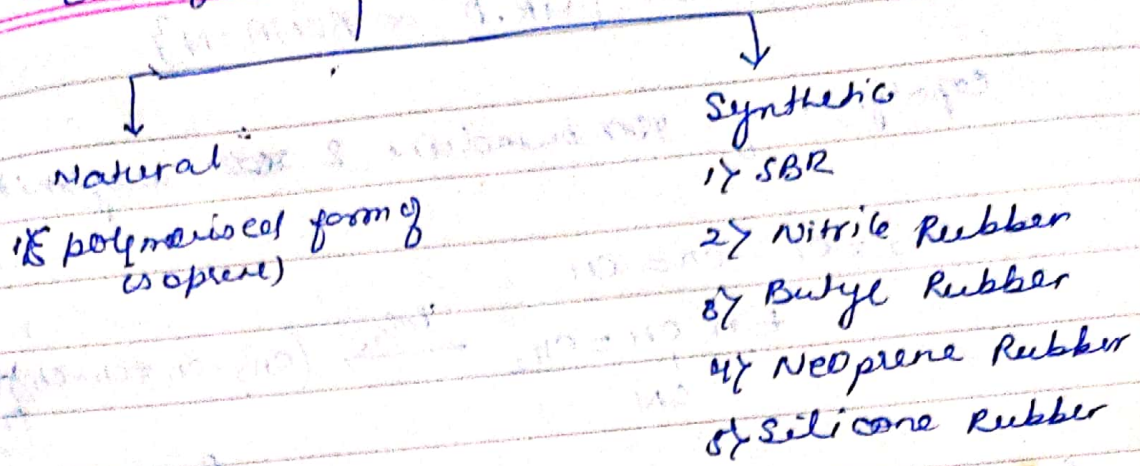


Classification of Rubber:



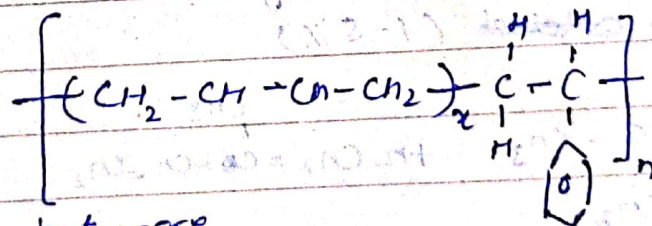
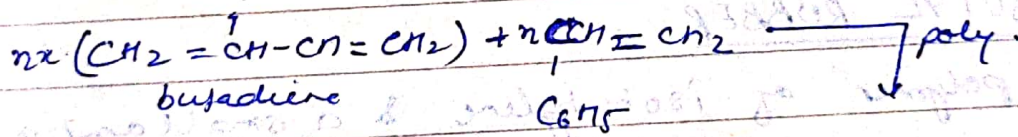
Synthetic Rubber - man made rubber that can be vulcanizable.

→ stretched to at least twice its length & as soon as force is removed, returns to its original shape.

main type of syn. rubbers are:

1) Buna-S (GR-S) or STYRENE RUBBER;

Obtd by copolymerisation of butadiene (75% by wt) and styrene (25% by wt.)



{ It reqs less Sulphur, but more accelerators for vulcanization }

polybutadiene-styrene
SBR

Prop → possesses high abrasion resistance

→ high load bearing capacity

→ resilience, → it oxidize by O₃

→ swells in oils & can be vulcanized by S as S₂Cl₂

Uses in manufacturing of motor tyres, floor tiles, shoe soles, gaskets, wire & cable insulation, adhesives, tank lining etc.

