

The Development And Application of Bio-Based Adhesives & Coatings

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Overview

◆ Adhesives

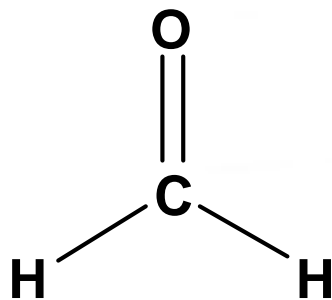
- ❖ Urea Formaldehyde Adhesives
- ❖ Formaldehyde Free Soy-Protein Adhesive

◆ Coatings

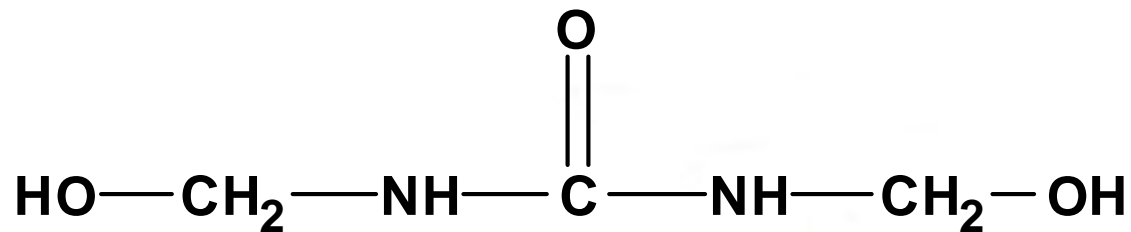
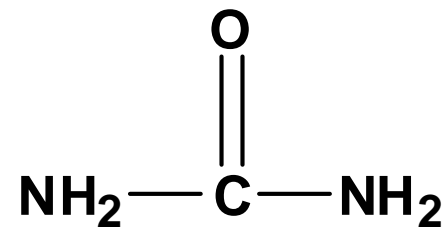
- ❖ Bio-Based Monomer Synthesis
- ❖ Bio-Based Coating Polymer Synthesis
- ❖ Bio-Based Coating Polymer Application

