Industrial Chemistry

Branch of chemistry which applies physical & chemical procedures towards the transformation of natural Raw materials and their derivate to products that are beneficial to humanity.

Important Topics :-

Dyes, pesticides, polymer, adhesive

Short Q/S

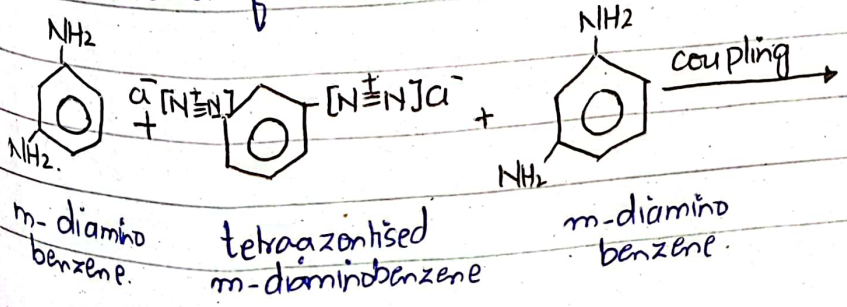
How is Bismark Brown is Prepared?

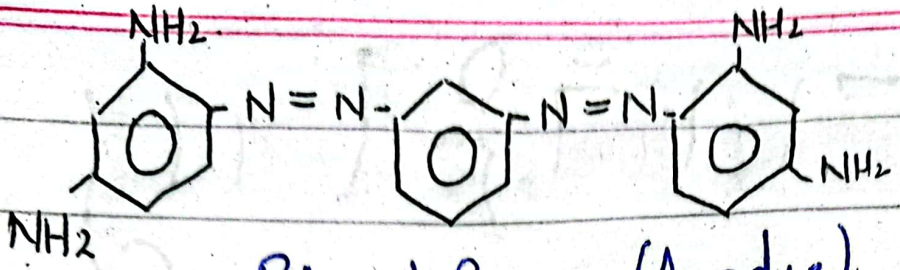
Bismark Brown, also known as Basic Brown 1, is a diazo dye that was discovered in 1863 by German chemist Carl Alexander von Martius.

Used: commonly used in brown boot polish or just boot Polish.

Chemical Reaction:

The synthesis of Bismark brown involves the reaction or coupling between tetraazontised m-diaminobenzene & 2 molecules of m-diaminobenzene.





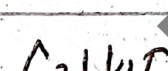
Bismark Brown (Azodye).

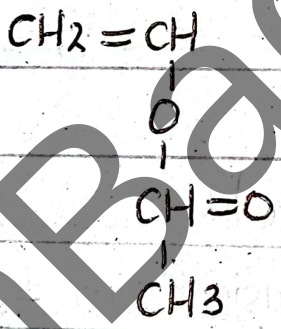
Q. Enlist different chemical Produ

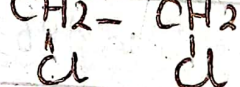
Ethylene, also known as ethene is a fundamental building block in petrochemical industry.

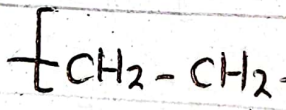
chemicals obtained :-

Ethanol C_2H_5OH

Ethylene Oxide C_2H_4O 

Vinyl acetate 

1,2-Dichloroethane 

polyethylene 

difference

addition polymerisation	condensation polymerisation
definition	
The process of synthesizing addition polymers.	The condensation process resulting in the formation of polymers.
Readability.	
Monomer should be unsaturated molecule.	Monomer should be saturated molecules.
Process rate	
A rapid process	A slow process
End product	
Produce high molecular weight polymers.	Produce low molecular weight polymers.
By-products	
Has no-by product.	Produce H_2O, HCl & ammonia.
Production of	
Produce thermoplastics.	Produce thermosets.
thermosets	**thermoplastics.**
Synthesis	
Condensation polymerization	Addition polymerization
Tensile strength	
High	Lower than thermosets
Melting point	
High.	Lower than thermosets
High.	"

Thermoplastic polymers	Thermosetting polymers
chemical structure	
Linear & branched chains	Cross linked or networked structure.
Reusability	
Can be melted & re-shaped multiple times.	Cannot be remelted or reshaped once set.
Heat resistance	
Generally less heat resistant	Highly heat resistant.
flexibility	
More flexible & ductile.	Rigid & brittle.
Processing	
easier to Process & mold.	More complex Processing.
application	
Packaging & toys.	automative parts etc.
example	
PVC, nylon	Epoxy & melamine

Homopolymer	Heteropolymer
Definition	
Polymer made up of single type of monomer.	Polymer made up of 2 or diff types of monomer
Structure	
uniform structure	Varied structure
Properties	
Consistent Properties throughout.	Properties varies

examples of polymer

→ Homopolymer :-

- $n\,CH_2 = CH_2 \xrightarrow{\text{Polymeriz}} \left[CH_2 - CH_2\right]_n$

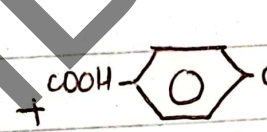
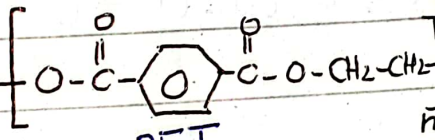
  ethene / ethylene — Polyethene / Polyethylene

- $CH_2 = \underset{Cl}{CH} \xrightarrow{\text{Polymerization}} \left[CH_2 - CHCl\right]_n$

  Vinyl chloride — Poly Vinyl chlorides (PVC)

→ Heteropolymer :-

PET (Polyethylene terepthalate).

