

**B.Sc. Semester-VI  
Organic Chemistry  
Paper-XIV**

**2. Synthetic Polymers**

**Coverage:**

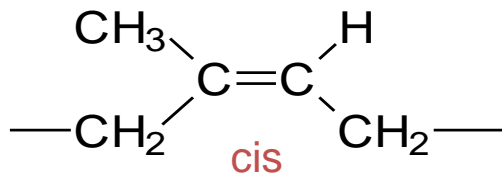
**18. Natural Rubber and Gutta-Percha**



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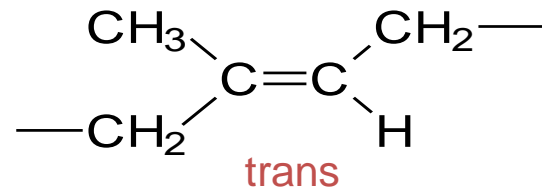
## 18. Natural Rubber and Gutta-Percha

Natural rubber is a polymer of isoprene (2-methyl-1,3-butadiene) which is also a diene. Many synthetic elastomers or rubber-like materials are polymers of isoprene and of butadiene.



cis-isoprene  
(Natural rubber)

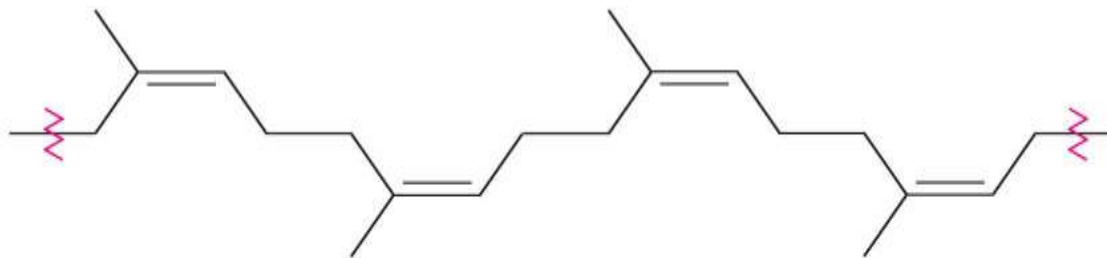
bulky groups on same side of chain



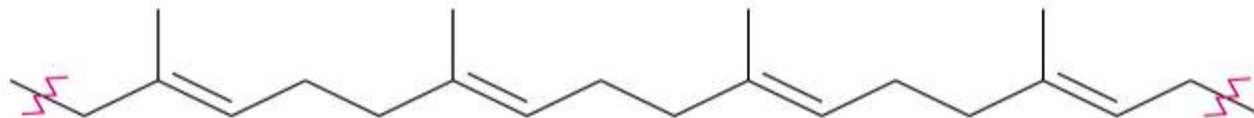
trans-isoprene  
(Gutta percha)

bulky groups on opposite sides of chain

(a)



