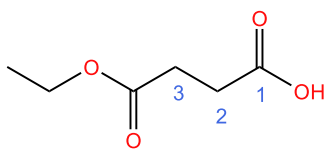
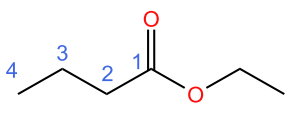
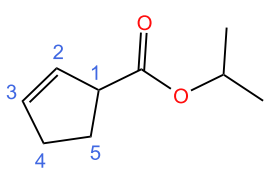
4- acide halides

5- amides

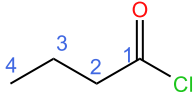
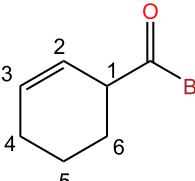
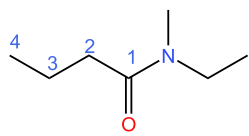
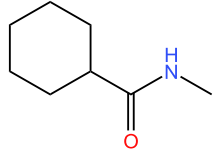
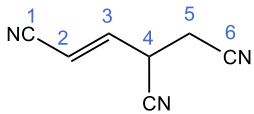
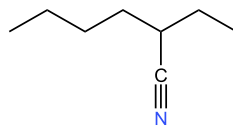
6- nitriles

N°	group	Prefixe	suffixe
1- carboxylic acids	-COOH	Carboxy : 2-carboxy pentan-1,5-dioic acid	-oic acid : pent-2-enoic acid <i>The carbon atom of the -COOH group always has the number 1.</i>

Nomenclature of functional compounds

			<p>-carboxylic acid :</p>  <p>6-isopropylcyclohex-2-ene-1-carboxylic acid</p> <p><i>the carbon of the cycle bearing the -COOH group is numbered 1</i></p>
2-anhydride acid	R-CO-O-CO-R'		<p>R = R' : alkanolic anhydride :</p>  <p>Ethanoic anhydride</p> <p>R ≠ R' ; alkanolic alkanolic anhydride :</p>  <p>benzoic propanoic anhydride</p>
3-esters	R-CO-OR'	<p>Alkoxy carbonyl :</p>  <p>Ethoxy carbonyl propanoic acid</p>	<p>-alkyl alkanooat :</p>  <p>Ethyl butanoat</p> <p>-alkyl alkyl carboxylate :</p>  <p>Isopropyl cyclopent-2-ene</p>

Nomenclature of functional compounds

			carboxylate
4-acid halide	R-CO-X (X : F, Cl, Br, I)	Halide carbonyl :	-oyl halide :  Chlorure de butanoyle -carbony halide :  Bromure de cyclohe-2-èneyle
5-amides			N-alkyl-N-alkyl alkan amide :  N-ethyl-N-methylbutane amide N-alkyl-N-alkyl alkan carboxamide :  N-methylcyclohexane carboxamide
6-nitrile		Cyano  4-cyano hex-2-enedinitril	-nitrile :  2-ethylhexane nitril -carbonitrile :

Nomenclature of functional compounds



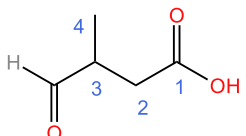
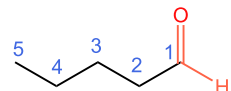
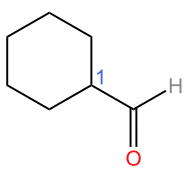
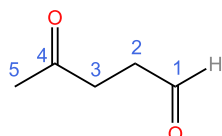

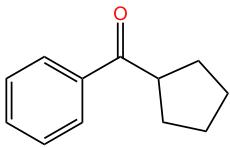
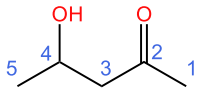
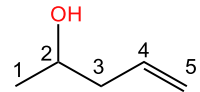
Nexte line : 7-aldehyde

