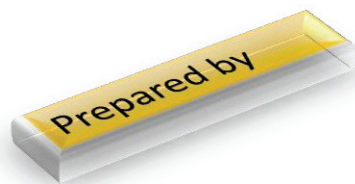


Industrial Polymers Synthesis Properties & Applications



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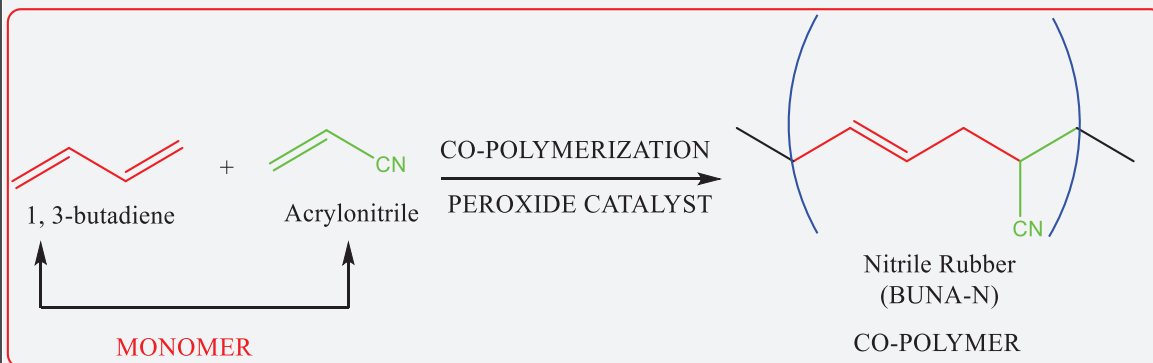
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PREPARATION OF BUNA -N NITRILE BUTADIENE RUBBER (NBR)



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This is a synthetic rubber co-polymer of acrylonitrile (ACN) and butadiene and produced by the polymerization of butadiene with acrylonitrile, invented in the mid-1930s in Germany and available in the United States just prior to the outbreak of World War II.

PROPERTISE OF BUNA-N

- Buna-N is resistant to oil, fuel and aliphatic Hydrocarbons.**
- It can be attacked by ozone, ketones, esters and aldehydes**
- It have poor resistance to ozone, sunlight and weathering as the double bond present in the polybutadiene segment of the chemical backbone**
- It is easily attacked by aromatic hydrocarbons**
- The general properties of Buna-N are not altered by minor structural or compositional differences.**

APPLICATION OF BUNA-N

- Buna-N is used in the automotive and aeronautical industry to make fuel and oil handling hoses, seals and grommets**
- It is used to make protective gloves in the nuclear industry**
- It is ideal material for aeronautical application as Buna-N can withstand a range of temperature from -40 to 108 °C**
- Buna-N latex is used in the preparation of adhesives and as a pigment binder**
- XNBR (carboxylated Butadiene Rubber), an improved version of Buna-N, is used for hoses, rubber belts, sealing parts etc.**

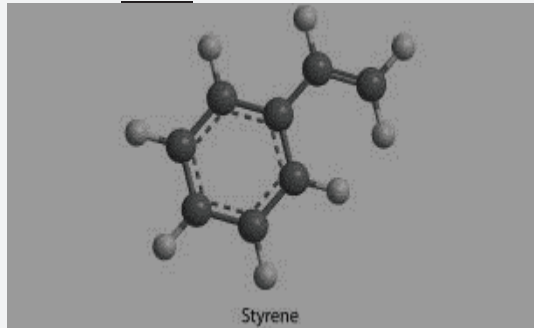
BUNA-S

Styrene Butadiene

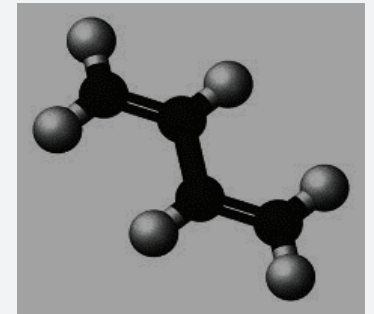
[SBR]

Styrene-Butadiene rubber (SBR or Styrene-butadiene) is a **synthetic rubber** comprising of **styrene** and **butadiene** monomers. The random copolymer has characteristics like natural rubber and contains:

- ❖ **Styrene content in the range of 10-25%** contributing to good wearing and bonding characteristics
- ❖ **While the butadiene unit is composed approximately 60 to 70% trans-1,4; 15 to 20% cis-1,4; and 15 to 20% 1,2 configurations for the polymer at 50°C.**

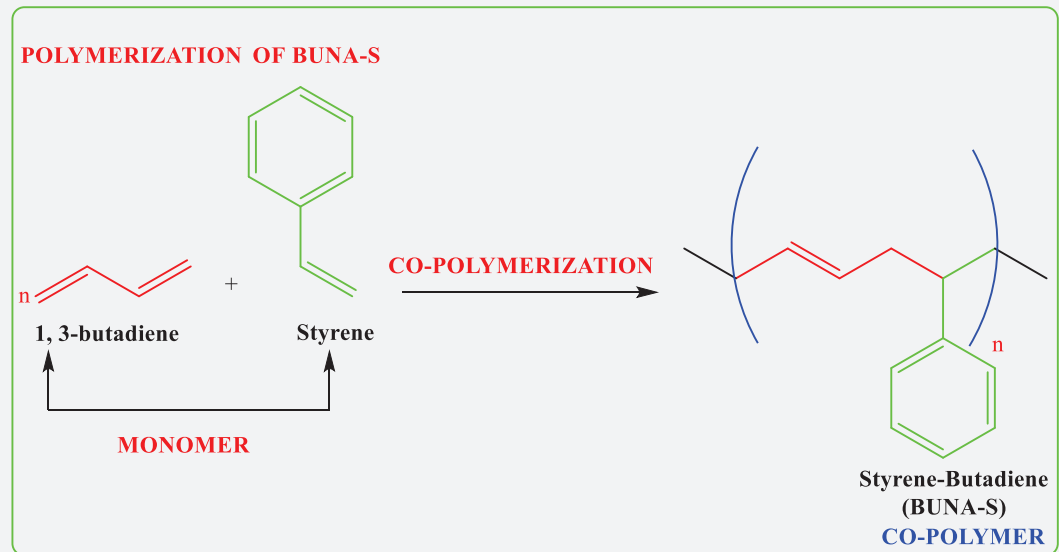


3-D Structure of Styrene



3-D Structure of Butadiene

PREPARATION OF BUNA-S Styrene Butadiene [SBR]



