

# ADVANCING SUSTAINABLE POLYSORBATE PRODUCTION WITH GREEN CHEMISTRY



### WHAT ARE POLYSORBATES?

Non-ionic surfactants used in pharmaceuticals, food, cosmetics, and biotechnology. They're made by esterifying sorbitol with fatty acids.



Stability Issues: 69% hydrolysis and 63% oxidation in drug products.

Raw Material Variability: Inconsistent sources of sorbitol and fatty acids.

**Environmental & Economic Impact:** Pollution from production, rising material costs, and supply chain challenges.



## SUSTAINABLE ALTERNATIVES: A GREENER PATH FORWARD

Plant-Based Oils: Sunflower, soybean for fatty acids.

**Sorbitol:** Sourced from renewable plant-based resources.

**Lignocellulosic Biomass:** Agricultural waste as a feedstock.

**Green Chemistry:** Cleaner esterification methods.

Biotechnology: Bio-based production via fermentation or enzymatic processes.



Bio-Based, Biodegradable Polysorbates: Rising demand for environmentally-friendly surfactants.

#### **Ultra-Purity Polysorbates:**

Increasing demand in biologics, vaccines, and injectables.

#### **Lignocellulosic Biomass:**

Agricultural waste as a feedstock.

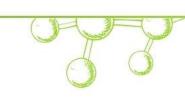


### MARKET GROWTH **PROJECTIONS:**

### **Ultra-Purity Polysorbates:**

Market value expected to grow from USD 1.2B in 2022 to USD 2.5B by 2033.

Food Grade Polysorbates: CAGR of 4.6% between 2023-2030.



Sustainable alternatives are emerging — and worth a closer look. Stay informed. Stay ahead.