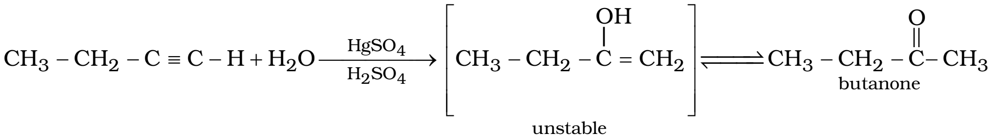
46.(A) Oxymercuration-demercuration brings about Markovnikov's addition of water as :



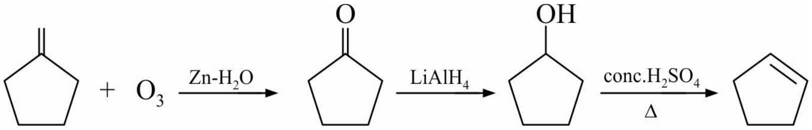
$$CH_3-CH_2-C\equiv C-H+H_2O\xrightarrow[H_2SO_4]{HgSO_4}\underbrace{\left[CH_3-CH_2-\overset{\overset{\displaystyle OH}{|}}{C}=CH_2\right]}_{\text{unstable}}\rightleftharpoons\underbrace{CH_3-CH_2-\overset{\overset{\displaystyle O}{\|}}{C}-CH_3}_{\text{butanone}}$$

47.(D) According to the IUPAC conventions, compound can be numbered as :

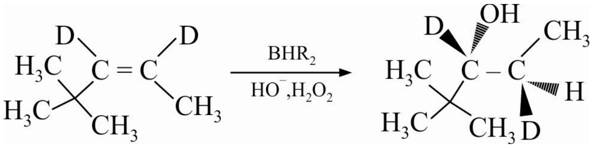
$$\overset{1}{H_2C}=\overset{2}{C}H-\overset{3}{C}H_2-\overset{4}{C}H_2-\overset{5}{C}\equiv\overset{6}{C}-H$$

Here, C-2 is sp^2 and C-3 is sp^3-hybridised.

48. **(a)**



(b)



$R = (CH_3)_2CHCH_2$

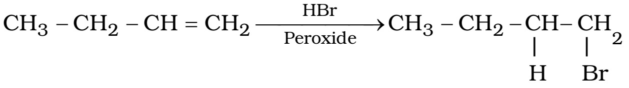
49.(D) Terminal alkynes forms silver salt with Tollen's reagent while alkene does not react with Tollen's reagent.

$$CH_3-C\equiv C-H+AgNO_3\xrightarrow{NH_3(aq)}\underset{\text{white ppt}}{CH_3-C\equiv CAg\downarrow}$$

Therefore, Tollen's reagent can be used to distinguish a terminal alkyne like propyne from alkene as well as from internal alkynes.

50.(A) Ease of catalytic hydrogenation depends upon the size of groups present at the doubly bonded carbon. Larger the size of groups, difficult the hydrogenation. Therefore, in the given situation, disubstituted alkene reacts at faster rate than tri and tetra substituted alkenes. Among disubstituted, the stability order is : cis < trans < geminal

51.(A)



$$CH_3-CH_2-CH=CH_2\xrightarrow[\text{Peroxide}]{HBr}CH_3-CH_2-\underset{\underset{\displaystyle H}{|}}{CH}-\underset{\underset{\displaystyle Br}{|}}{CH_2}$$

Secondary radical formed before formation of product that is $CH_3-CH_2-\dot{C}H-CH_2Br$

$$CH_3-CH_2-CH=CH_2\xrightarrow[\text{peroxide}]{HBr}CH_3CH_2-CH_2CH_2Br$$

Secondary free radical is intermediate in this reaction.

