

Organic Chemistry Some Basic Principles and Techniques Important Questions With Answers

NEET Chemistry 2023

1. Which of the following organic compounds has same hybridization as its combustion (CO_2) product?
 a) Ethane **b) Ethyne** c) Ethene d) Ethanol

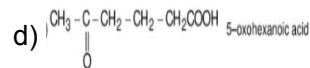
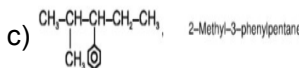
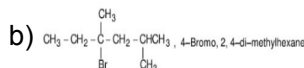
Solution : -

In CO_2 ($\text{O}=\text{C}=\text{O}$) the hybridisation of carbon is sp and in ethyne ($\text{H}-\text{C}\equiv\text{C}-\text{H}$) the hybridization of carbon is sp .

2. Which nomenclature is not according to IUPAC system?

Br-CH₂-CH=CH₂

a) 1-bromo prop 2-ene



Solution : -

In IUPAC nomenclature, preference is given to multiple bond than halogen substituent so the correct name of $\text{Br}-\text{CH}_2-\text{CH}=\text{CH}_2$ is 3-bromo prop-1-ene.

3. The correct order of increasing bond length of $\text{C}-\text{H}$, $\text{C}-\text{O}$, $\text{C}-\text{C}$ and $\text{C}=\text{C}$ is:

- a) $\text{C}-\text{C} < \text{C}=\text{C} < \text{C}-\text{O} < \text{C}-\text{H}$ b) $\text{C}-\text{O} < \text{C}-\text{H} < \text{C}-\text{C} < \text{C}=\text{C}$ c) $\text{C}-\text{H} < \text{C}-\text{O} < \text{C}-\text{C} < \text{C}=\text{C}$
d) $\text{C}-\text{H} < \text{C}=\text{C} < \text{C}-\text{O} < \text{C}-\text{C}$

Solution : -

Bond length values are:

$\text{C}-\text{H}$: 0.109 nm

$\text{C}=\text{C}$: 0.134 nm

$\text{C}-\text{O}$: 0.143 nm

$\text{C}-\text{C}$: 0.154 nm

Thus, the bond length order will be

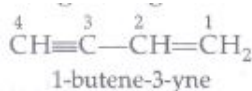
$\text{C}-\text{H} < \text{C}=\text{C} < \text{C}-\text{O} < \text{C}-\text{C}$

4. The IUPAC name of the compound having the formula $\text{CH}\equiv\text{C}-\text{CH}=\text{CH}_2$ is:

- a) 3-butene -1-yne b) 1-butyne 3-ene c) but 1-yne -3-ene **d) 1-butene-3-yne**

Solution : -

Double bond has preference over triple bond while naming the organic compound.



5. In compound 'X' all the bond angles are exactly $109^\circ 28'$ 'X' is.

- a) Chloromethane b) Iodoform **c) Carbon tetrachloride** d) Chloroform

Solution : -

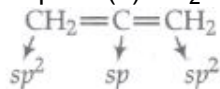
Carbon tetrachloride (CCl_4) have sp^3 hybridisation with tetrahedral geometry so it will have all bond angle of $109^\circ 28'$.

6. Which of the following possesses a sp -carbon in its structure?

- a) $\text{CH}_2=\text{CCl}-\text{CH}=\text{CH}_2$ b) $\text{CH}_2=\text{C}=\text{CH}_2$ c) $\text{CCl}_2=\text{CCl}_2$ d) $\text{CH}_2=\text{CH}-\text{CH}=\text{CH}_2$

Solution : -

In option (b) $\text{CH}_2=\text{C}=\text{CH}_2$, the middle carbon is attached with two π -bonds, so it has sp -hybridisation.



(they are called as allenes)

7. Which of the following is correct with respect to -I effect of the substituents? (R = alkyl)

- a) $-\text{NH}_2 > -\text{OR} > -\text{F}$ b) $-\text{NR}_2 < -\text{OR} < -\text{F}$ c) $-\text{NH}_2 < -\text{OR} < -\text{F}$ d) $-\text{NR}_2 > -\text{OR} > -\text{F}$

Solution : -

-I effect increases on increasing electronegativity of atom. So, correct order of -I effect is $-\text{NH}_2 < -\text{OR} < -\text{F}$.