8-ketone

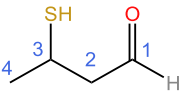
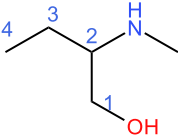
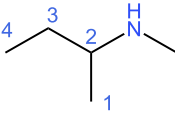
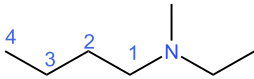
9-alcohol

10- thiol

11-amine

N°	Group	Prefix	suffixe
7- aldehyde	-CHO	Formyl- :  3-formyl butanoic acid	-al :  pentanal -carbaldehyd :  Cyclohexane carbaldehyde
8-ketone	R-CO-R'	Oxo- :  4-oxo pentanal	-one  Propanone (acetone) Alkyl alkyl ketone  Cyclopentyl phenyl ketone
9-alcohols	-OH	Hydroxy- : 	-ol 

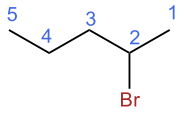
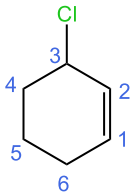
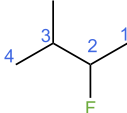
Nomenclature of functional compounds

		4-hydroxypentan-2-one	Pent-4-en-2-ol
10-thiols	-SH	Mercapto- :  3-mercaptobutanal	
11-amines	$\begin{array}{c} R' \\ \\ R-N-R'' \end{array}$	N-alkyl-N-alkyl amino-  2-(N-methylamino)butan-1-ol	N-alkyl-N-alkyl alkan amine :  N-methyl- butan-2-amine  N-ethyl-Nmethyl butane amine

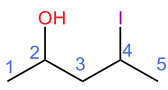
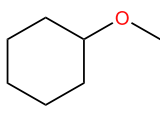
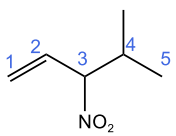
Functional groups that are always prefixes : 12-halides

13-alkoxy

14-nitro

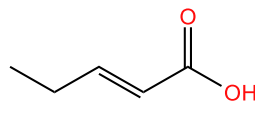
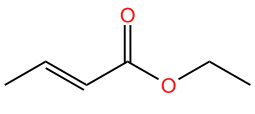
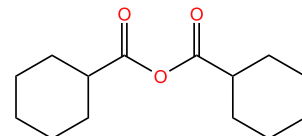
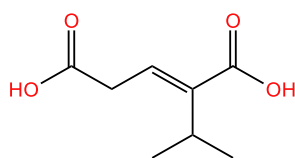
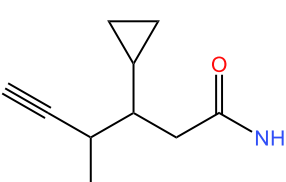
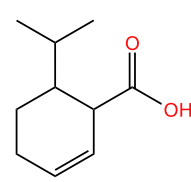
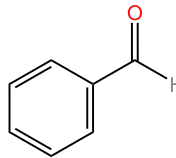
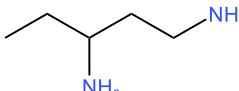
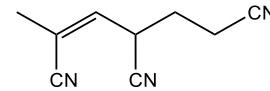
N°	Group	prefixe
12- halide	-X X : F, Cl, Br , I	bromo- :  2-bromo pentane Chloro :  3-chloro cyclohexene Fluoro : 

