

Cellulose

Dr.S.S.M.Abdul Majeed

Professor & Head

Department of Polymer Engineering

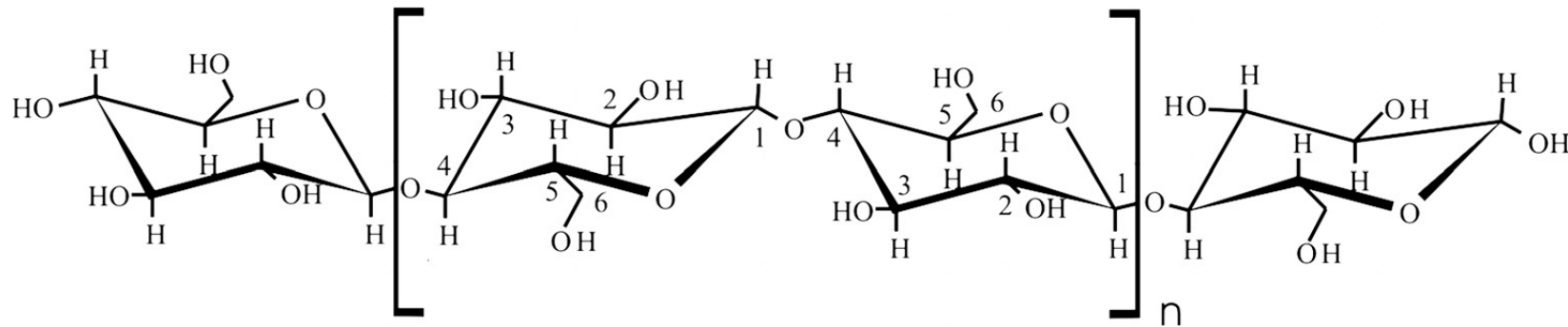
*B.S.Abdur Rahman Crescent Institute
of Science and Technology*