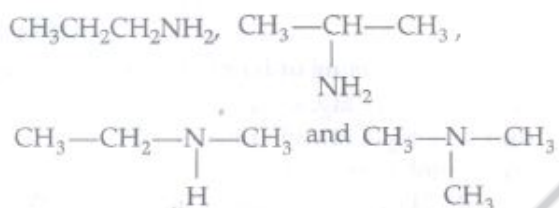
Most appropriate answer is option (c), however option (b) may also be correct answer. So, answer (b) can also a correct answer.

8. The number of structural isomers possible from the molecular formula $\text{C}_3\text{H}_9\text{N}$ is :

- a) 4 b) 5 c) 2 d) 3

Solution : -

Structural isomers of $\text{C}_3\text{H}_9\text{N}$ are :



9. Which of the following statement is not correct for a nucleophile?

- a) **Nucleophile is a lewis acid** b) Ammonia is a nucleophile
c) Nucleophiles attack low electron density sites d) Nucleophiles are not electron seeking

Solution : -

Nucleophiles are electron rich species and acts as a Lewis base but not as Lewis acid.

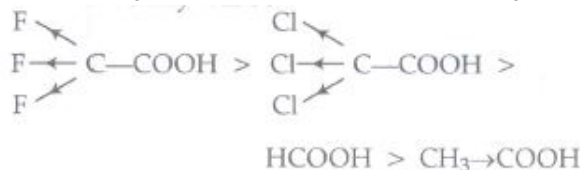
10. The correct order of decreasing acidic strength of trichloroacetic acid (A) trifluoroacetic acid (B) acetic acid (C) and formic acid (D) is :

- a) **$\text{B} > \text{A} > \text{D} > \text{C}$** b) $\text{B} > \text{D} > \text{C} > \text{A}$ c) $\text{A} > \text{B} > \text{C} > \text{D}$ d) $\text{A} > \text{C} > \text{B} > \text{D}$

Solution : -

The presence of -I effect group makes the removal of proton more easy by stabilising the remaining carboxylate ion and thus making acid more acidic.

Here $-\text{CF}_3$ has more -I effect than $-\text{CCl}_3$. Thus order of acidity will be

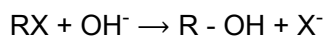
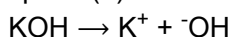


11. Which of the following reactions is an example of nucleophilic substitution reaction?

- a) **$\text{R-X} + \text{KOH} \rightarrow \text{ROH} + \text{KX}$** b) $2\text{RX} + 2\text{Na} \rightarrow \text{R-R} + 2\text{NaX}$ c) $\text{RX} + \text{H}_2 \rightarrow \text{RH} + \text{HX}$
d) $\text{RX} + \text{Mg} \rightarrow \text{RMgX}$

Solution : -

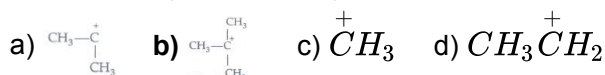
Option (a) involves



(nucleophile)

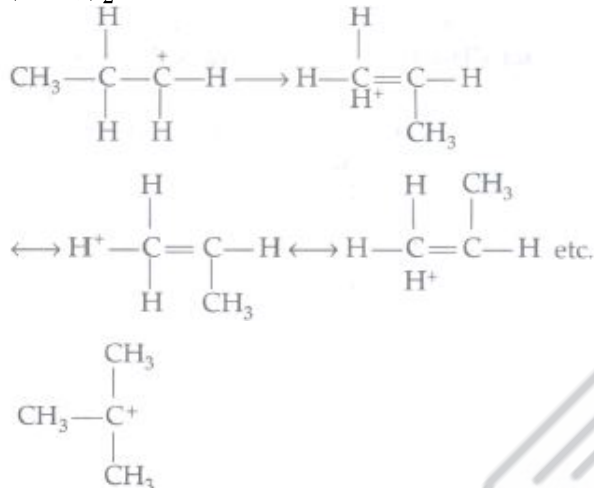
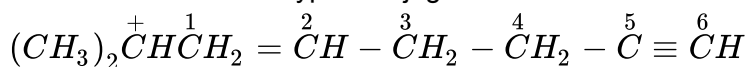
OH^- is a stronger nucleophile than halogen so easily replace the weaker nucleophile. Thus, it is an example of nucleophilic substitution reaction.

