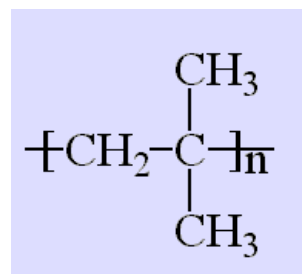


Name and Composition

Polyisobutylene (PIB) is a synthetic elastomer (a natural or synthetic polymer exhibiting elastic properties) with strong oxygen barrier properties. PIB is generally colorless but may have a light yellow color and it is generally odorless and tasteless although it may have a slight odor. PIB is the homopolymer of isobutylene on which butyl rubber is based. Butyl rubber consists of a copolymer of isobutylene with isoprene that is produced by polymerization of about 98% of isobutylene and about 2% of isoprene. PIB and butyl rubber have a wide variety of uses.



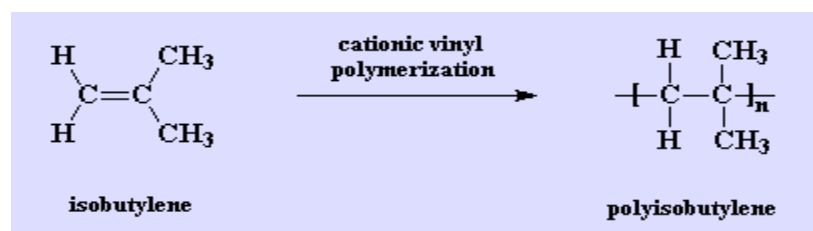
Chemical structure for Polyisobutylene (C₄H₈)_n

Polymer Science Learning Center 2016 (<http://pslc.ws/macrog/pib.htm>)

How it is made

Isobutylene was discovered in 1825 by Michael Faraday. Polyisobutylene was first developed in Germany in 1931 but it was not until the early 1940's that the U.S. used it to develop butyl rubber. This was necessary due to a lack of natural rubber supplies which originated from hevea trees in Malaysia and was under control by Japan at that time.

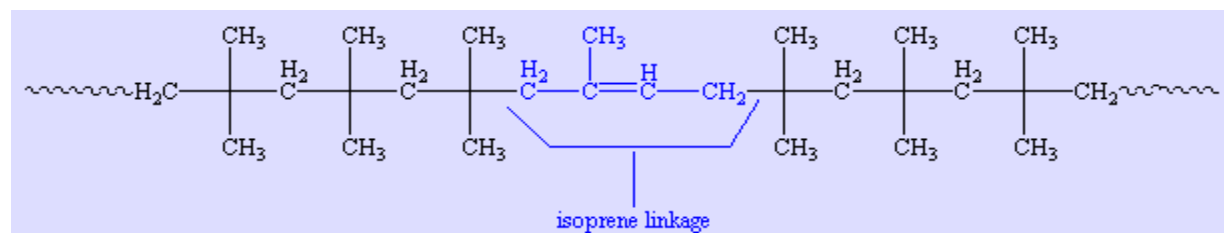
PIB is made from the monomer isobutylene by cationic vinyl polymerization. Typically, a small amount of isoprene is added to the isobutylene and the reaction is carried out at -100C. This low temperature is required in order to control the reaction which would occur too quickly otherwise.



Generation of PIB from its monomer isobutylene.

*Polymer Science Learning Center 2016
(<http://nslr.ws/macrog/nib.htm>)*

Butyl rubber is made through the copolymerization of polyisobutylene and isoprene.



Polymerization of isoprene and isobutylene to generate butyl rubber.

Polymer Science Learning Center 2016 (<http://pslc.ws/macrog/pib.htm>)

Its uses (as many as you can find with particular attention to how you are using it)

The first major use of PIB and butyl rubber was in the inner liners of tires due to its excellent impermeability to air and other gases. This property of butyl rubber is especially important for tires as it prevents any moisture in the air within the inner liner of a tire from reaching the tire's steel cords. PIB and butyl rubber are also used in the manufacturing of a wide variety of products such as adhesives, agricultural chemicals, fiber optic compounds, sealants, lubricants, paper, electrical fluids, fuel additives and even chewing gum.

An overall description of its properties with particular attention to the property that is most relevant to you research

Butyl rubber displays excellent impermeability while also having excellent flexibility due to the long segments of polyisobutylene that make up the copolymer. Compared to natural rubber, butyl rubber is more than eight times as impermeable to gases. Butyl rubber also has very high electrical resistivity, excellent resistance to weathering, oxidation, moisture and inorganic chemicals, and excellent thermal stability. However, butyl rubber displays low resilience, only limited physical strength and is notably more expensive than natural rubber.

References

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