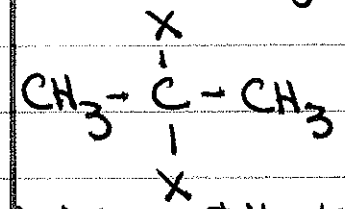
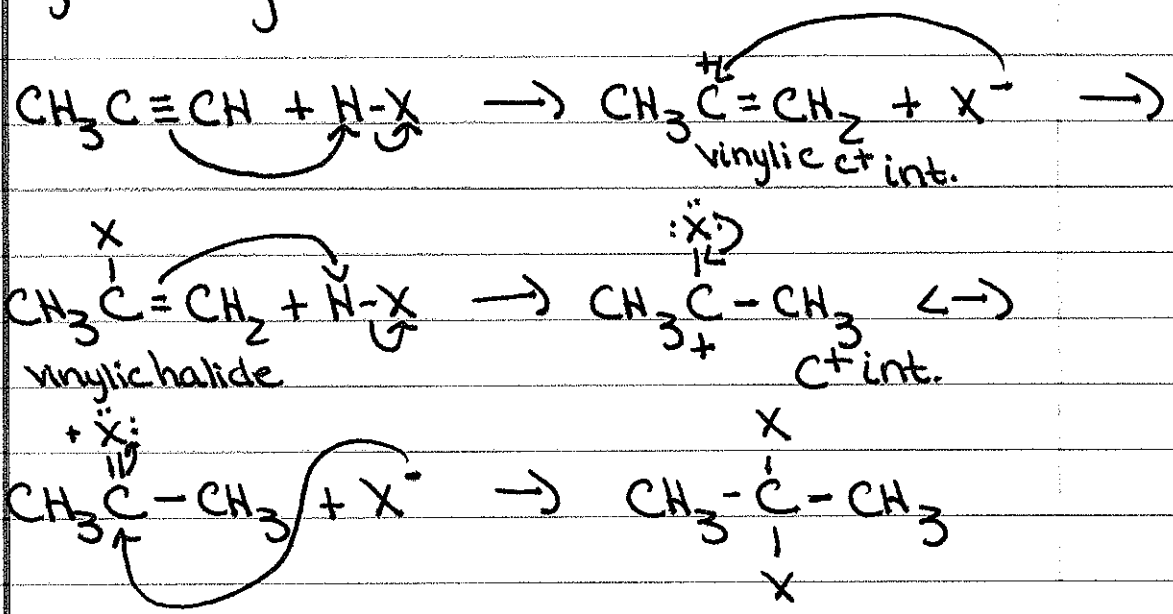
* Rxns of Alkynes

① $CH_3C\equiv CH$ (Alkyne) $\xrightarrow[\text{ether}]{2HX}$ or $\xrightarrow[\text{ether}]{XS\ HX}$ X = Br or Cl



Vicinal Dihalide

E.A.: Mark. Rule: Vinylic C^+ int. + C^+ int.: Hydrohalogenation



② $CH_3C\equiv CH \xrightarrow[H_2SO_4, H_2O]{HgSO_4} CH_3\overset{O}{\overset{\|}{C}}CH_3$

Alkyne → Ketone

E.A.: Mark. Rule: Oxymercuration

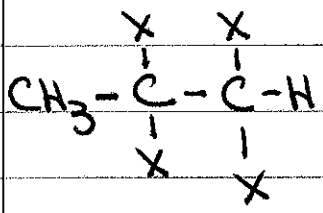
③ $CH_3C\equiv CH \xrightarrow[2)\ H_2O_2, OH^-]{1)\ BH(Sia)_2, THF} CH_3CH_2\overset{O}{\overset{\|}{C}}H$

