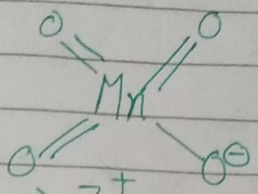
# Oxidation ($KMnO_4$)

Structure of $KMnO_4$ :-



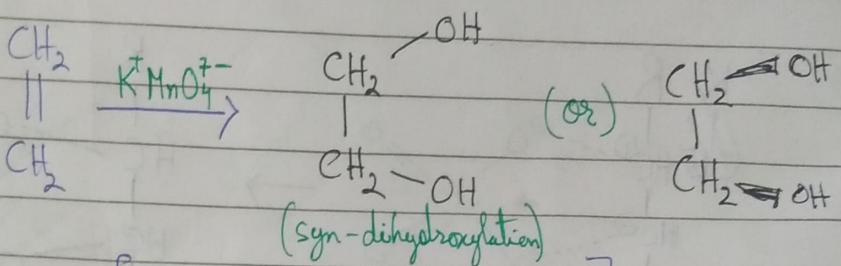
Oxidation state of Mn $\Rightarrow 7^+$

∴ Mn is e⁻ deficient ∴ Mn will attack e⁻ rich double bonds (=)

$KMnO_4$ causes syn-dihydroxylation in alkenes

(same side → 2OH added)

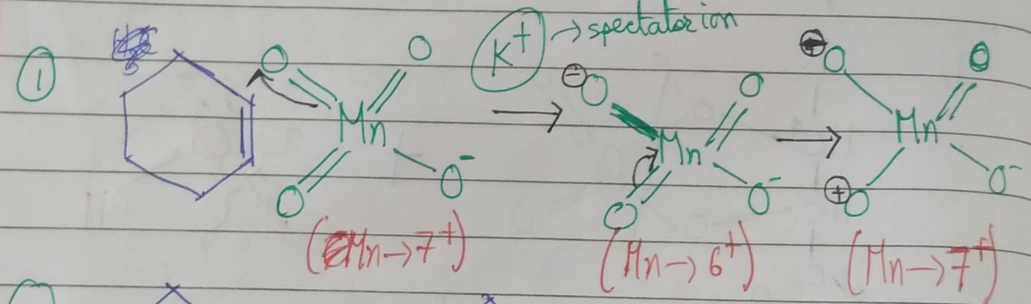
Eg :-

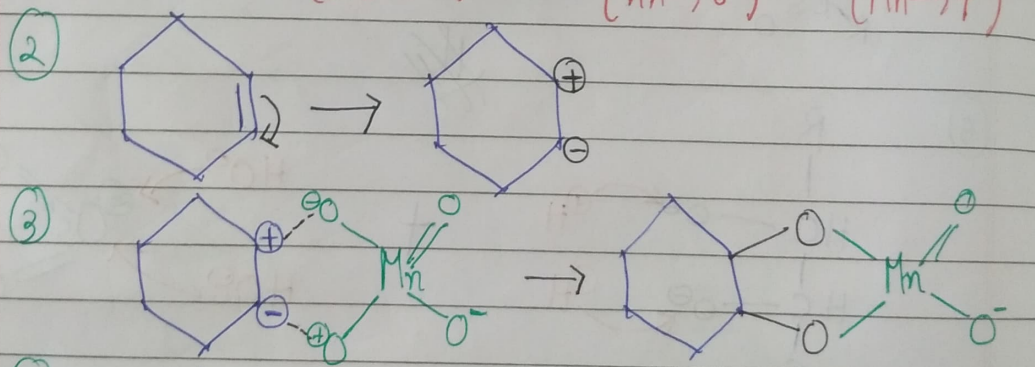


(syn-dihydroxylation)

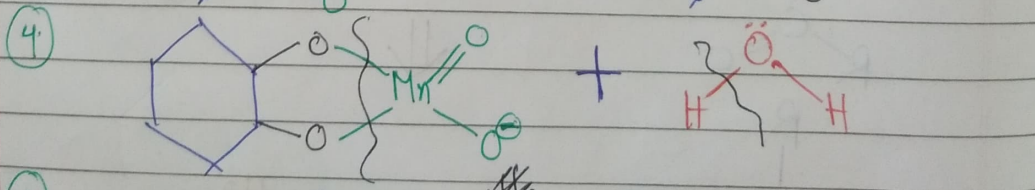
Mechanism :- [Formation of Syn/Cis diol]

