

# 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.



## KEY CHALLENGES IN CURRENT PRODUCTION:

**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

### Sustainable Raw Materials:

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

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

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

### Sustainable Technologies:

**Green Chemistry:** Cleaner esterification methods.

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



## EMERGING TRENDS:

**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.**