Sulphur monochloride

9 moles, m. wt $M_1 = 30,000$
 5 gms, " $M_2 = 50,000$

$M_n =$

$$\bar{M}_n = \frac{(9 \text{ mol} \times 30000 \text{ g/mol}) + (5 \times 50000)}{9 + 5}$$

$$\bar{M}_w = \frac{9(30000)^2 + 5(50000)^2}{9(30000) + 5(50000)} = 37000 = 40,000 \text{ g/mol}$$

wt

$$\bar{M}_n = \frac{\sum n_i M_i}{\sum n_i} = \frac{\sum w_i}{\sum w_i / M_i} = \frac{\text{Total wt of all}}{\text{Total no. moles}}$$

9 gms, 30000
 5 gms 50000

n = no. of molecules
 M = mwt of each mol.
 w = wgt of mol.

$$\bar{M}_n = \frac{9 + 5}{\frac{9}{30000} + \frac{5}{50000}} = 37000$$

Expt. No.

consider a polymer, which contains ~~polymer~~ ^{polymer} in diff. no. 2

Page No.

wt.

		gm	wt.
Poly-1	2	10	20
Poly-2	4	20	80
3	6	100	600
4	13	250	750
	<u>15</u>		<u>1450</u>

$$M_n = \frac{1450}{15} = 96.66 \text{ gm}$$

Weight av. method

$$\frac{20 \times 10 + 1800 + 60000 + 187500}{1450}$$

$$= \frac{249300}{1450} = 171.93 \text{ gm}$$

Teacher's Signature : _____

A polydisperse sample of polystyrene is prepd by mixing 3 monodisperse samples in the following proportion:

1 gm 10,000 mwt

2 gm 50,000 mwt

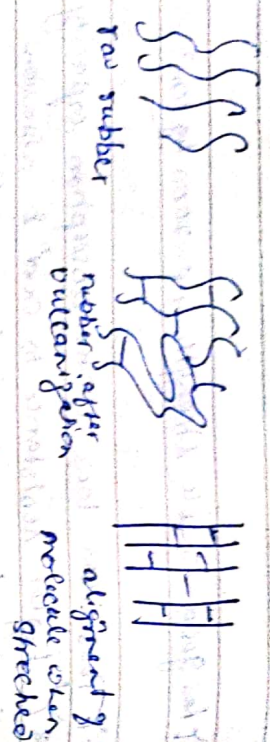
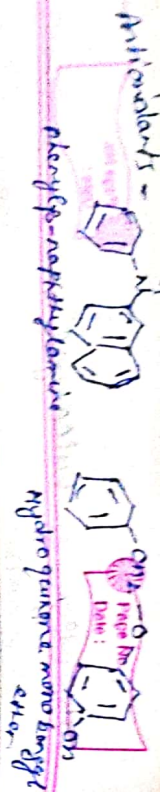
2 gm 100,000 mwt

$$\bar{M}_n = \frac{1 + 2 + 2}{\frac{1}{10000} + \frac{2}{50000} + \frac{2}{100000}} = 31,250$$

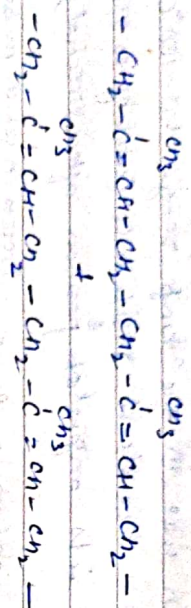
$$wt = n \bar{M}$$

$$\bar{M}_w = \frac{1 \times 10000 + 2 \times 50000 + 2 \times 100000}{1 + 2 + 2} = 62,000$$

$$PDI = \frac{62000}{31250} = 1.98$$

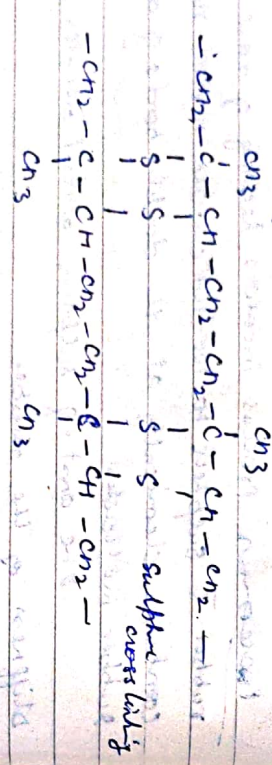


Mechanism:-



Raw rubber springs

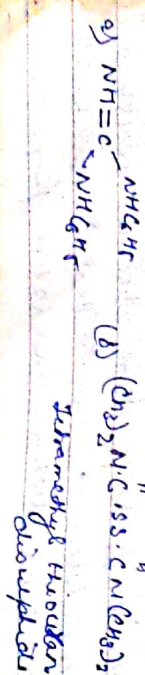
↓ vulcanized (↑ sulphur)



vulcanization of raw rubber & sulphur

properties of vulcanised rubber can be enhanced by certain org. substance known as accelerators & curatives. curative compounds known as accelerators & curatives