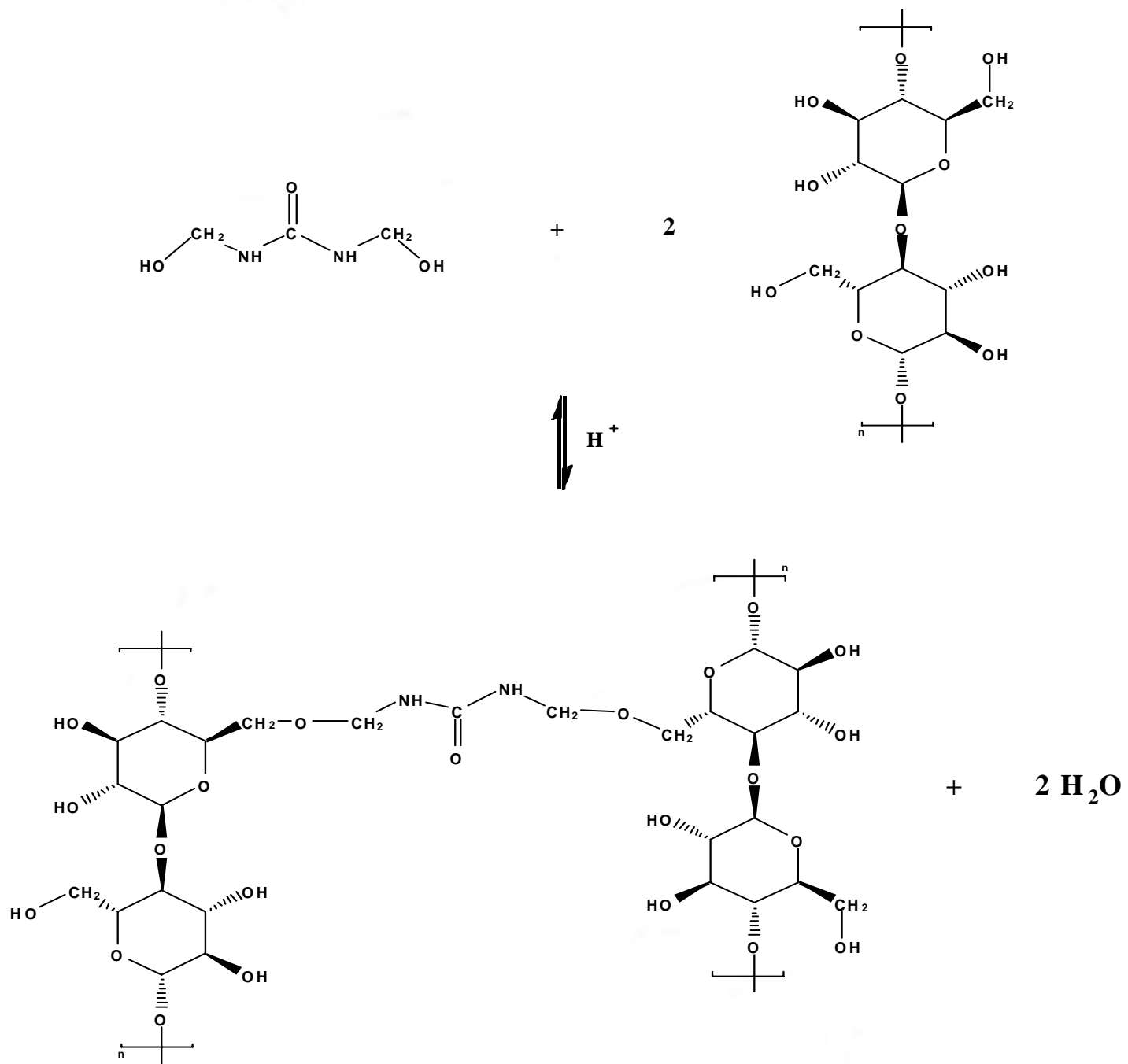
Urea Formaldehyde Adhesives

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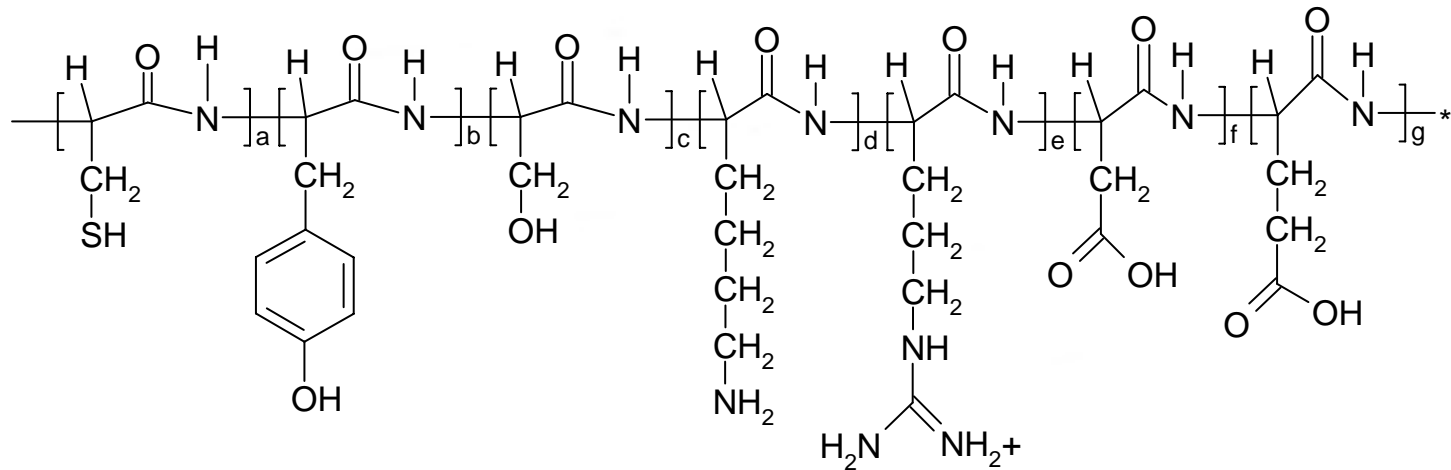
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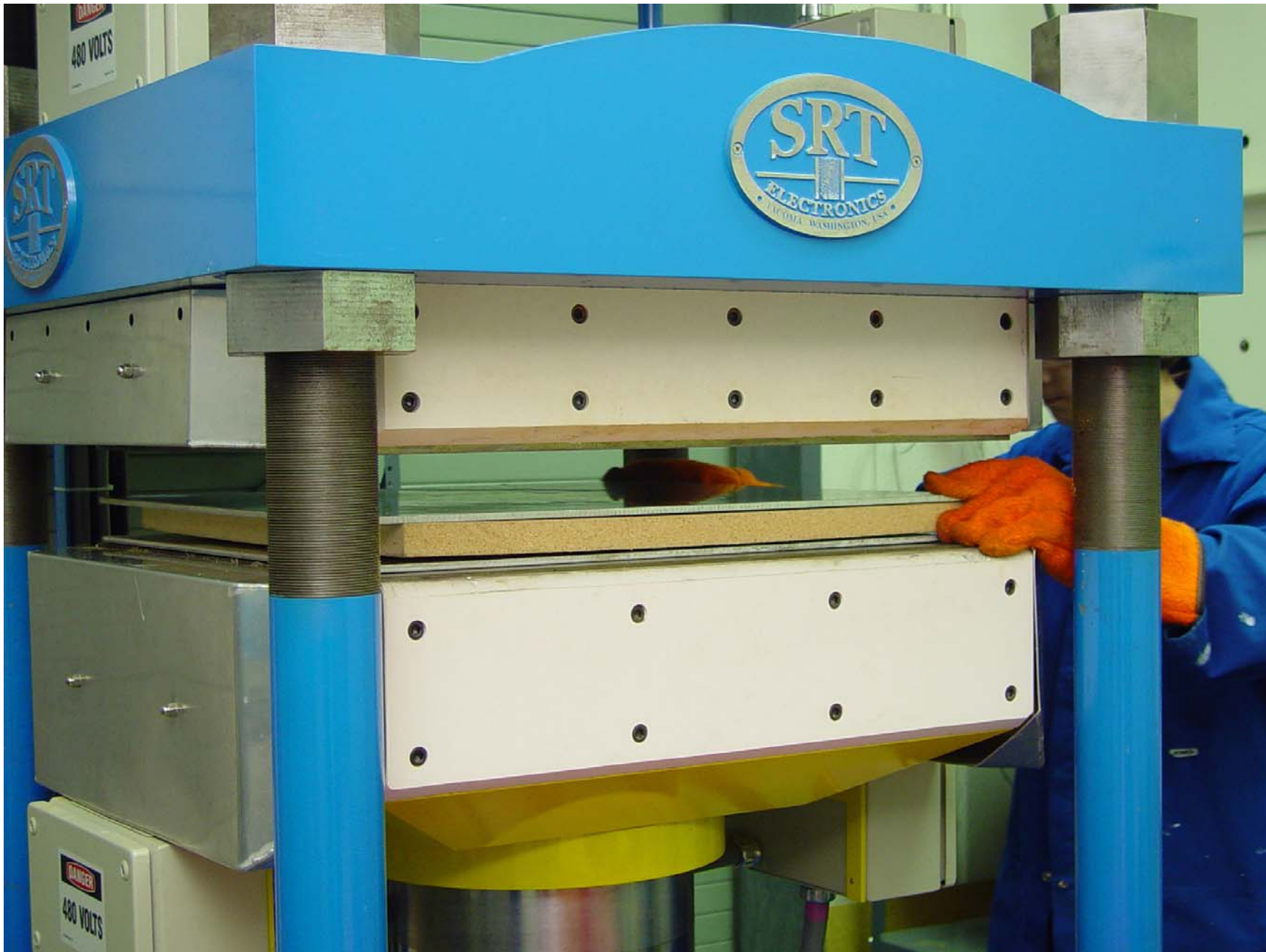


Formaldehyde Free Soy-Protein Adhesive

Soy Protein



Amino acid	Content (g/100 g protein)
Cysteine (a)	1.2
Tyrosine (b)	4.2
Serine (c)	5.5
Lysine (d)	6.4
Arginine (e)	8.2
Aspartic Acid (f)	12.0
Glutamic Acid (g)	19.9



Formaldehyde-Free Adhesive for Particleboard

		Density lb/ft ³	MC %	MOR PSI	MOE PSI	TS %	WA %
ANSI	M2	40-50	<10	>2103	>326300	NS	NS
Commercial	UF Resin	50.5	7.0	2314	398288	<7	<21
USM Adhesive 4/8"		50.5	5.5	2582	456585	3.9	9.3
USM Adhesive 5/8"		50.6	8.0	2554	430011	3.8	11.4
USM Adhesive 6/8"		48.9	7.3	2325	444523	3.7	11.3
USM Adhesive 7/8"		48.0	7.2	2298	412071	3.3	10.6

Particle Board Adhesive (Soy Protein Based)