12. Which among the following is the most stable carbocation?



Solution : -

The most stable carbocation is t-alkyl carbocation because the order of stability of alkyl carbocation is t-alkyl > s-alkyl > p-alkyl > CH_3 carbocation. The stability order is described with the help of hyperconjugation and inductive effect. On the basis of hyper-conjugation

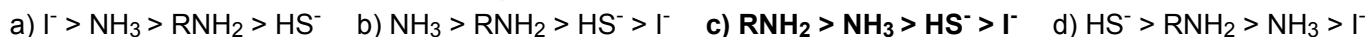


shows nine resonating structures due to the presence of nine $\alpha\text{-C-H}$ bonds. Greater the number of α -hydrogen atom greater will be the hyperconjugation and thus greater will be the stability.

$\overset{+}{\text{C}}\text{H}_3$ does not show any hyperconjugation while $\text{CH}_3\overset{+}{\text{C}}\text{H}_2$ shows three hyperconjugating structures. The larger number of hyperconjugation is possible in option (b) only.

Moreover the +I effect of $-\text{CH}_3$ group increase the stability of carbocation by decreasing the magnitude of positive charge.

13. In HS^- , I^- , RNH_2 , NH_3 order of proton accepting tendency will be :

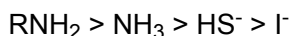


Solution : -

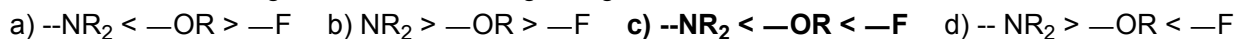
Basic strength is directly proportional to rate of accepting a proton.

In $\text{R}-\ddot{\text{N}}\text{H}_2$, nitrogen has lone pair of electron whose intensity increases due to presence of R group and thus the tendency to donate lone pair of electron to H^+ increases.

On other hand as the size of the ion increases there is less attraction for H^+ and form weaker bond with H-atom and thus order will be

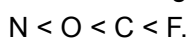


14. Which of the following orders is correct regarding the -I effect of the substituents?

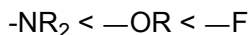


Solution : -

The electronegativity follow the order



So, due to electronegative character the order of -I effect is



15. Which one of the following compounds is resistant to nucleophilic attack by hydroxyl ions?

- a) Methyl acetate b) Acetonitrile c) **Dimethyl ether** d) Acetamide

Solution : -

Dimethyl ether does not show nucleophilic attack due to absence of multiple bond. Rest in all other compounds given in option have multiple bonded C-atom and bears partial positive charges therefore they undergo nucleophilic attack by ^-OH ions.

16. Correct increasing order of acidity is given as:

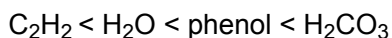
- a) H_2O , C_2H_2 , H_2CO_3 , phenol b) C_2H_2 , H_2O , H_2CO_3 , phenol c) Phenol, C_2H_2 , H_2CO_3 , H_2O

d) **C_2H_2 , H_2O , phenol and H_2CO_3**

Solution : -

$HC \equiv CH$ have acidic nature but it is less acidic than water but phenol is more acidic than water due to resonance stabilization of phenoxide ion. H_2CO_3 is most acidic due to resonating stabilization of carbonate ion CO_3^{-2}

\therefore Acidic order will be

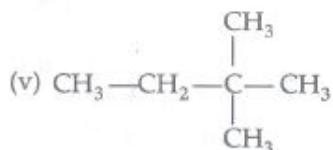
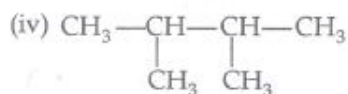
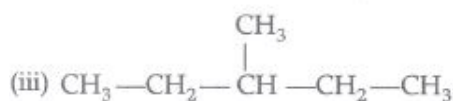
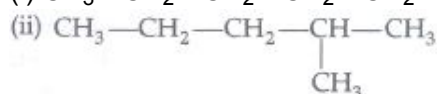
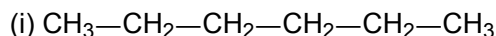


17. How many chain isomers could be obtained from the alkane C_6H_{14} ?

- a) Four b) **Five** c) Six d) Seven

Solution : -

There are five chain isomers for hexane (C_6H_{14})