Nomenclature of functional compounds

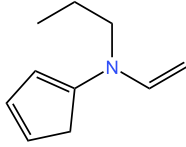
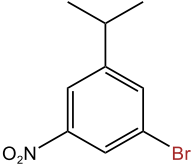
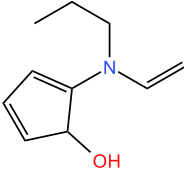
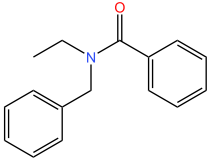
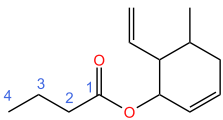
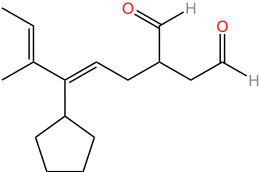
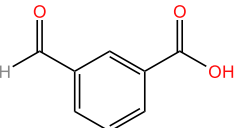
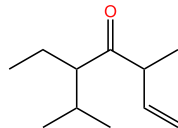
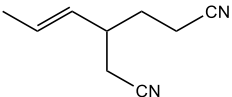
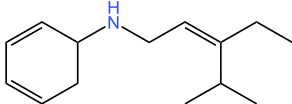
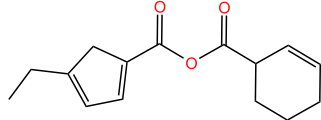
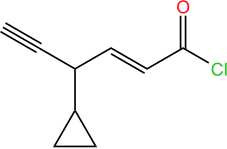
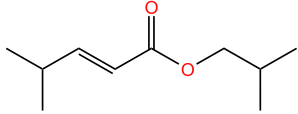
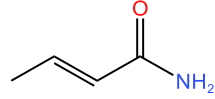
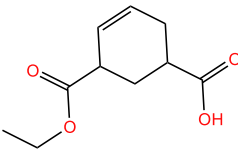
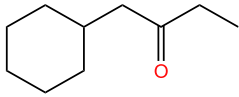
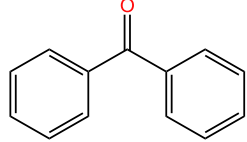
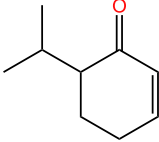
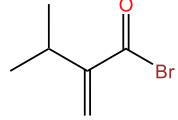
		<p>2-fluoro-3-methylbutane</p> <p>Iodo :</p>  <p>4-iodo pentanol</p>
13-alkoxy	-O-R	<p>alkoxy :</p>  <p>Methoxy cyclohexane</p>
14-nitro	-NO₂	<p>nitro- :</p>  <p>4-methyl-3-nitropentene</p>

Exercise :

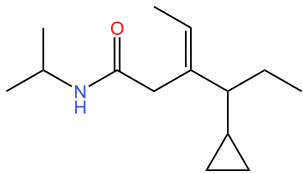
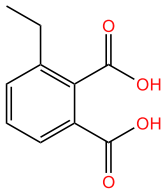
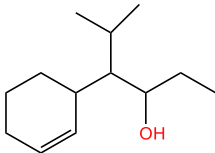
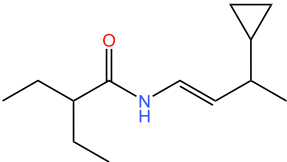
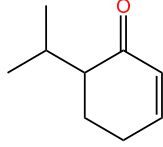
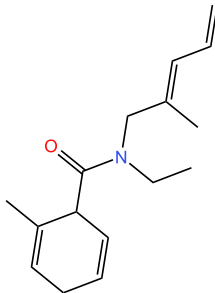
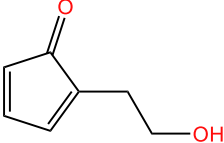
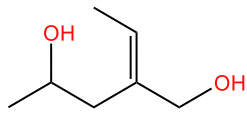
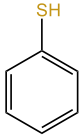
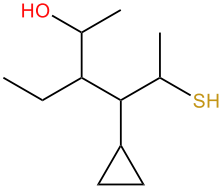
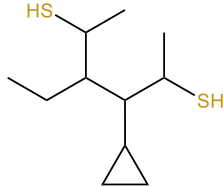
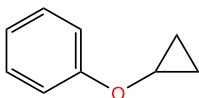
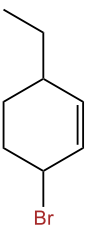
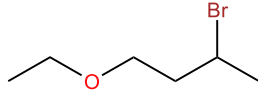
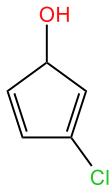
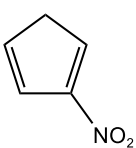
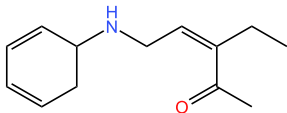
Naming th following compounds :

1.	2.	3.
		