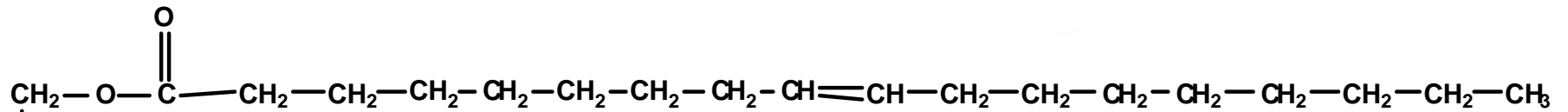
- ◆ **Density**
 - ❖ 50.6 lb/ft³
- ◆ **Modulus of Rupture**
 - ❖ 2,554 psi
- ◆ **Modulus of Elasticity**
 - ❖ 430,011 psi
- ◆ **Thickness Swell**
 - ❖ 3.8 %
- ◆ **Water Absorption**
 - ❖ 11.4 %



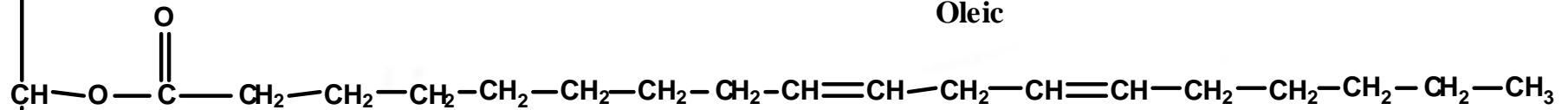
Bio-Based Coatings

Synthesis of Bio-Based Monomer

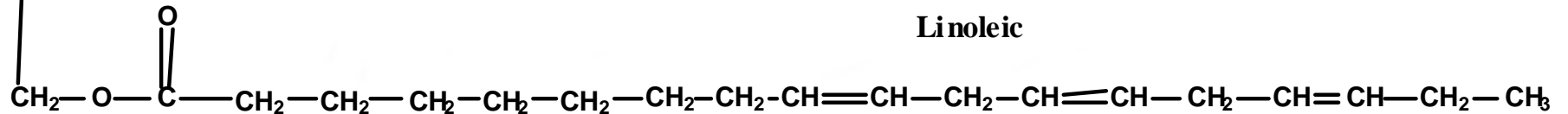
Soybean Oil



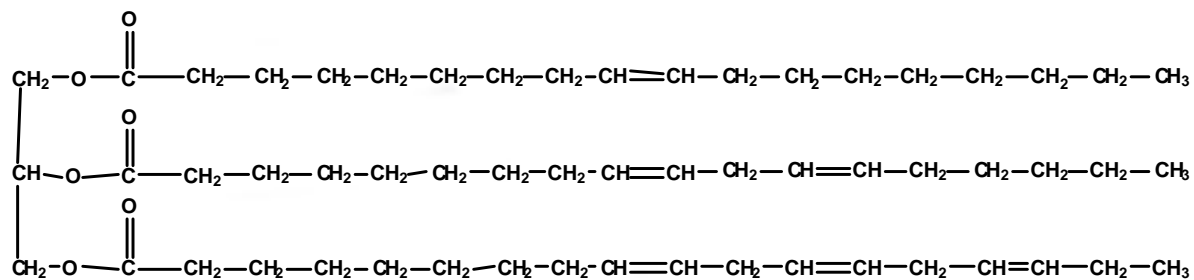
Oleic



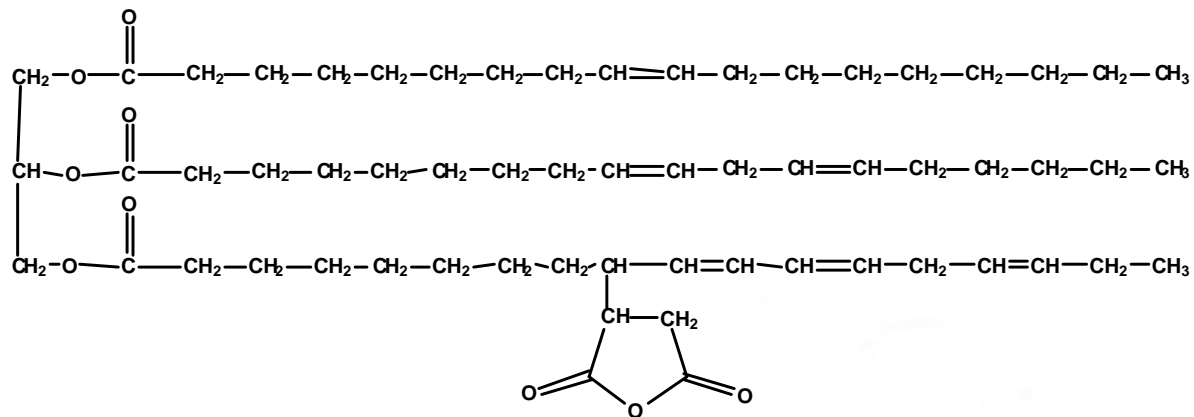
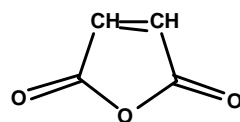
Linoleic