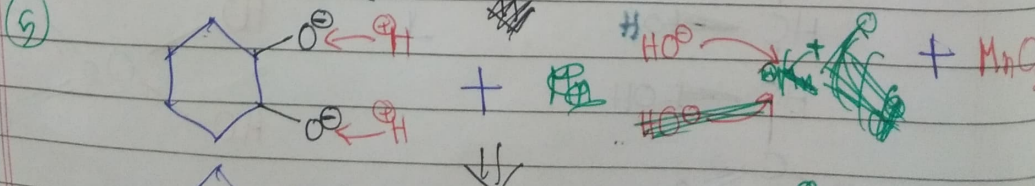
Eg :-

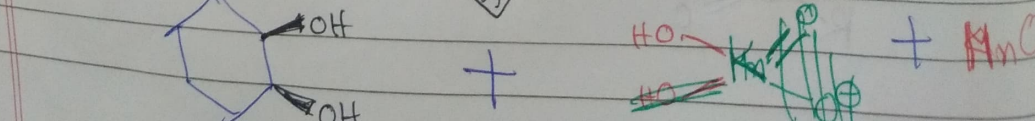




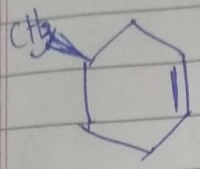




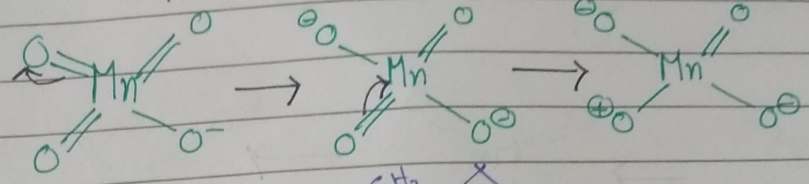


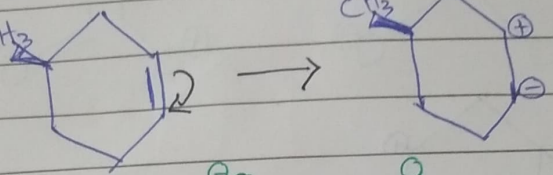


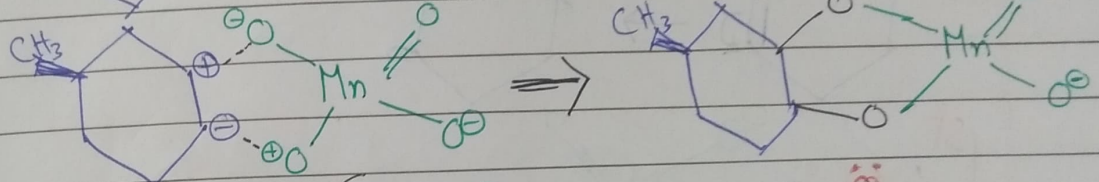
Q. Show syn-dihydroxylation mechanism of following ⇌

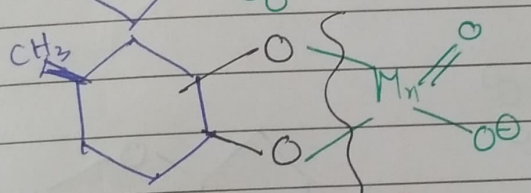
(i) 

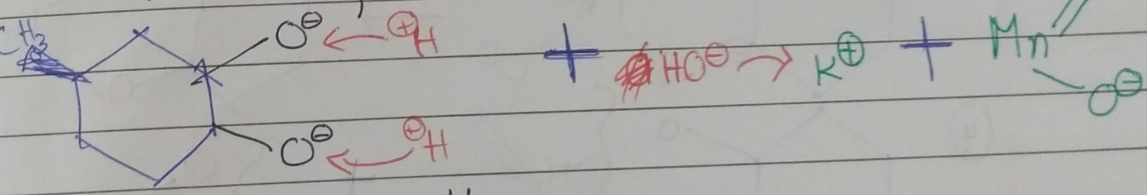
Sol$^{n}$:- (1) $KMnO_4 \longrightarrow K^+ + MnO_4^{-}$