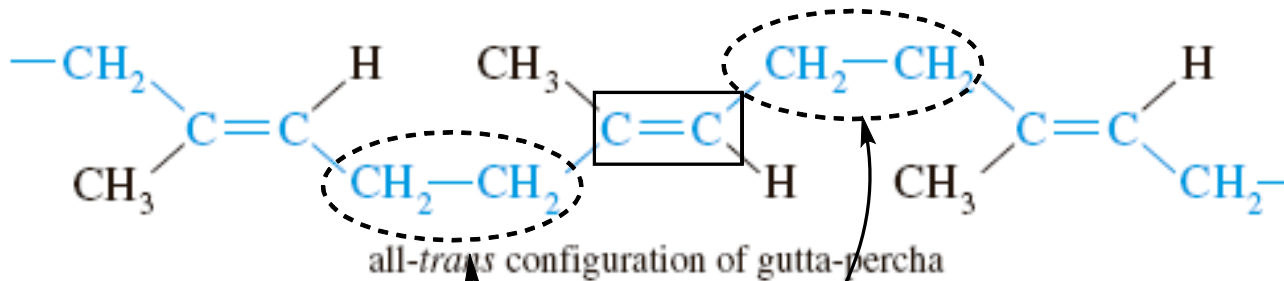
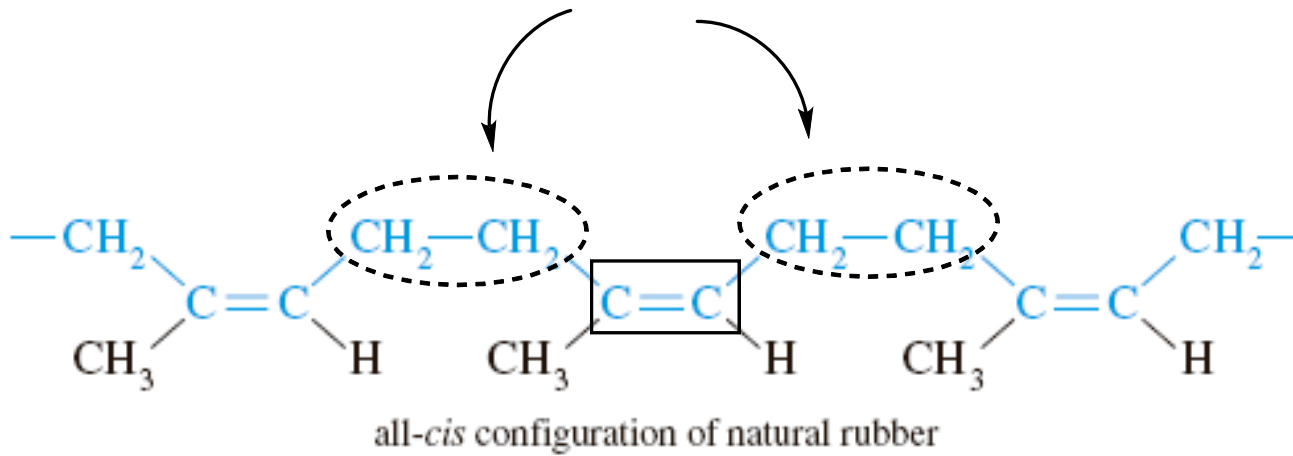
(b)



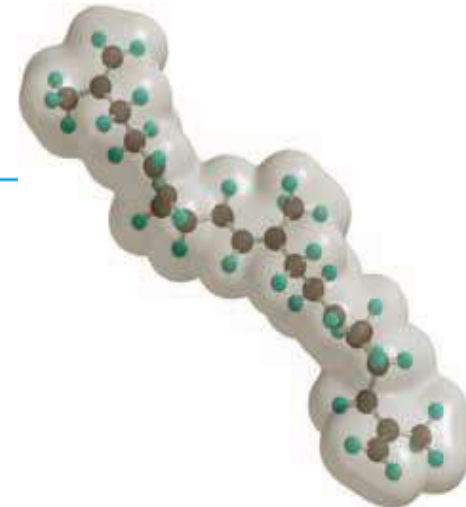
- The upper structure is rubber, a natural elastomer
- The lower structure is the nonelastic gutta-percha