Introduction

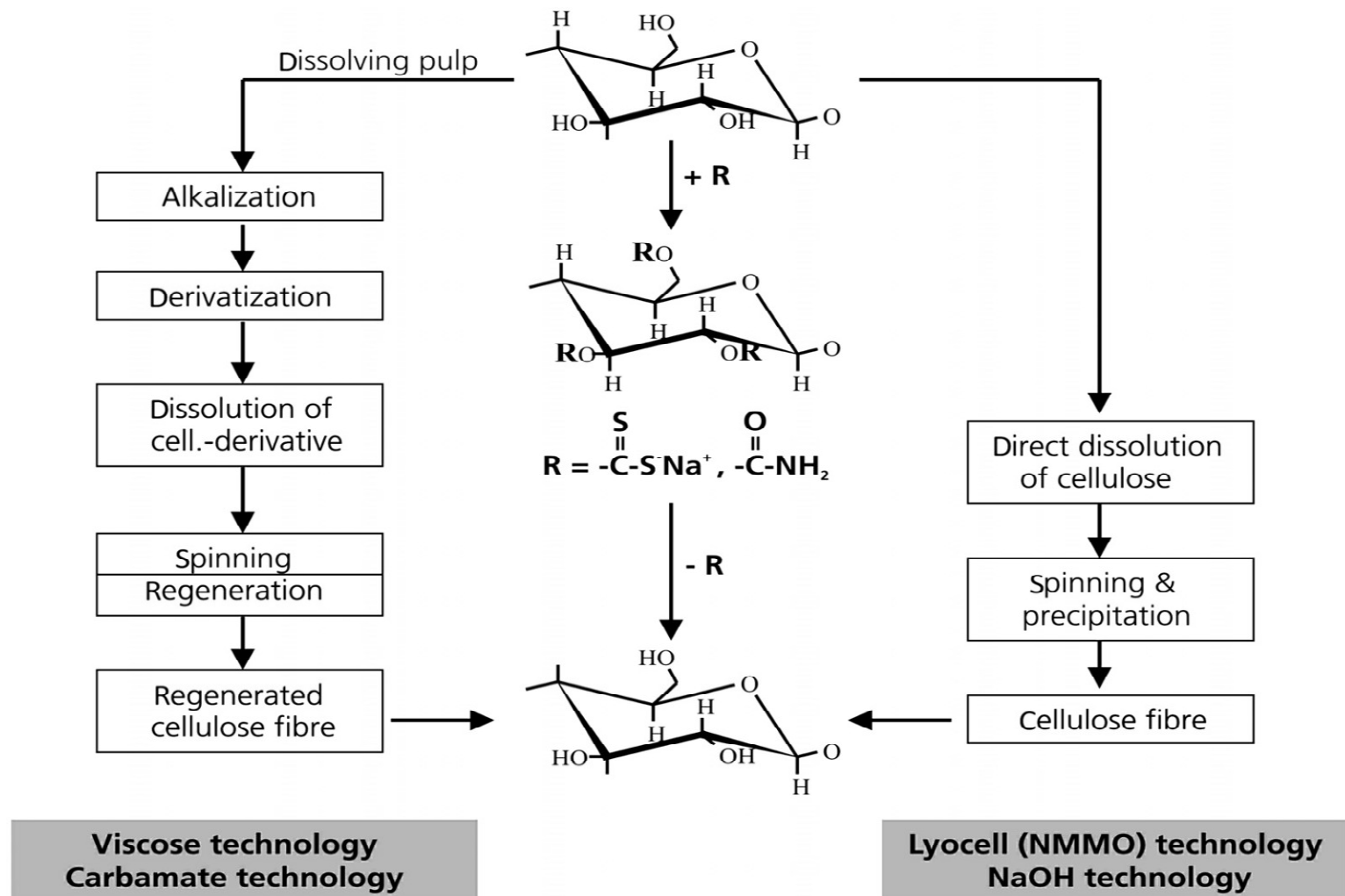
- Cellulose is the most abundant natural polymer on earth.
- Cellulose is a semirigid polysaccharide of well defined chemical configuration
- The main source of cellulose is wood
- Traditional source of cellulose is represented by vegetable fibres found in plants like cotton , hemp, flax, jute, sisal etc.

Structure

- ❑ The cellulose molecule is a polysaccharide built up of six-membered sugar rings of anhydroglucose units.
- ❑ The chemical repeating unit is $C_6O_5H_{10}$