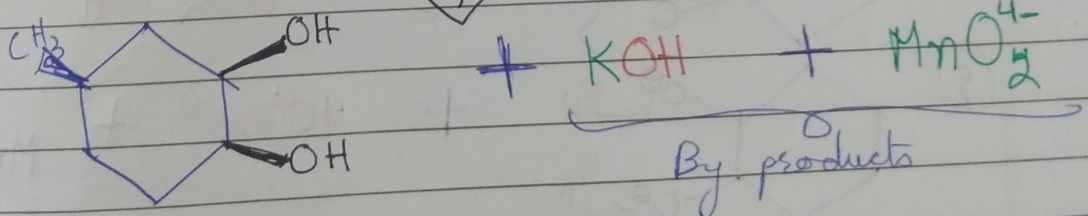


(2) 

(3) 

(4) 

(5) 



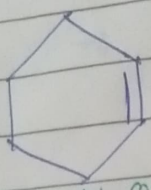
→ syn-diol

By products

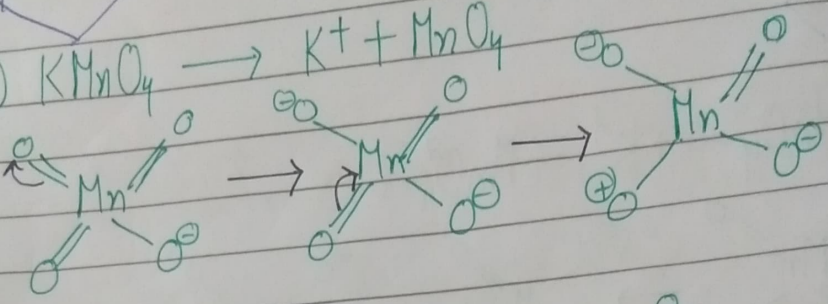
⊛ $e^-$ → Addition of +ve charge in Oxidation state
⊖ → Addition of -ve charge in Oxidation state
⊕ → Addition of +ve charge in Oxidation state
— → Addition of +ve charge in Oxidation state

∴ Eg:- $Mn^{6+} + \ominus \rightarrow Mn^{7+}$

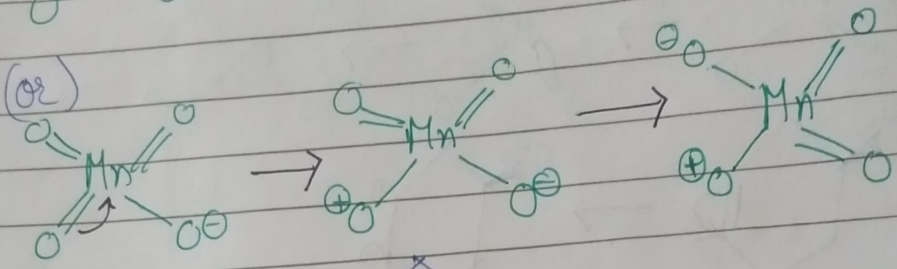
$Mn^{7+} + \oplus \rightarrow Mn^{6+}$

8. (ii)  ($KMnO_4$, $\Delta$)

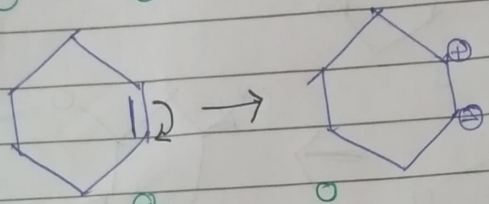
Sol:- (1) $KMnO_4 \longrightarrow K^+ + MnO_4^-$



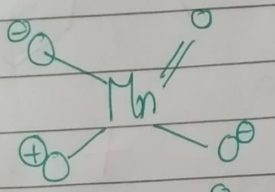
(or)



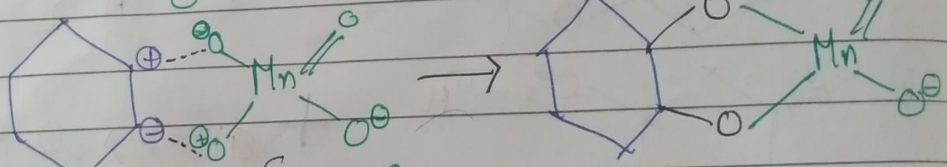
(2)