Alkyne → Aldehyde

E.A.: Anti-Mark. Rule: Hydroboration

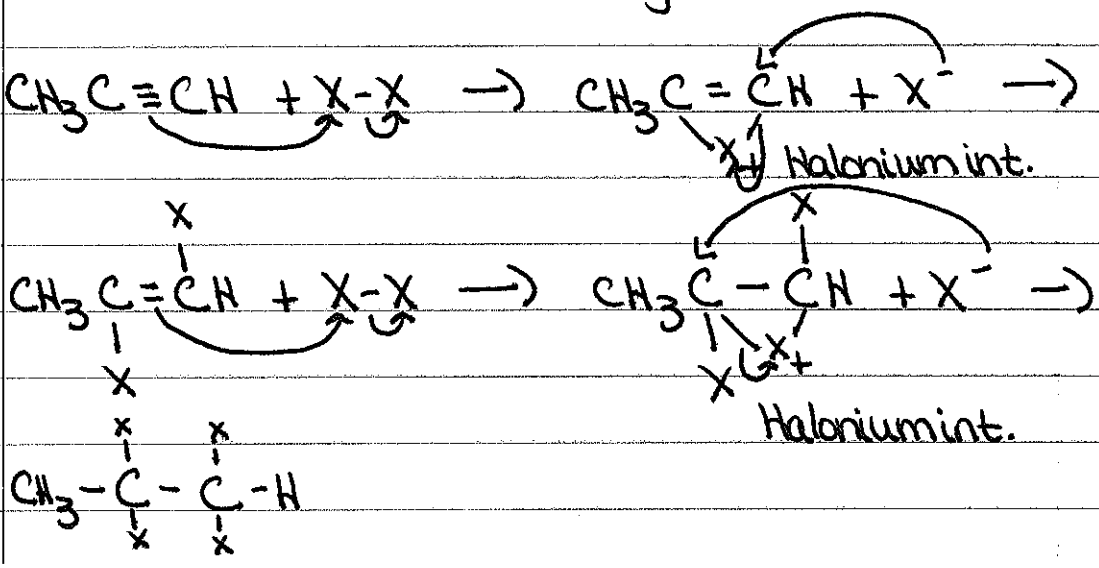
④ $CH_3C\equiv CH \xrightarrow{2X_2} \text{or} \xrightarrow{XS\ X_2} CH_2Cl_2$ $\quad X = Cl$ or Br

Alkyne



Tetrahalide

E.A.: Halonium int.: Halogenation



⑤.

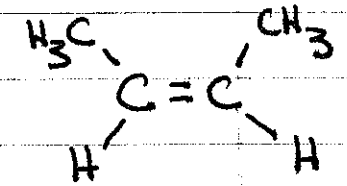
$CH_3C\equiv CCH_3 \xrightarrow[Pd/C]{H_2} CH_3CH_2CH_2CH_3$

Alkyne → Alkane

Reduction : Hydrogemation : Pd = Catalyst

⑥. $CH_3C\equiv CCH_3 \xrightarrow[lindlar]{H_2}$

Alkyne

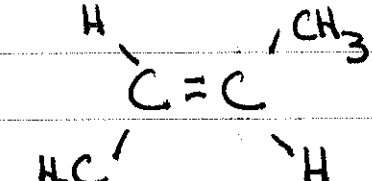


Cis Alkene

Reduction : Hydrogemation : lindlar = poisoned catalyst

⑦. $CH_3C\equiv CCH_3 \xrightarrow[NH_3]{Li\ or\ Na}$

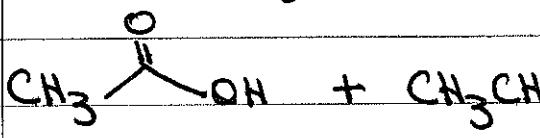
Alkyne



Trans Alkene

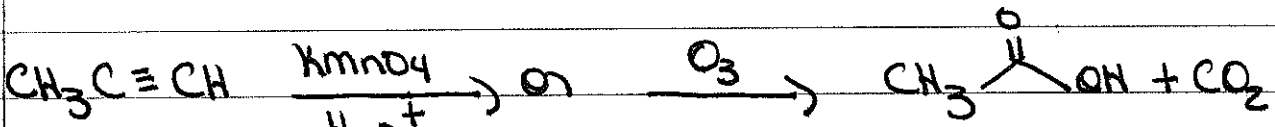
Reduction : Dissolving Metal Reduction

⑧ $CH_3C\equiv CCH_2CH_3$ (Alkyne) $\xrightarrow[H_3O^+]{KMnO_4}$ or $\xrightarrow{O_3}$



