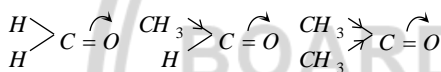


Dipole moment, resonance and reaction intermediates

21. (a) It is hyperconjugation process.
22. (a) Triphenyl methyl cation has three benzene resonating ring so it is most stable compound.
23. (b) Due to mesomeric effect (+) of – OH group the electron density on benzene ring increase. So the electrophile easily attacked on these electron rich center.
24. (c) Carbonyl carbon become more reactive toward nucleophilic addition by increasing the +I effect of alkyl group so the reactivity order is as



25. (c) The octet of all atoms are complete in structures (a) and (b). In structure (d) electron deficiency of positively charged carbon is duly compensated by lone pair electrons of adjacent oxygen atom while such neighbour group support is not available in structure (c).

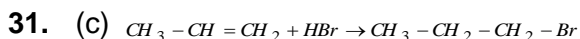
26. (b) $\begin{array}{c} \text{CH}_3 \\ | \\ \text{CH}_3 - \text{C}^+ \\ | \\ \text{CH}_3 \end{array}$ Due to (+I) effect of three methyl group 3° carbocation is more stable.

27. (b) $\text{CH}_3 - \overset{+}{\text{C}}\text{H} > \text{CH}_3 - \overset{+}{\text{C}}\text{H} > \text{CH}_3 - \overset{+}{\text{C}}\text{H}$
 $\quad \quad \quad | \quad \quad \quad | \quad \quad \quad |$
 $\quad \quad \quad \text{CH}_3 \quad \quad \quad \text{OCH}_3 \quad \quad \quad \text{COCH}_3$

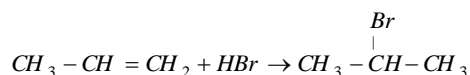
28. (b) $\text{C}_6\text{H}_5 - \overset{\cdot\cdot}{\text{C}}\text{H}_2 > \text{CH}_3\text{CH}_2 - \overset{\cdot\cdot}{\text{C}}\text{H}_2$
 Benzylcarbanion Ethylcarbanion
 $(\text{CH}_3)_2\text{CH} - \overset{\cdot\cdot}{\text{C}}\text{H} > (\text{CH}_3)_3\text{C} - \overset{\cdot\cdot}{\text{C}}\text{H}$
 Isopropyl carbanion Tert-butyl Carbanion

30. (b) 3° alcohol on dehydrogenation gives most stable carbonium ion.



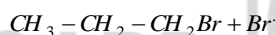
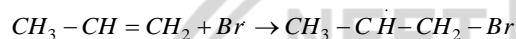


32. (c) Without intermediate reaction take place as under

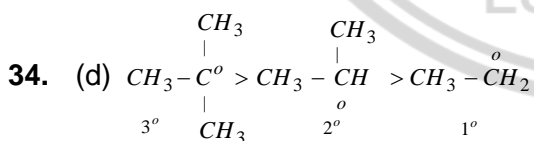


(According to markownikoff rule)

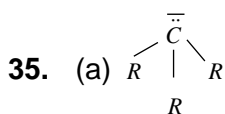
But the halogen bonded with terminal carbon so it take place in presence of peroxide by free radical mechanism.

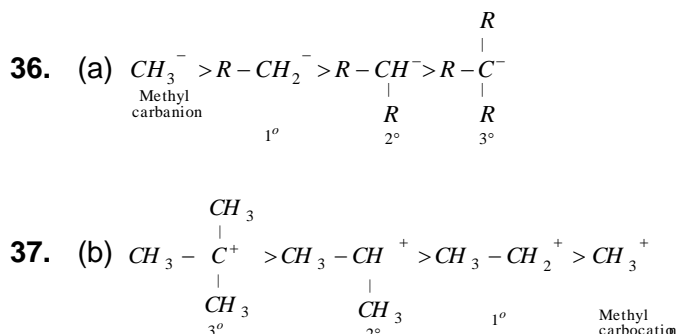


33. (a)	Species	Valence electrons	Magnetic behaviour
1.	Free radical	7	Paramagnetic
2.	Carbonium ion	6	Diamagnetic
3.	Carbanion	8	Diamagnetic
4.	Carbene	6	Diamagnetic
5.	Nitrene	6	Diamagnetic

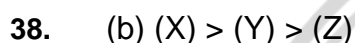


Greater the no. of alkyl groups attached to the carbon atom carrying the odd electrons, greater is the delocalization of odd electron and hence more stable is the free radical.





Greater the no. of alkyl groups, greater would be the dispersal of the charge and hence more stable will be the carbonium ion.



Explanation

- The acidity of a proton depends on how stable its **conjugate base** is.
- A conjugate base is more stable when nearby groups **withdraw electrons**.

(X): $-\text{COOH}$ group

- When $-\text{COOH}$ loses H^+ , the negative charge is shared (resonance) by two oxygen atoms.
- This makes it **very stable** \rightarrow strongest acid \rightarrow most acidic position.

(Y) and (Z): $-\text{NH}_3^+$ groups

- These are ammonium groups. They can lose H^+ , but they are **less acidic** than $-\text{COOH}$.

To compare Y and Z:

- The $-\text{COO}^-$ group (present in the zwitterion) pulls electrons through the chain ($-\text{I}$ effect).
- This effect is **stronger at the closer position (Y)** than at the farther position (Z).
- So the conjugate base formed at (Y) is more stable than at (Z).

Therefore:

(X) is most acidic \rightarrow (Y) next \rightarrow (Z) least acidic.

Final acidity order:

(X) > (Y) > (Z)



39. (a) $C-C$ bond length in benzene is 1.39\AA which is in between $C-C$ (1.54\AA) and $C=C$ (1.34\AA) because of resonance.

40. (d) $C-Cl \xrightarrow[\text{bond fission}]{\text{Heterolytic}} C^+ + Cl^-$
Cation Anion