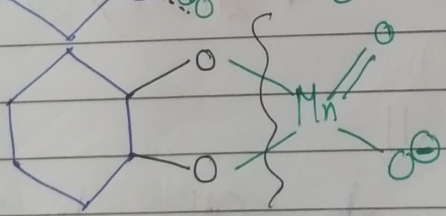
1st way:-



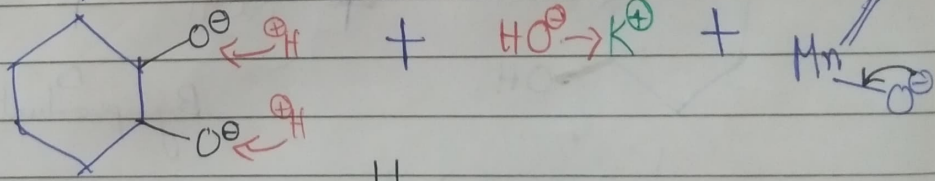
(3)

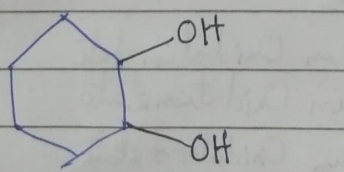


(4)



(5)

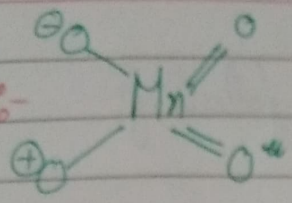




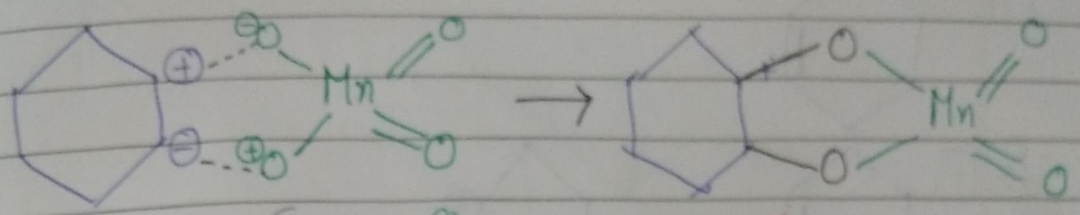
$+ KOH + MnO_2$ (or) $MnO_2$

(*) Single bond (–) = $2\bar{e}$ = ⊖

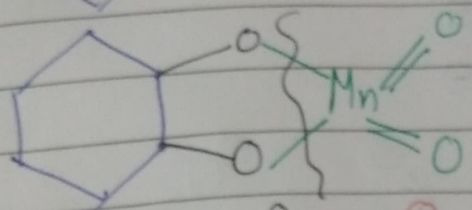
2nd way :-



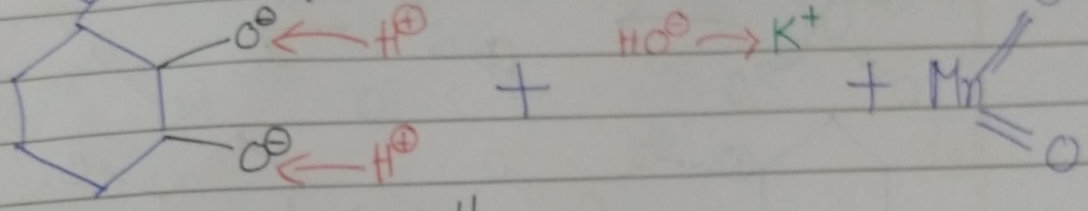
③

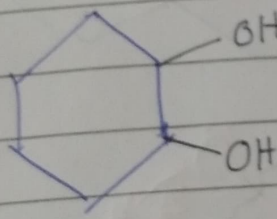


④



⑤

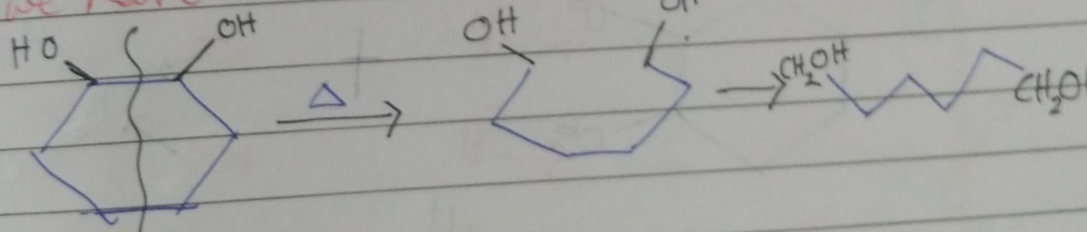




+ KOH + $MnO_2$

But, we have △ involved

⑥



∴ Cyclic chain ⟶ Straight chain