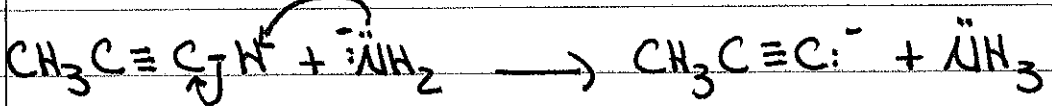
Carboxylic Acid

Oxidation : Cleavage : Organolysis (O_3)



⑨ $CH_3C\equiv CH$ (Alkyne) $\xrightarrow[NH_3]{NaNH_2}$ $CH_3C\equiv C:^-$ (Acetylide Ion)

Formation of Acetylide Ion: Acid / Base Rxn



⑩ $CH_3C\equiv C:^-$ (Acetylide Ion) + $CH_3CH_2CH_2\text{-}\ddot{X}$ (Alkyl Halide) ⟶

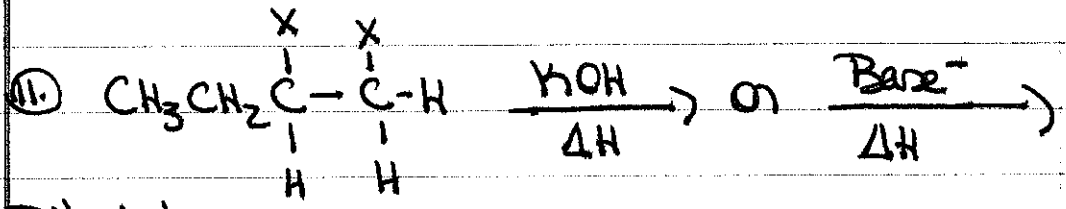
$CH_3C\equiv CCH_2CH_2CH_3 + X^-$

Alkylation / Homologation (Add C): S_N2

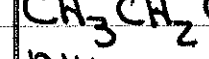
* Sometimes, you can see 9+10 combined

Alkyne — Bigger Alkyne

Acetylide Ion Formation + Alkylation:
Acid / Base + S_N2

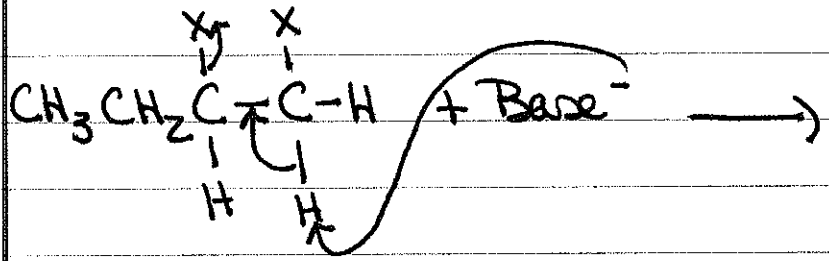


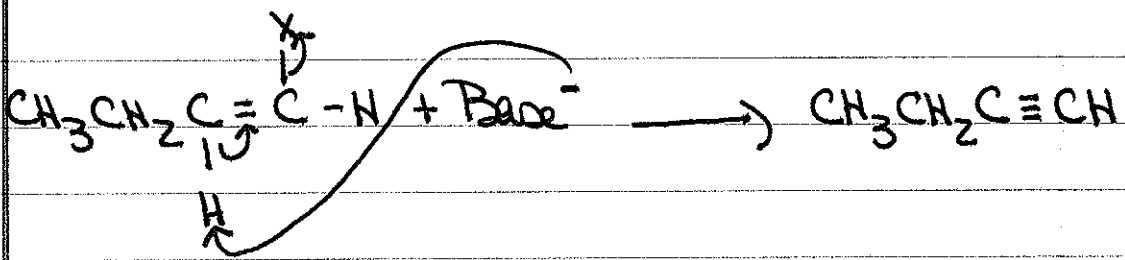
Dihalide



Alkyne

Elimination (E2): Antiperiplanar Geometry must be achieved





Vinyl halide