18. The most suitable method of separation of 1 : 1 mixture of ortho- and para-nitrophenols is :

- a) sublimation b) chromatography c) crystallisation d) **steam distillation**

Solution : -

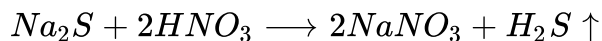
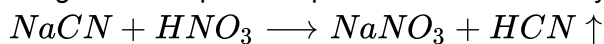
In ortho-nitrophenol, there is intramolecular hydrogen bonding while in para-nitrophenol, there is intermolecular hydrogen bonding due to which para-isomers have stronger attraction between molecules which results it to be non-molecule. But ortho-isomer lack this interaction among their molecules which results it to be water or steam. Thus, due to these properties these two isomers can be separated by steam distillation. Being volatile, ortho-nitrophenol vapourise with steam leaving behind non-volatile component that is paranitrophenol. Being immiscible with water orthonitrophenol then separates with water (steam) at later stage.

19. The Lassaigne's extract is boiled with concentrated HNO_3 while testing for halogens. By doing so, it

- a) helps in the precipitation of $AgCl$ b) increases the solubility product of $AgCl$
c) increases the concentration of NO_3^- ions d) **decomposes Na_2S and $NaCN$, formed**

Solution : -

In case of Lasseigne's test of halogens, it is necessary to remove NaCN and Na₂S from the sodium extract, if nitrogen and sulphur are present. This is done by boiling the sodium extract with conc.HNO₃



20. Lassaigne's test for the detection of nitrogen fails in :

- a) NH₂CONHNH₂.HCl **b) NH₂NH₂.HCl** c) NH₂CONH₂ d) C₆H₅NHNH₂.HCl

Solution : -

Lassaigne's test is given by only those compounds which contain both carbon and nitrogen. When compounds containing carbon and nitrogen are heated with sodium then it forms NaCN which is easily detected by FeCl₃.

21. Kjeldahl's method is used in the estimation of :

- a) nitrogen** b) halogens c) sulphur d) oxygen

Solution : -

Kjeldahl's method is used for estimation of nitrogen in organic compounds. However, this method cannot be used for the organic compound containing nitrogen in the ring such as pyridine, quinoline and organic compound containing nitro (-NO₂) and diazo (—N=N—) groups.

22. Lassaigne's test is used in qualitative analysis to detect :

- a) nitrogen b) sulphur c) chlorine **d) All of these**

Solution : -

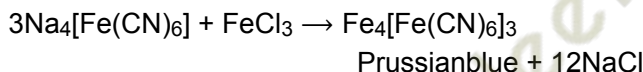
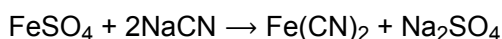
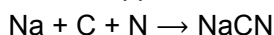
Lassaigne's test is used in detection of nitrogen, sulphur and chlorine.

23. Prussian blue is formed when :

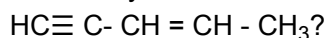
- a) ferrous sulphate reacts with FeCl₃ **b) ferric sulphate reacts with Na₄[Fe(CN)₆]**
c) ferrous ammonium sulphate reacts with FeCl₃ d) ammonium sulphate reacts with FeCl₃

Solution : -

When sodium fusion extract is added with FeCl₃ and then the resulting solution is acidified with dilute hydrochloric acid the appearance of prussian blue colouration confirms the presence of nitrogen in the organic compound.

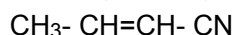


24. How many σ and π bonds are present in



- a) 9σ, 4π **b) 10σ, 3π** c) 6σ, 6π d) 6σ, 6π

25. Which type of hybridisation of each carbon is there in the compound?

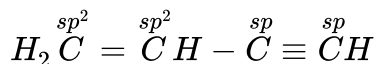


- a) sp³, sp², sp², sp** b) sp³, sp², sp², sp³ c) sp³, sp², sp³, sp³ d) sp³, sp², sp, sp³

26. Which of the following represents the given sequence of hybridisation of carbon atoms from left to right sp², sp², sp, sp?