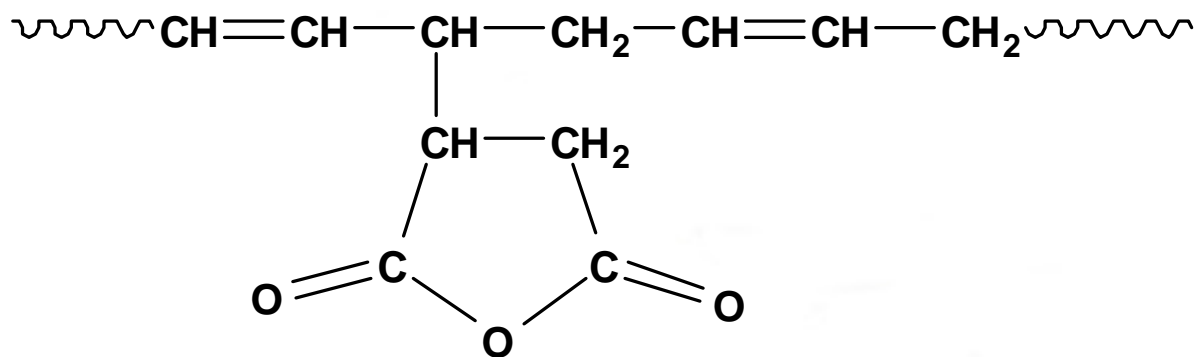
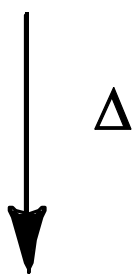
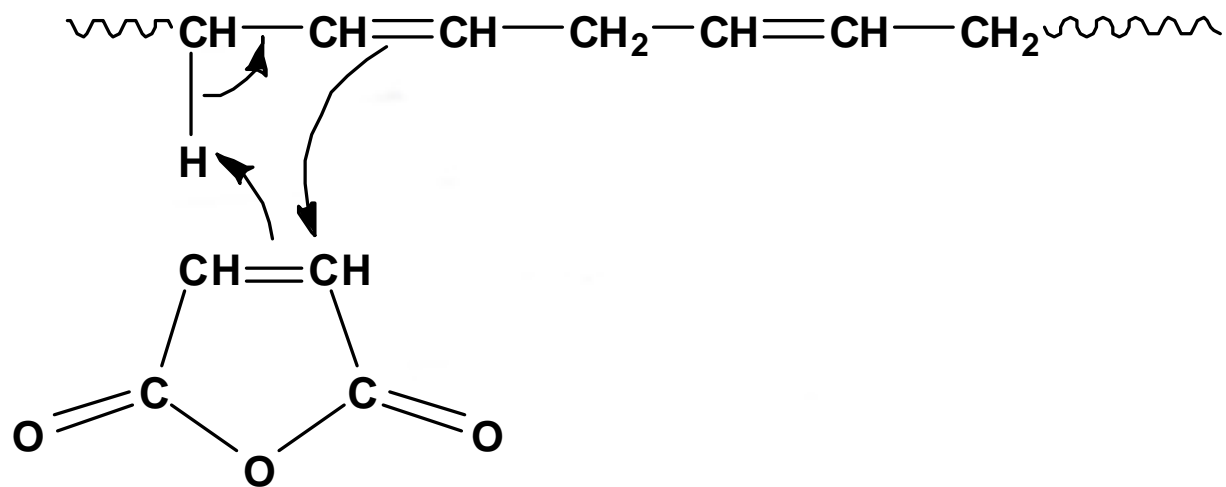


