


Lecture 3: Homo chain inorganic polymers.

Classification Based upon Polymer Structure

In addition to classification based upon processing and polymerization characteristics, polymers may also be grouped based upon the chemical structure of their backbones. For example, polymers having all carbon atoms along their backbone are important examples of *homochain* polymers. They may be further classified depending upon whether there are single or double bonds along their backbone. Carbon-chain polymers with only single bonds along the backbone are called *polyalkylenes* (or polyalkylidenes). Examples of polyalkylenes include polystyrene, the polyolefins (e.g., polyethylene and polypropylene), and poly(vinyl chloride). Carbon-chain polymers with double bonds along the chain such as the diene elastomers—polyisoprene and polybutadiene—are called *polyalkenylenes*. Another example of a polyalkenylene is polyacetylene, an electrically conducting polymer.

Heterochain polymers that contain more than one atom type in their backbone are grouped according to the types of atoms and chemical groups (e.g., carbonyl, amide, or ester) located along the backbone. The most important classes of organic heterochain polymers are listed in Table 1-4. Another important class of heterochain polymers includes polysiloxanes. These have a –Si–O– backbone with methyl or other substituent groups attached to silicon.

Table 1-4 Backbone Structures of Some Important Organic Heterochain Polymers

Polymer Classification	Backbone Group
Carbon–Oxygen Polymers	
• Polyethers	

Polymer Classification	Backbone Group
<ul style="list-style-type: none"> • Polyesters of carboxylic acids 	$\begin{array}{c} \text{O} \\ \\ \text{---C---O---} \end{array}$
<ul style="list-style-type: none"> • Polyanhydrides of carboxylic acids 	$\begin{array}{c} \text{O} \qquad \qquad \text{O} \\ \qquad \qquad \quad \\ \text{---C---O---C---} \end{array}$
<ul style="list-style-type: none"> • Polycarbonates 	$\begin{array}{c} \text{O} \\ \\ \text{---O---C---O---} \end{array}$
Carbon–Sulfur Polymers	
<ul style="list-style-type: none"> • Polythioethers 	---S---C---
<ul style="list-style-type: none"> • Polysulfones 	$\begin{array}{c} \text{O} \\ \\ \text{---S---C---} \\ \\ \text{O} \end{array}$

Polymer Classification	Backbone Group
Carbon–Nitrogen Polymers	
<ul style="list-style-type: none"> <li data-bbox="244 510 443 544">• Polyamines 	—C—N—
<ul style="list-style-type: none"> <li data-bbox="244 689 443 723">• Polyimines 	—C=N—
<ul style="list-style-type: none"> <li data-bbox="244 869 443 902">• Polyamides 	$\begin{array}{c} \text{O} \\ \parallel \\ \text{—C—N—} \end{array}$
<ul style="list-style-type: none"> <li data-bbox="244 1261 419 1294">• Polyureas 	$\begin{array}{c} \text{O} \\ \parallel \\ \text{—N—C—N—} \end{array}$

Reference:

<http://www.informit.com/articles/article.aspx?p=2235827>