- a) H₂C = CH - C = CH** b) HC = C - CH = CH₂ c) H₃C - CH = CH - CH₃ d) H₂C = CH - CH = CH₂

Solution : -



27. The hybridisation of carbons of C - C single bond of HC ≡ C - CH = CH₂ is

- a) sp³-sp³ **b) sp-sp²** c) sp³-sp d) sp²-sp³

28. What are the hybridization and shapes of the following molecules?

(i) CH_3F (ii) $\text{HC} = \text{N}$

a) (i) sp^2 , trigonal planar; (ii) sp^3 , tetrahedral **b) (i) sp^3 , tetrahedral; (ii) sp , linear**

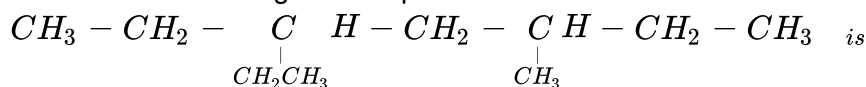
c) (i) sp , linear; (ii) sp^2 , trigonal planar d) (i) sp^2 , trigonal planar, (ii) sp^2 , trigonal planar

Solution : -

(i) CH_3F - sp^3 hybridised carbon, tetrahedral shape

(ii) $\text{HC} = \text{N}$ - sp hybridised carbon, linear shape.

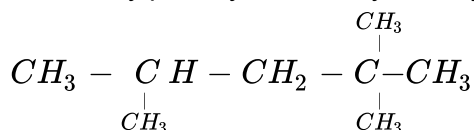
29. Correct name for the given compound



a) 3-ethyl-5-methylheptane b) 5-ethyl-3-methylheptane c) 1, 1-diethyl-3-methylpentane

d) 3-methyl-5, 5-diethylpentane.

30. How many primary, secondary, tertiary and quaternary carbon atoms are present in the following compound?



a) One primary, two secondary and one tertiary b) Five primary, three secondary

c) Five primary, one secondary, one tertiary and one quaternary

d) Four primary, two secondary and two quaternary

31. IUPAC name of $(\text{CH}_3)_3\text{C} - \text{CH} = \text{CH}_2$ is:

a) 2, 2-dimethylbut-3-ene b) 2, 2-dimethylpent -4-ene **c) 3, 3-dimethylbut-1-ene** d) hex-1-ene

32. Which of the following represents 3-methylpenta-1,3-diene?

a) $\text{CH}_2 = \text{CH}(\text{CH}_2)_2\text{CH}_3$ b) $\text{CH}_2 = \text{CHCH}(\text{CH}_3)\text{CH}_2\text{CH}_3$ **c) $\text{CH}_3\text{CH} = \text{C}(\text{CH}_3)\text{CH} = \text{CH}_2$**

d) $\text{CH}_3\text{CH} = \text{C}(\text{CH}_3)_2$

33. The correct decreasing order of priority for the functional groups of organic compounds in the IUPAC system of nomenclature is

a) - CONH_2 , - CHO , - SO_3H , - COOH **b) - COOH , - SO_3H , - CONH_2 , - CHO**

c) - SO_3H , - COOH , - CONH_2 , - CHO d) - CHO , - COOH , - SO_3H , - CONH_2

34. Which of the following compounds is not correctly matched with its IUPAC name?

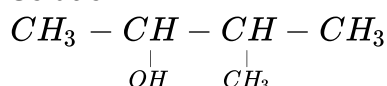
a) $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_2\text{CH}_3$ - Ethyl butanoate

b) $\text{CH}_3 - \text{CH} - \text{CH}_2 - \text{CHO}$ - 2 - methylpentan - 3 - one

c) $\text{CH}_3 - \underset{\text{CH}_3}{\text{C}} - \text{H} - \underset{\text{O}}{\text{C}} - \text{CH}_2\text{CH}_3$ - 2 - methylpentan - 3 - one

d) $\text{CH}_3 - \underset{\text{OH}}{\text{C}} - \text{H} - \underset{\text{CH}_3}{\text{C}} - \text{H} - \text{CH}_3$ - 2 - methylpentan - 3 - oI

Solution : -



The correct name is 3-methyl butan-2-ol since functional group should get lowest number.