4.	5.	6.
		
7.	8.	9.
		

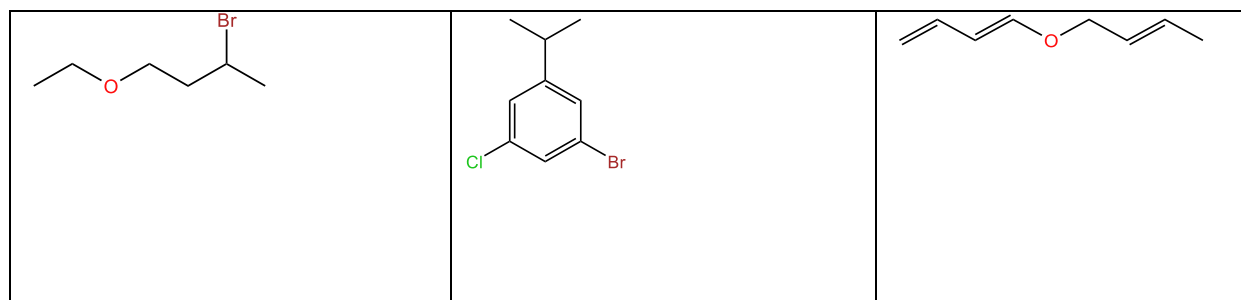
Nomenclature of functional compounds

10. 	11. 	12. 
13. 	14. 	15. 
16. 	17. 	18. 
19. 	20. 	21. 
22. 	23. 	24. 
25. 	26. 	27. 
28.	29. 	30.

