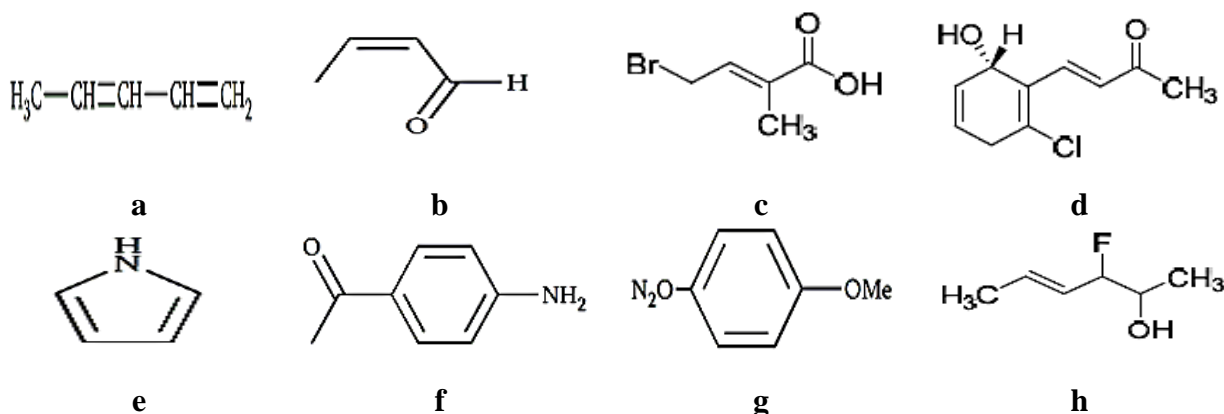


Séries N°1

Exercise 1 :

I) Specify for each of the following groups the nature of the electronic effects (inductive and/or mesomeric).:  $-\text{OCH}_3$ ,  $-\text{COCH}_3$ ,  $-\text{COOCH}_3$ ,  $-\text{OCOCH}_3$ ,  $-\text{NH}_2$ ,  $-\text{NO}_2$ ,  $-\text{NHCOCH}_3$ ,  $-\text{NEt}_2$ ,  $-\text{N}^+(\text{CH}_3)_3$ ,  $-\text{CCl}_3$ ,  $-\text{CH}_3$ .

II) Provide all the resonance forms of the following molecules:



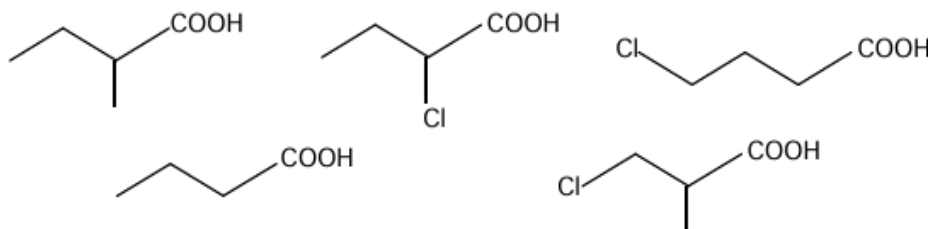
Exercise 2 :

I) Rank the following molecules in order of increasing acidity, justifying your choice:

1)  $\text{CH}_3\text{OH}$ ,  $(\text{CH}_3)_2\text{CHOH}$ ,  $\text{ClCH}_2\text{CH}_2\text{OH}$ ,  $\text{CF}_3\text{CH}_2\text{OH}$ ,  $\text{CF}_3\text{CH}_2\text{CH}_2\text{OH}$

2)  $\text{CH}_3-\text{COOH}$ ,  $(\text{CH}_3)_3\text{C}-\text{COOH}$ ,  $\text{ClCH}_2-\text{COOH}$ ,  $\text{Cl}_3\text{C}-\text{COOH}$ .

II) Rank the following 5 compounds in order of decreasing pKa:

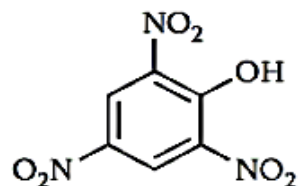
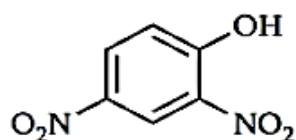
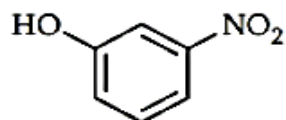
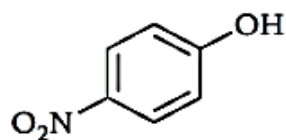


Exercise 3 :

1) Assign the two pKa values of 10 and 16 to the following two compounds:



2) Consider the mononitrated, dinitrated, and trinitrated derivatives of phenol, represented below:



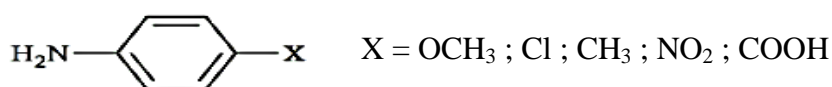
Assign to each compound the corresponding pKa value: 1.02; 4.01; 7.14; 8.35. Justify. Estimate the approximate pKa value of orthonitrophenol.

**Exercise 4 :**

1) Rank the following bases in order of increasing basicity:

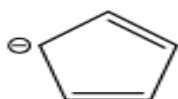
$\text{C}_6\text{H}_5\text{NH}_2$  ;  $\text{NH}_3$  ;  $(\text{C}_2\text{H}_5)_2\text{NH}$  ;  $\text{C}_2\text{H}_5\text{NH}_2$ .

2) Rank the following compounds in order of decreasing basicity, justifying your answer.

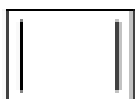


**Exercise 5 :**

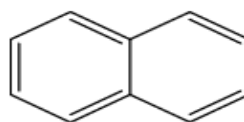
Among the following compounds, indicate which ones are aromatic.



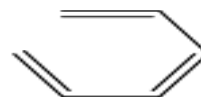
**a**



**b**



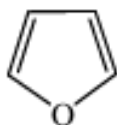
**c**



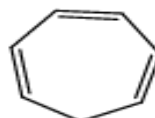
**d**



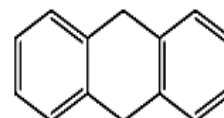
**e**



**f**



**g**



**h**