$n\,CH_2 = CH_2 +$  $\rightarrow$ 

ethylene — terepthalic acid — PET.

nylon

obtaining Nylon 6,6 from Adipic Acid :-

$$n\ HO\text{-}\overset{O}{\overset{\|}{C}}\text{-}(CH_2)_4\text{-}\overset{O}{\overset{\|}{C}}\text{-}OH + n\ H\text{-}NH\text{-}(CH_2)_6\text{-}NH\text{-}H \longrightarrow$$

Adipic Acid — hexamethylene diamine

$$\left[\ \overset{O}{\overset{\|}{C}}\text{-}(CH_2)_4\text{-}\overset{O}{\overset{\|}{C}}\text{-}NH\text{-}(CH_2)_6\text{-}NH\ \right]_n + n\ H_2O$$

nylon - 6,6

example co-polymer/heteropolymer formed via Condensation reaction or polymerisation.

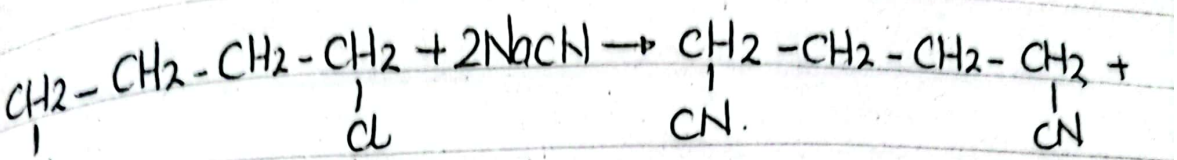
obtaining Nylon 6,6 from 1,3-butadiene :-

$$CH_2 = CH - CH = CH_2 + Cl_2 \xrightarrow{\text{Selective halogenation}} \underset{Cl}{CH_2} - CH = CH - \underset{Cl}{CH_2}$$

1,3-butadiene — 1,4-Dichlorobutene-2

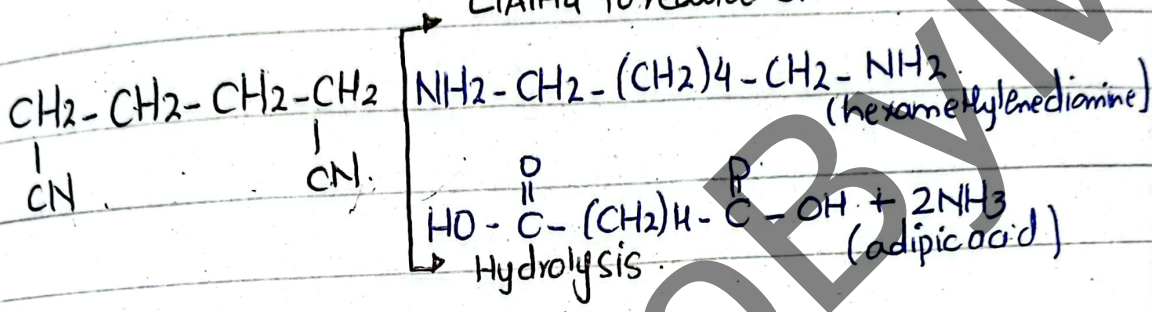
$$\underset{Cl}{CH_2} - CH = CH - \underset{Cl}{CH_2} + H_2 \xrightarrow[200\text{-}300^\circ C]{Ni} \underset{Cl}{CH_2} - CH_2 - CH_2 - \underset{Cl}{CH_2}$$

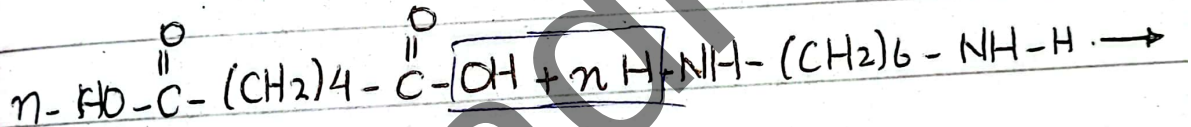
1,4-Dichloro-2-butene — 1,4-Dichlorobutane

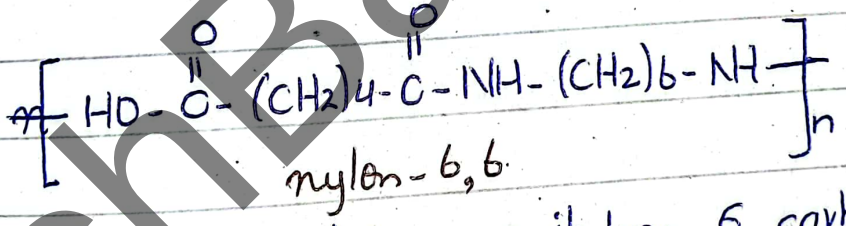


1,4-Dichlorobutane. 1,4-Butanedinitrile.

2NaCN







nylon-6,6

nylon-6,6 is called because it has 6 carbon atom in both monomer.