Accelerators -



Antioxidants -

Classifications of Rubber:

Natural

15 polyisoprene (gum)

25 nitrile Rubber

35 Butyl Rubber

45 Neoprene Rubber

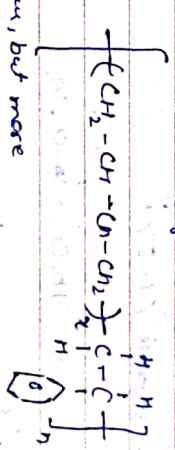
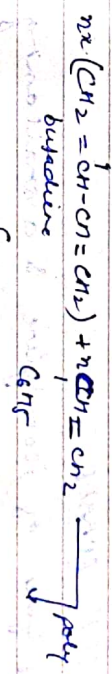
55 Silicone Rubber

Synthetic Rubber - man made rubber that can be vulcanizable.

→ stretched to at least twice its length & as soon as force is removed, returns to its original shape. main type of syn. rubbers are:

1) Buna-S (GR-S) or STYRENE RUBBER;

obtained by copolymerization of butadiene (75% by wt) and styrene (25% by wt) or



It reqs less sulphur, but more accelerators for vulcanization of polybutadiene-styrene

Prep → possesses high abrasion resistance

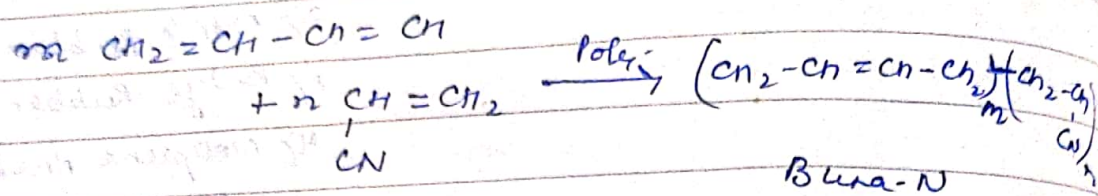
→ high load bearing capacity

→ resistance, → it oxidize by O_3

→ Swells in oil & can be vulcanized by S or G_2Cl_2

2) Nitrile Rubber { GR.A or Buna-N }

copolymer of ~~isobutylene~~ butadiene & ~~acrylonitrile~~ acrylonitrile



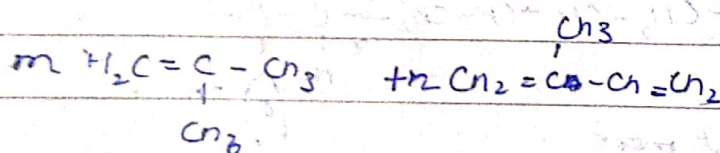
Prop possesses excellent resistance to heat, sunlight, oils, acids, and salts; but it has less resistance to alkalis ~~due~~ due to the presence of CN gp.

Use - used to make

conveyor belt, High altitude air craft components, Tank-linings, Gaskets, printing rollers, oil resistance foams & automobile spare, adhesives etc.

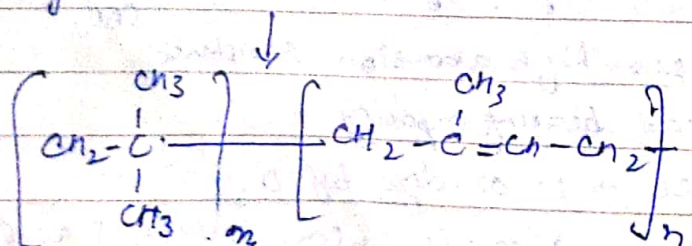
3) BUTYL RUBBER =

→ Copolymer of isobutylene & a small amt of isoprene. ~~about~~ (1-5%)



Isobutylene

Isoprene



polyisobutylene - isoprene (Butyl rubber)