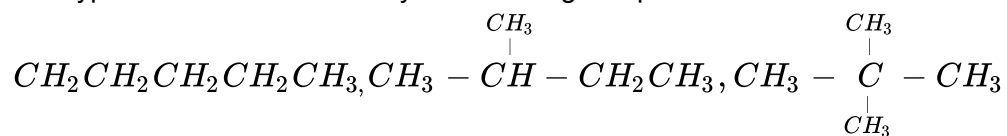
35. What is the minimum number of carbon atoms of an alkane must have to form an isomer?

a) 4 b) 3 c) 2 d) 1

36. 1-Butene and cyclobutane show

a) position isomerism **b) ring-chain isomerism** c) functional isomerism d) metamerism

37. The type of isomerism shown by the following compounds is



a) position' isomerism b) metamerism c) ring-chain isomerism **d) chain isomerism**

38. Which of the following is an isomer of ethanol?

a) Methanol b) Acetone c) Diethylether **d) Dimethylether**

39. Heterolysis of a carbon-chlorine bond produces

a) two free radicals b) two carbo cations **c) one cation and one anion** d) two carbanions.

40. Which of the following intermediates contains three pairs of electrons in its valence shell?

a) Carbocations b) Carbanions c) Free radicals d) Both (a) and (b)

41. Which of the following is an electrophilic reagent?

a) H_2O b) NH_3 c) OH^- **d) NO_2^+**

Solution : -

Electron deficient species act as electrophiles i.e., NO_2^+

42. Which of the following sets of groups contain only electrophiles?

a) NH_2^- , NO_2^+ , H_2O , NH_3 b) F^- , OH^- , NH_3 , SO_3 , SO_3 **c) NO_2^+ , $AlCl_3$, SO_3 , $CH_3C^+ = O$**
d) NO_2^+ , $AlCl_3$, SO_3 , $CH_3C^+ = O$

43. Inductive effect involves

a) displacement of σ -electrons resulting in polarisation

b) displacement of $1t$ -electrons resulting in polarisation c) delocalisation of σ -electrons

d) delocalisation of π -electrons

44. The increasing order of electron donating inductive effect of alkyl groups is

a) $-H < -CH_3 < -C_2H_5 < -C_3H_7$ b) $-H > -CH_3 > -C_2H_5 > -C_3H_7$ c) $-H < -C_2H_5 < -CH_3 < -C_3H_7$

d) $-H > -C_2H_5 > -CH_3 > -C_3H_7$

45. Inductive effect of which atom is taken as zero to compare inductive effect of other atoms?

a) Hydrogen b) Chlorine c) Carbon d) Oxygen

46. Maximum $-I$ effect is exerted by the group

a) $-C_6H_5$ b) $-OCH_3$ c) $-Cl$ **d) $-NO_2$**

47. Which one of the following acids would you expect to be the strongest?

a) $I - CH_2COOH$ b) $Cl - CH_2COOH$ c) $Br - CH_2COOH$ **d) $F - CH_2COOH$**

Solution : -

Fluorine is most electronegative atom and exerts maximum $-I$ effect. Hence $F - CH_2COOH$ is the strongest acid.

48. Few pairs of molecules are given below. Which bond of the molecule of the pairs is more polar?

(i) $H_3C - H$, $H_3C - Br$

(ii) $H_3C - NH_2$, $H_3C - OH$

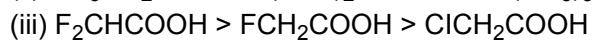
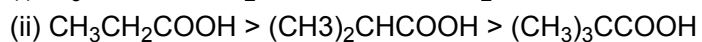
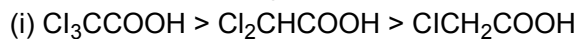
(iii) $H_3C - OH$, $H_3C - SH$

(iv) $H_3C - Cl$, $H_3C - Br$

a) $C - Br$, $C - N$, $C - O$, $C - Br$ **b) $C - Br$, $C - O$, $C - O$, $C - Cl$** c) $C - Br$, $C - O$, $C - O$, $C - Cl$

d) $C - Br$, $C - O$, $C - S$, $C - Br$

49. Which of the following is the correct order of acidity of carboxylic acids?



a) (i) and (ii) b) (ii) and (iii) c) (i) and (iii) **d) (i), (ii) and (iii)**

Solution : -

The strength of the acid increases with the inductive effect of the electronegative group attached to it (-I effect).

The strength of the acid decreases with the presence of electron releasing group.

50. Point out the incorrect statement about resonance?

a) Resonance structures should have equal energy

b) In resonance structures, the constituent atoms must be in the same position

c) In resonance structures, there should not be same number of electron pairs

d) Resonance structures should differ only in the location of electrons around the constituent atoms.