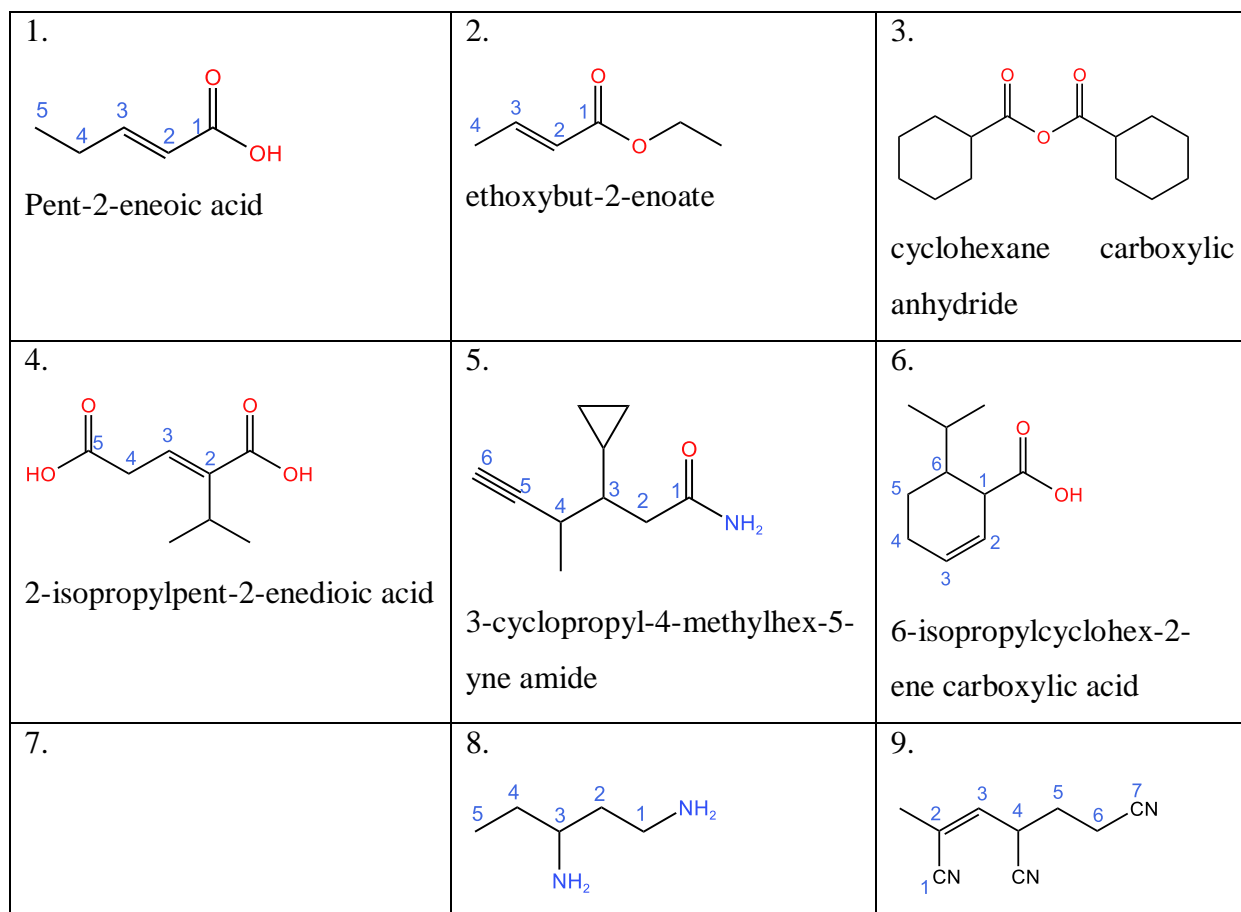
Nomenclature of functional compounds

		
31. 	32. 	33. 
34. 	35. 	36. 
37. 	38. 	39. 
40. 	41. 	42. 
43. 	44. 	45. 
46.	47.	48.

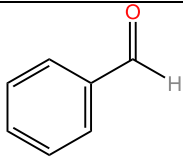
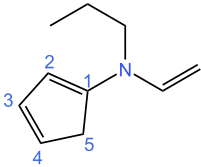
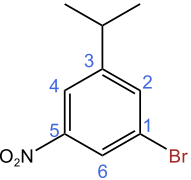
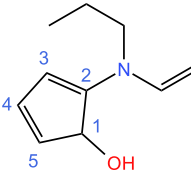
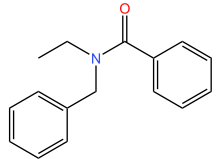
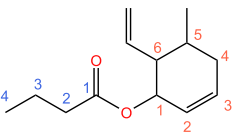
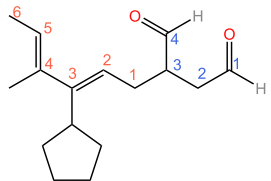
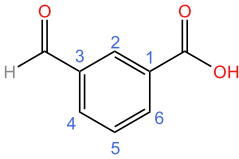
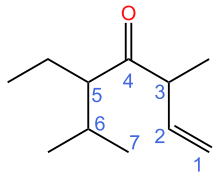
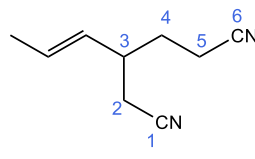
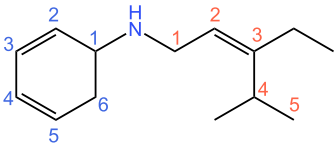
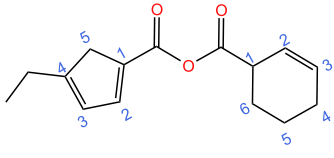
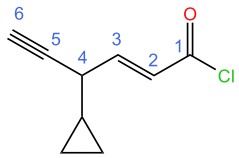
Nomenclature of functional compounds