Regenerated Cellulose



Solvents

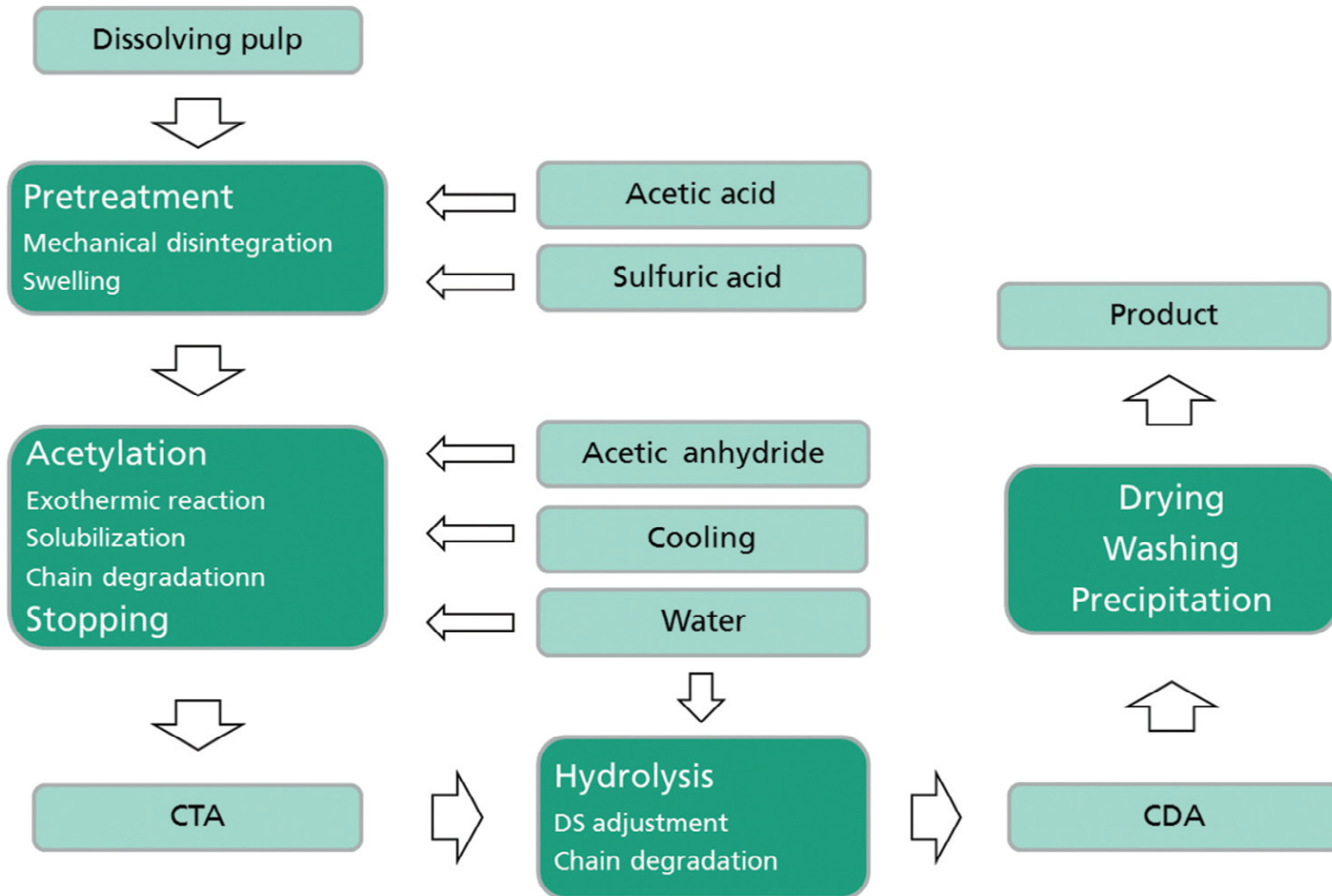
- LiCl/DMAc (lithium chloride/N,Ndimethylacetamide)
- DMSO/TBAF (dimethyl sulfoxide/tetra-n-butylammonium fluoride)
- Sodium hydroxide/urea and superphosphoric acid
- N-methylmorpholine-N-oxide monohydrate (NMMO)