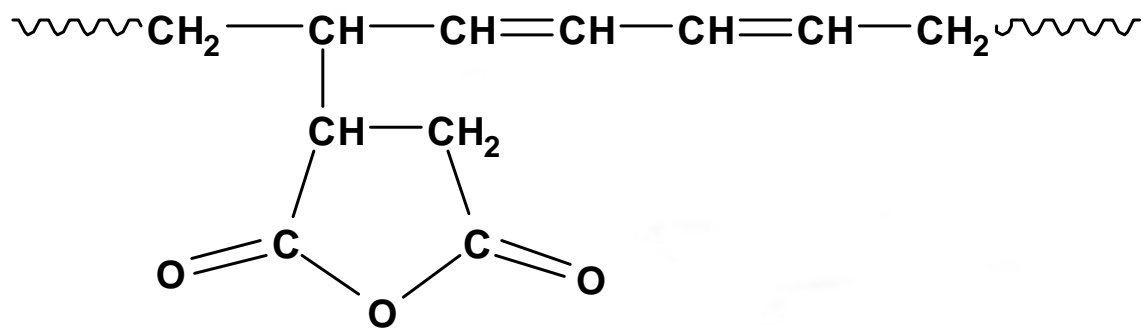
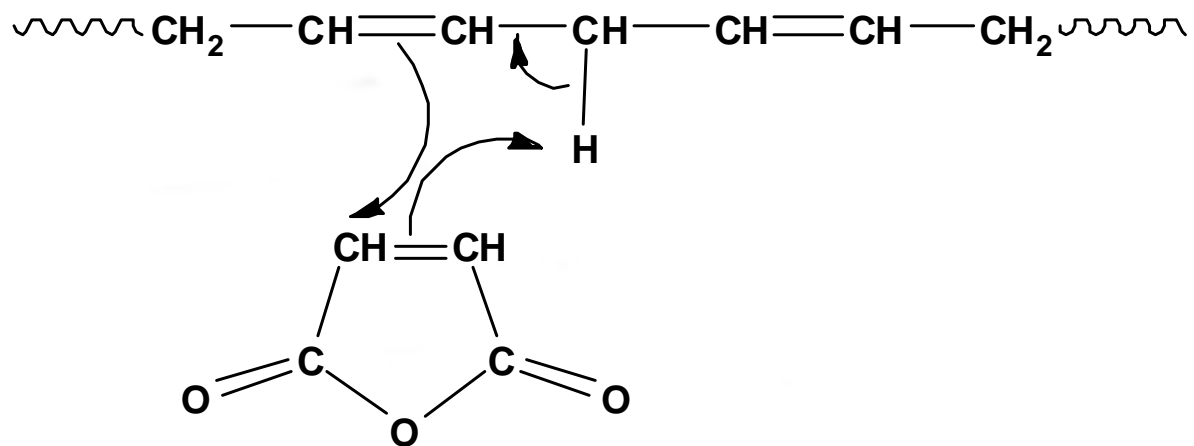
Linolenic

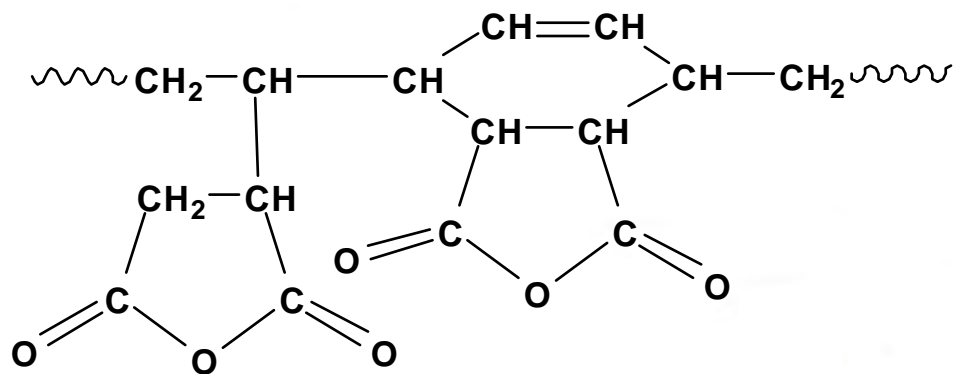
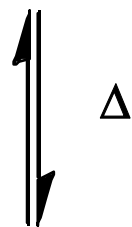
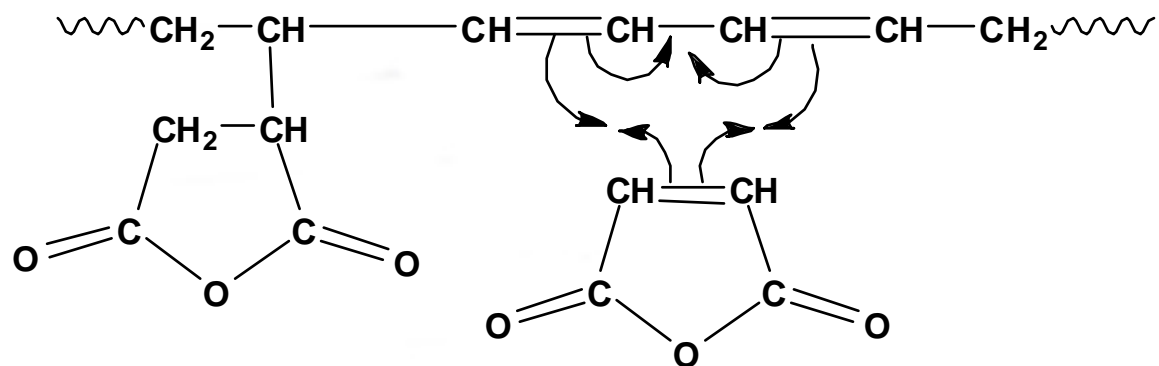