It is a **random co-polymer** formed by the **emulsion polymerization** of a mixture of **1:3 butadiene** and **styrene** in the presence of peroxide catalyst at 5 degree Celsius and therefore the product is called as cold rubber. The rubber obtained is also called **Styrene butadiene rubber (SBR)**

or

It is derived from two monomers, **styrene** and **butadiene**. The mixture of these two monomers is polymerized by two basically different processes: from **solution (S-SBR)** or as an **emulsion (E-SBR)**

PROPERTISE OF BUNA-S Styrene Butadiene [SBR]

KEY FEATURES OF BUNA-S:

- ❖ **Abrasion resistance**
- ❖ **Perfect impact strength**
- ❖ **Good resilience**
- ❖ **High tensile strength**
- ❖ **It is the most used synthetic rubber**

Also, when compared with polybutadiene rubber alone, styrene-butadiene rubber has improved strength, abrasion resistance, and blend compatibility. These properties are further enhanced with the use of additives.

It is vulcanized with sulfur. The rubber is slightly inferior to natural rubber in its physical properties.

APPLICATION OF BUNA-S Styrene Butadiene [SBR]

- ❖ **It is used for the manufacture of passenger car tyres and treads, motorcycle and scooter tyres, cycle tyres and tubes.**
 - ❖ **They are also used for the manufacture of conveyor belts, foot-wares, shoe soles, hoses and electrical insulation**
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NEOPRENE

[POLYCHLOROPRENE]

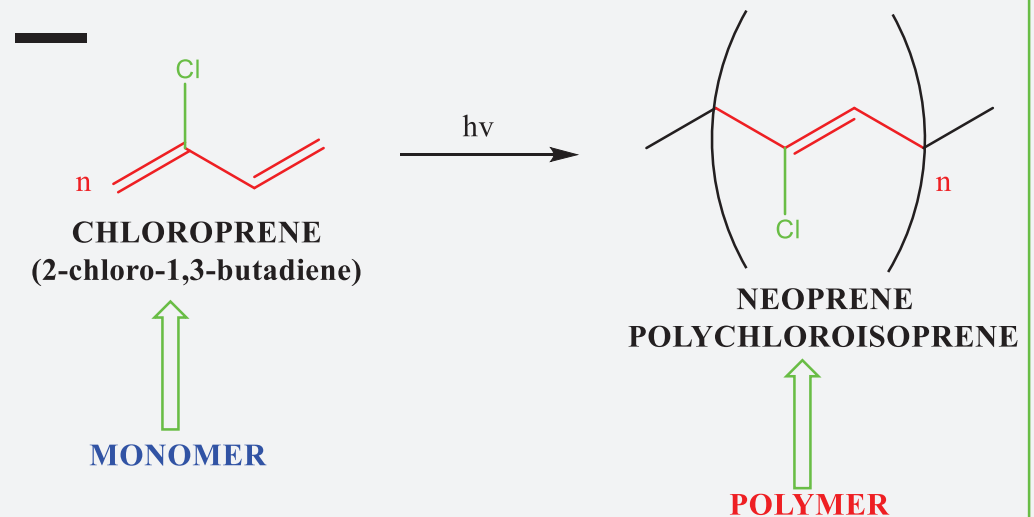
- ❖ Neoprene or polychloroprene is a family of synthetic rubbers produced by polymerization of the **CHLOPRENE (MONOMER of NEOPRENE)**
- ❖ Neoprene exhibit good chemical stability and retain flexibility over a wide range of temperatures.
- ❖ It is used in wide variety of commercial applications, such as laptops sleeves, orthopedic braces, electrical insulation and automotive fans belt.

NEOPRENE [POLYCHLOROPRENE]

PRODUCTION :

- ❖ Neoprene is produced by **FREE RADICAL polymerization** of chloroprene (**2-chloro-1,3-butadiene**)
- ❖ In commercial production this polymer is produced by **free radical emulsion polymerization** (FREP)
- ❖ Polymerization is initiated by using peroxide catalysts (i.e. Benzoylperoxide, potassium persulphate)

Synthesis of Neoprene:



NEOPRENE **[POLYCHLOROPRENE]**

PROPERTISE :

- ❖ **It's a very heat resistant synthetic rubber**
 - ❖ **Neoprene is also cold resistant.**
 - ❖ **Elongation ranges from 350% to 400%.**
 - ❖ **Tensile strength ranges from 900 to 1,000 PSI**
 - ❖ **Stretch and cushioning properties**
-

NEOPRENE

[POLYCHLOROPRENE]

APPLICATIONS:

- ❖ Neoprene is used in sealing gaskets, especially in relation to electricity, due to its heat and static resistance.
- ❖ it is commonly used in power transformers, light bulbs, wires, and other electrical applications as an insulator
- ❖ It used in making bridge bearing pads.
- ❖ Use in making high tensile bands for athletic stretch.
- ❖ Use in making high-pressure gaskets.

Thank you

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