Cellulose Acetate

Steps in Manufacturing

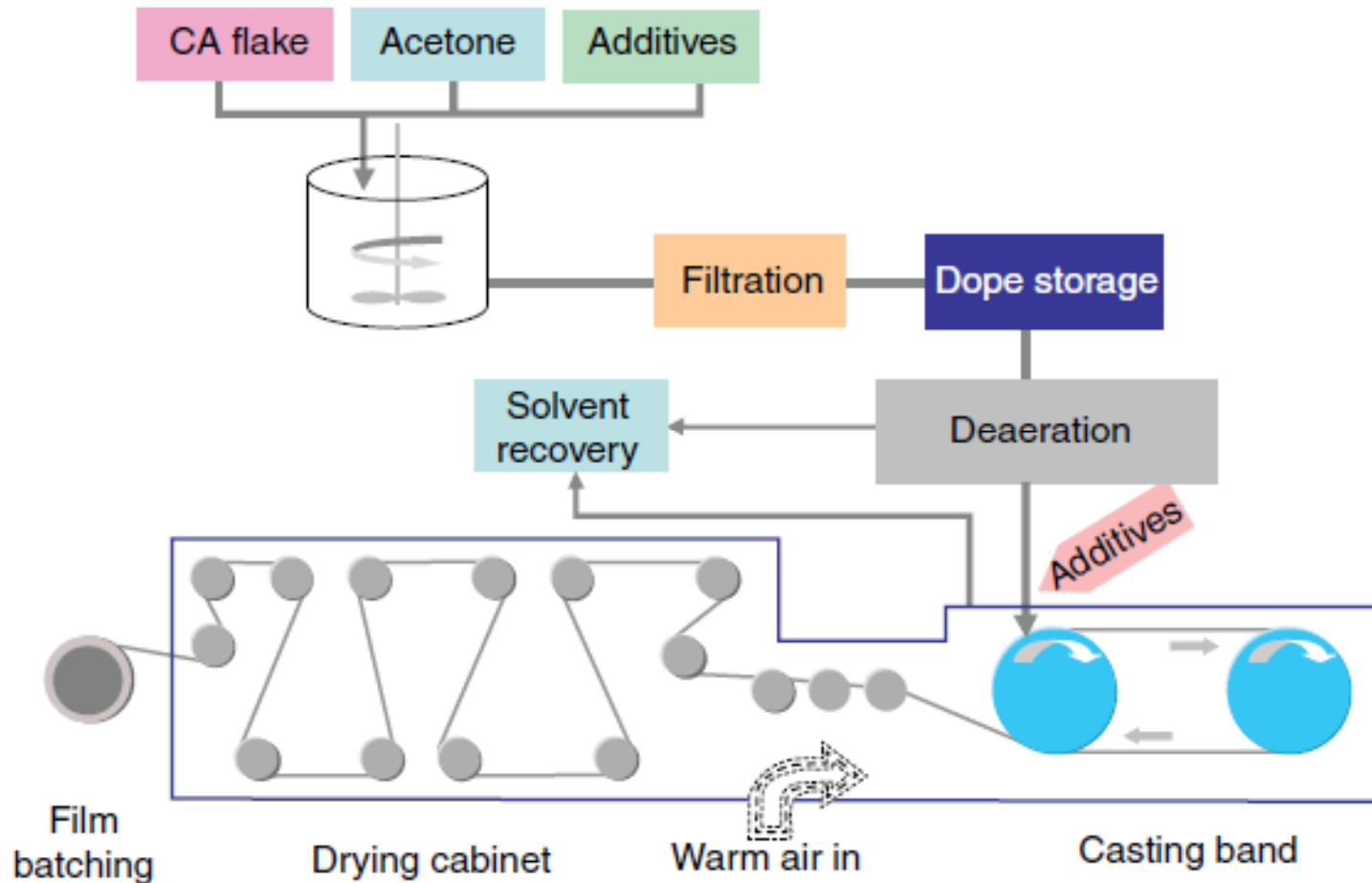
- High-quality dissolving cellulose pulp is activated in a pretreatment step by mechanical disintegration.
- Then swelling in aqueous acetic acid solvent in order to make accessible to the cellulose hydroxyl .
- Sulfuric acid is added as the catalyst.
- As soon as acetic anhydride is introduced in the next step, the derivatization reaction starts.
- As soon as cellulose acetate is produced and dissolved in the reaction mixture ending in a homogeneous cellulose triacetate (CTA) solution.

Cellulose Acetate...



Processing of Cellulose Acetate

Fibres and films



Production of Cellulose Film

Applications

- **Fibre**
 - Highly absorbent
 - Soft and comfortable
 - Easy to dye
 - Drape well
- **Film**
 - Excellent transparency and gloss
 - Highly permeable to moisture
 - Excellent gas and aroma barrier
 - Anti-static, easy tearing and anti-mist;
 - Receptive to inks and adhesives
 - Certified compostable
 - Suitable for anaerobic digestion

Applications...

Moulded Articles

- Tool handles
- Eye wear
- Safety shields
- Appliance parts
- Displays and signage
- Toys and sporting good
- Cosmetics and personal care.