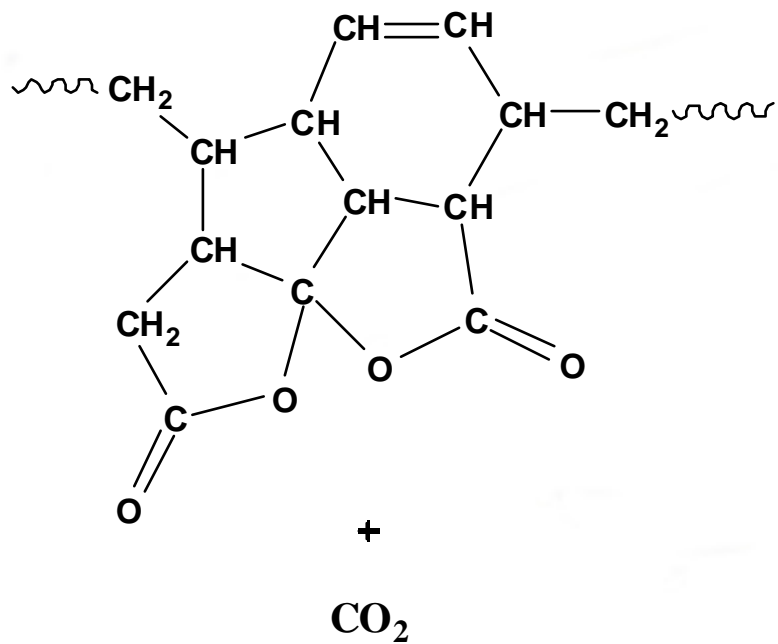
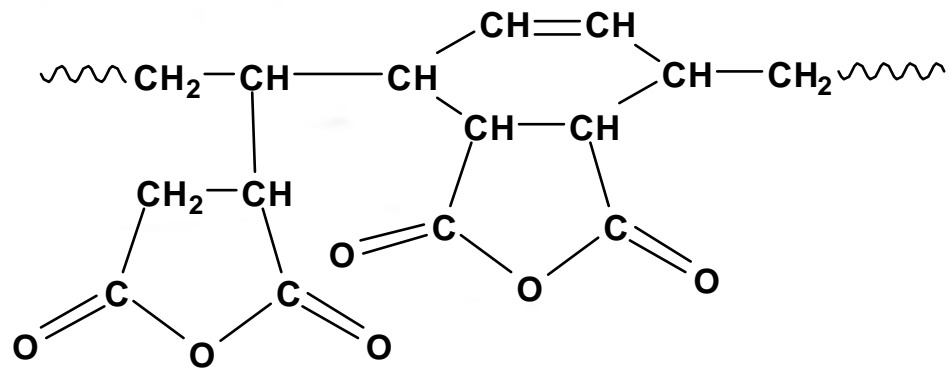
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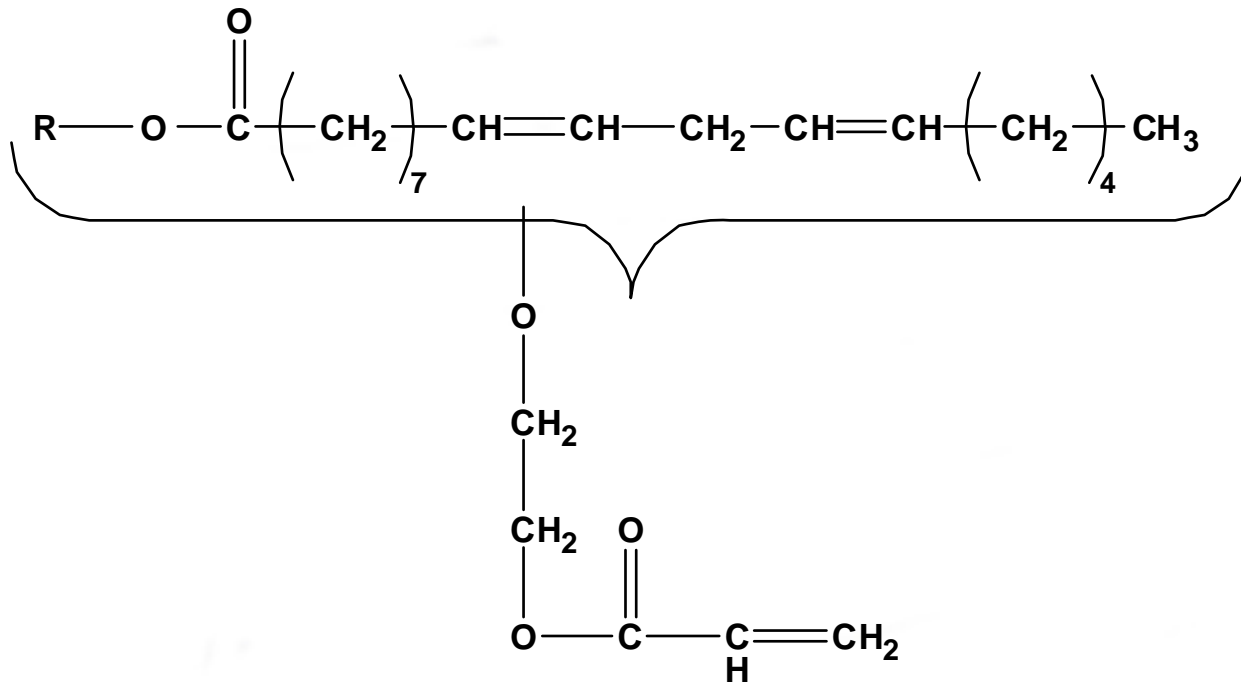