# Natural Rubber and Gutta-Percha

Ethylene groups on same side = cis

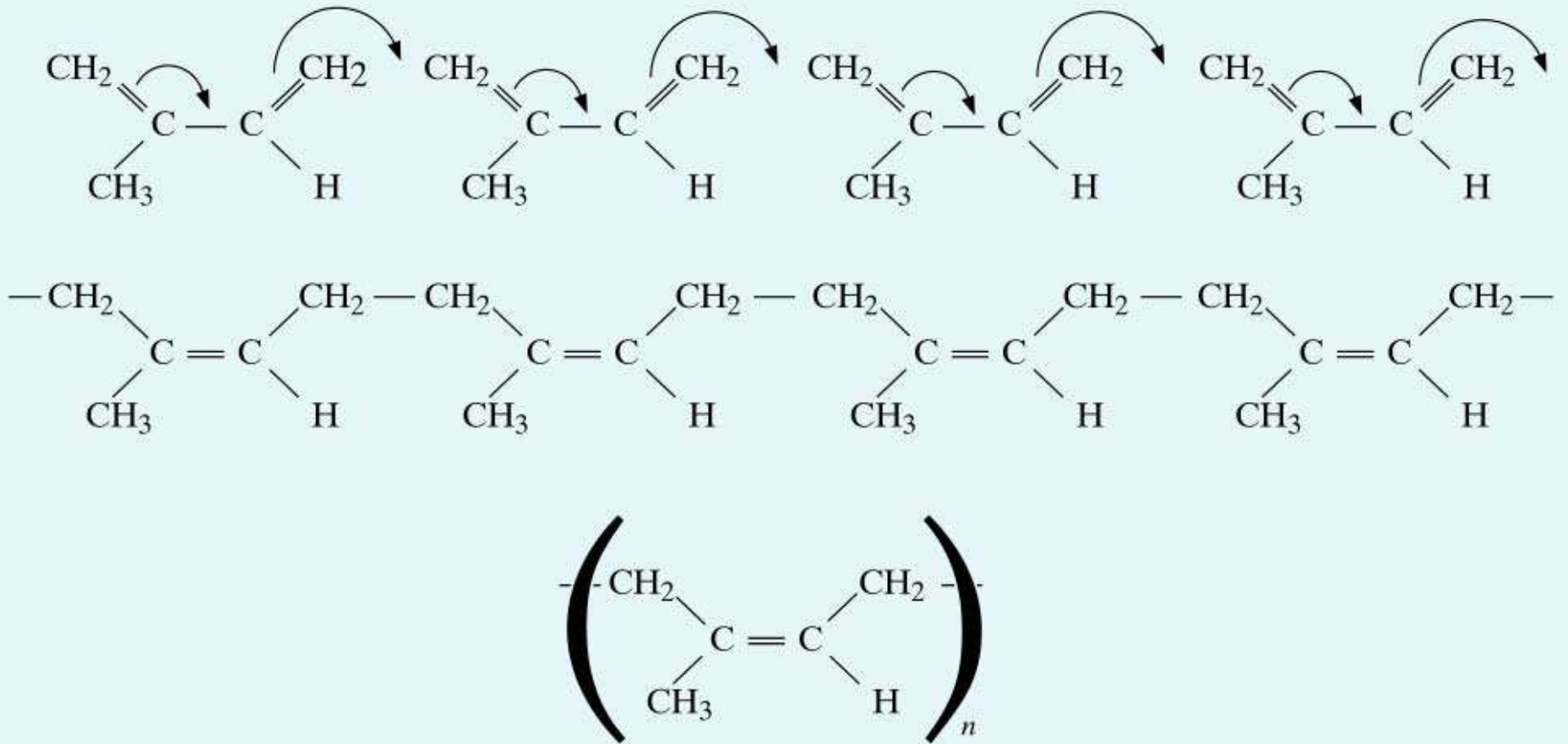


Ethylene groups on opposite side = trans



# Natural Rubber and Gutta-Percha

Rubber forms by addition-polymerization of isoprene units.



Rubber is a natural elastomer.

## Natural Rubber and Gutta-Percha

Although these two polymers have the same composition, their properties are radically different.

The *cis* natural rubber is a soft, elastic material, whereas the *trans*-gutta-percha is a tough, nonelastic, hornlike substance.

- Macromolecules commonly contain thousands of atoms.
- Polymers with double bonds commonly have geometric isomerism.
- Natural rubber is an elastomer of all-*cis* polyisoprene, while gutta-percha is tough non-elastic material made from all-*trans* polyisoprene.