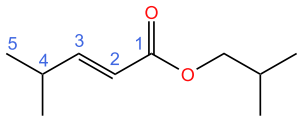
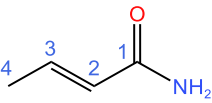
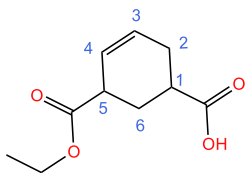
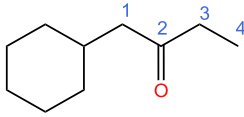
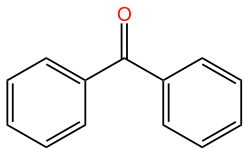
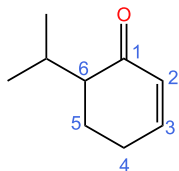
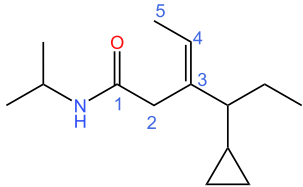
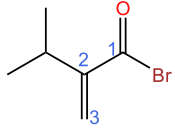
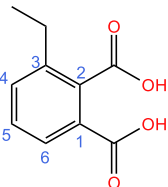
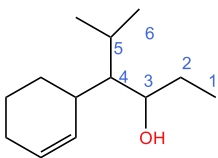
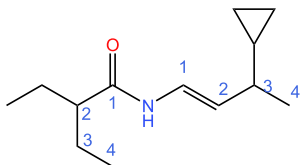
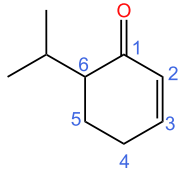
Solution :



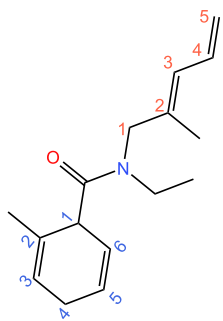
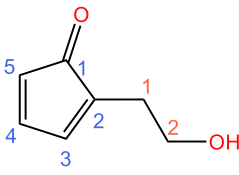
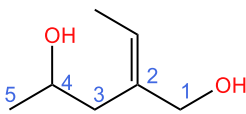
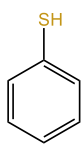
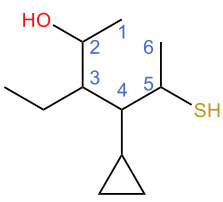
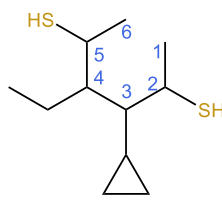
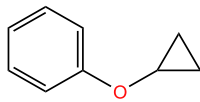
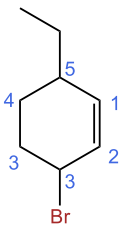
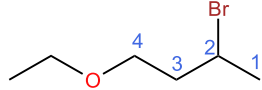
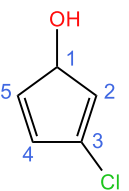
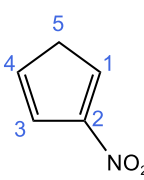
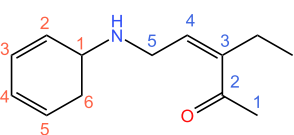
Nomenclature of functional compounds

 <p>Benzene carbaldehyde (benzaldéhyde)</p>	<p>Pentane-1,3-diamine</p>	<p>4-cyano-2-methylhept-2-ene dinitrile</p>
<p>10.</p>  <p>N-ethenyl-N-propylcyclopenta-1,3-diene amine</p>	<p>11.</p>  <p>1-bromo-3-isopropyl-5-nitrobenzene</p>	<p>12.</p>  <p>2-(N-ethyl-N-propyl amino)cyclopenta-2,4-dien-1-ol</p>
<p>13.</p>  <p>N-benzyl-N-ethyl benzamide</p>	<p>14.</p>  <p>5-methyl-6-ethenylcyclohex-2-enyl Butanoate</p>	<p>15.</p>  <p>3-(3-cyclopentyl-4-methylhexa-2,4-dienyl)butandial</p>
<p>16.</p>  <p>3-formylbenzoic acid (3-formyl benzene carboxylic acid)</p>	<p>17.</p>  <p>5-ethyl-3,6-dimethylheptan-4-one</p>	<p>18.</p>  <p>3-prop-1-enylhexane dinitrile</p>
<p>19.</p>  <p>N-(3-ethyl-4-</p>	<p>20.</p>  <p>cyclohex-2-ene carboxylique-</p>	<p>21.</p>  <p>4-cyclopropylhex-2-en-5-</p>