52.(C) In addition of HBr to an alkene, in the presence of peroxide, both the propagation steps are exothermic:

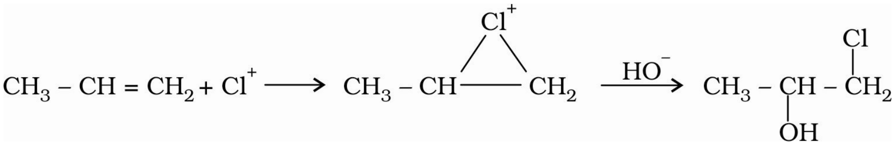
$$HBr+RO^{\bullet}\longrightarrow ROH+Br^{\bullet}$$

Propagation

$$\begin{cases}CH_3-CH=CH_2+Br^{\bullet}\longrightarrow CH_3-\dot{C}H-CH_2Br & \Delta H<0\\ CH_3-\dot{C}H-CH_2Br+HBr\longrightarrow CH_3-CH_2-CH_2Br+Br^{\bullet} & \Delta H<0\end{cases}$$

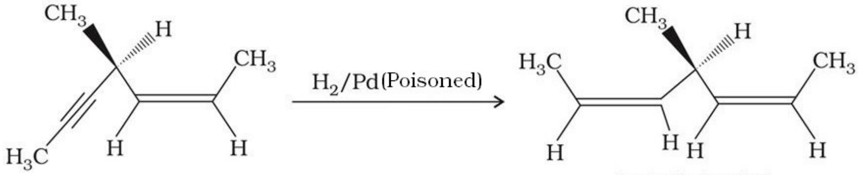
In case of addition of HCl and HI one of the propagation step is endothermic, hence reaction fail to occur.

53.(B) $HOCl \longrightarrow HO^- + Cl^+$



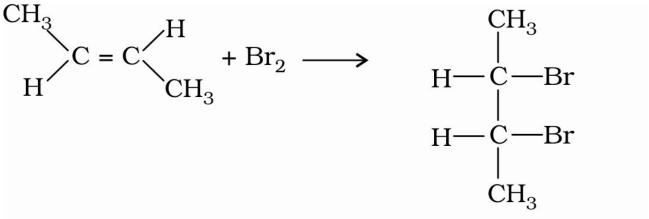
i.e. reaction is initiated by Cl^+ (chloronium ion electrophile)

54.(B) Hydrogenation with poisoned palladium brings about syn hydrogenation of alkyne and does not affect double bonds :



(optically inactive)

55.(B)



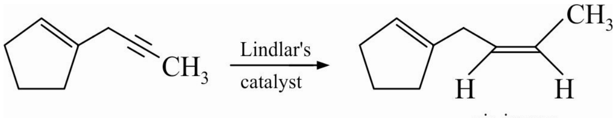
Meso product
(Plane of symmetry present)

Product formed through electrophilic addition of alkene. Addition of bromine to trans-2-butene yield meso product because anti addition to trans alkene yield meso product.

56.(A) $Me-S-Me + \text{ozonide} \longrightarrow \text{product} + (CH_3)_2SO$, Dimethyl sulphoxide is water soluble.

When $(CH_3)_2S$ is used with O_3, reductive ozonolysis of alkene occur $(CH_3)_2S$ changes into $(CH_3)_2SO$ & remaining part of $(CH_3)_2S$ evaporates.

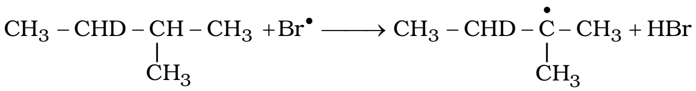
57.



cis-isomer

(syn addition of H_2 across $C \equiv C$)

58.(B) Bromination is highly selective, occurs at the carbon, where the most stable free radical is formed



$$CH_3-CHD-\underset{\displaystyle CH_3}{\underset{|}{CH}}-CH_3 + Br^\bullet \longrightarrow CH_3-CHD-\underset{\displaystyle CH_3}{\underset{|}{\overset{\bullet}{C}}}-CH_3 + HBr$$

(a tertiary free radical)

59.(D) Ammoniacal Cu_2Cl_2 forms red precipitate with terminal alkynes. It can be used to distinguish terminal alkynes from non-terminal alkynes :

$$CH_3-CH_2-C\equiv C-H + Cu_2Cl_2 \xrightarrow{NH_3(aq)} CH_3-CH_2-C\equiv C-Cu\downarrow$$

60. $CH_3CH_2-C\equiv C-H \xrightarrow[\text{(ii) } CH_3CH_2Br]{\text{(i) } NaNH_2} CH_3-CH_2-C\equiv C-CH_2-CH_3 \text{ (X)}$