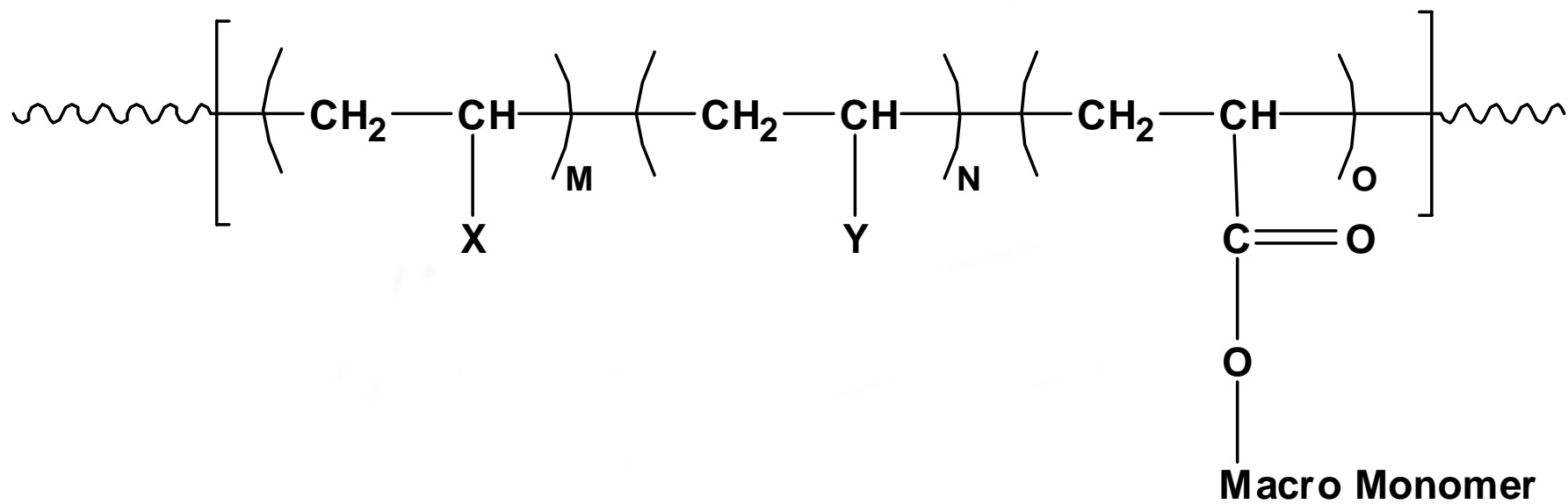






- ◆ **Adaptable to emulsion polymerization process**
- ◆ **Provides effective auto-oxidation cure**
- ◆ **Cost effective**
- ◆ **Manufactured via green process**





Textile Latex



Navy Haze Gray