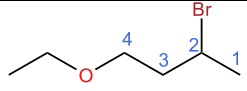
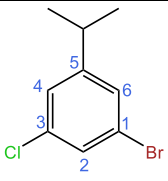
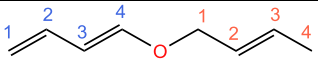
Nomenclature of functional compounds

<p>methylpentyl)cyclohexa-2,4-diene amine</p>	<p>4-ethylcyclopenta-1,3-diene carboxylique anhydride</p>	<p>ynoyle chloride</p>
<p>22.</p>  <p>isobutyl 4-methyl pent-2-enoate</p>	<p>23.</p>  <p>but-2-ene amide</p>	<p>24.</p>  <p>5-(ethoxy carbonyl)cyclohex-3-ene carboxylique acid</p>
<p>25.</p>  <p>1-cyclohexylbutan-2-one</p>	<p>26.</p>  <p>diphenyl ketone</p>	<p>27.</p>  <p>6-isopropyl cyclohex-2- en-1-one</p>
<p>28.</p>  <p>N-isopropyl cyclopropylpent-3-ene amide</p>	<p>29.</p>  <p>2-isopropyl Bromide</p> <p>propnoyle</p>	<p>30.</p>  <p>3-ethyl benzene-1,2- dicarboxylic acid (2-carboxy-3- ethylbenzoique acide)</p>
<p>31.</p>  <p>4-cyclohex-2-enyl-5- methylhexan-3-ol</p>	<p>32.</p>  <p>N-(3-cyclopropylbut-1-enyl)- 2-ethylbutane amide</p>	<p>33.</p>  <p>6-isopropyl cyclohex-2- en-1-one</p>

Nomenclature of functional compounds

<p>34.</p>  <p>N-ethyl-N-(2-methylpenta-2,4-enyl) 2-methylcyclohexa-2,5-diene carboxamide</p>	<p>35.</p>  <p>2-(2-hydroxyethyl)cyclopenta-2,4-dien-1-one</p>	<p>36.</p>  <p>2-ethylidene-pentane-1,4-diol</p>
<p>37.</p>  <p>phenylthiol</p>	<p>38.</p>  <p>4-cyclopropyl-3-ethyl-5-mercaptanhexan-2-ol</p>	<p>39.</p>  <p>3-cyclopropyl-4-ethylhexa-2,5-dithiol</p>
<p>40.</p>  <p>cyclopropoxybenzène</p>	<p>41.</p>  <p>3-bromo-5ethyl cyclohex-1-ene</p>	<p>42.</p>  <p>4-ethoxy-2-bromobutane</p>
<p>43.</p>  <p>3-chloro cyclopenta-2,4-dien-1-ol</p>	<p>44.</p>  <p>2-nitro cyclopent-1,3-diene</p>	<p>45.</p>  <p>5-(N-cyclohexa-2,5-dienyl amino)-3-ethylpent-4-en-2-one</p>
<p>46.</p>	<p>47.</p>	<p>48.</p>

Nomenclature of functional compounds

 <p>4-ethoxy-2-bromobutane</p>	 <p>1-bromo-3-chloro-5-isopropyl benzene</p>	 <p>But-2-enoxy buta-1,3- diene</p>
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