

PRE-TREATMENT OF DIFFERENT FIBERS – PART XV

REF: TT/ MARCH 2021/ WK 1

LIQUID AMMONIA MERCERIZATION

Besides Caustic Soda, Liquid ammonia is also used in the mercerizing of cotton. In this process cotton is treated with ammonia and gives similar effect as that is achieved when mercerization is done using sodium hydroxide.

The mechanism involved is also similar to that of Caustic Soda mercerization process. Liquid Ammonia swells the cotton fiber and changes the crystalline structure of cotton. Ammonia penetrates into the cotton very fast and forms a complex with the hydroxyl group after breaking the hydrogen bonds in the crystalline and semi crystalline region. As ammonia molecule is very small it allows it to penetrate into the core of the fiber unlike caustic soda. This results into even mercerization. In the process of ammonia mercerization, the Cellulose I (Base cellulose) is converted into ammonia cellulose complex, then to Cellulose III on heating and removal of ammonia. The small amount of residual ammonia present in the fabric after drying is removed by steaming. The ammonia vapors are recovered, liquefied and reuse.

However, this process is not so popular and Caustic Soda is used commonly for mercerization of the cotton fiber. The disadvantages of Liquid ammonia process are:

- Storing Ammonia in liquid form at below 33 deg C is difficult.
- It forms explosives when reacts with moisture present in the air.
- It's a health hazard and during When leakage in machine it highly affects the workers.

Recovery of Ammonia

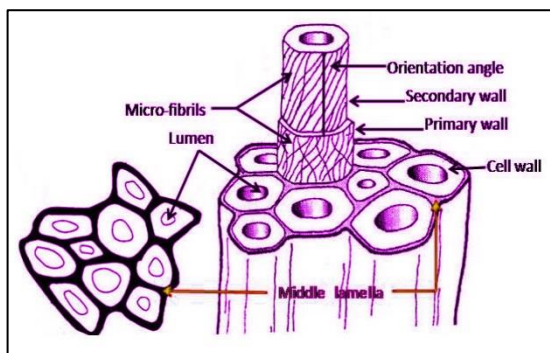
- Recovery of Ammonia occurs by the reaction between Ammonia water and gas that is discharged.
- Ammonia water mixes with air and goes outside.
- It is then separated through the distillation column. Ammonia is distilled and then is sent to the storage unit.



E) Pre-treatment of Jute

Jute is a lignocellulosic fiber, it falls into the bast fiber category. The chemical composition of jute includes cellulose, hemicellulose, lignin, water soluble matters and fat & wax. Jute fiber consists of several cells; these cells are formed out of crystalline micro fibrils based on cellulose, which are connected to a complete layer by amorphous lignin and hemicellulose.

Chemical composition of jute is complex. Hence, pre-treatment of jute fiber should be done delicately as severe treatment may cause damage to the fabric. Like, this fiber is very sensitive to alkali due to the presence of hemicellulose and since it contains cellulose it becomes sensitive to strong acid also.



Content's name	Percentage
Cellulose	65.2%
Hemi-cellulose	22.2%
Lignin	12.5%
Water Soluble matter	1.5%
Fat and Wax	0.6%

Fig 1.1 Structure of a Jute fiber cell

Fig 1.2 Chemical composition of Jute fiber

Ref: gpktt.weebly.com

Ref: textileadvisor.com

References:

- <https://www.textiletoday.com.bd/>
- <http://www.fibre2fashion.com/>
- <http://drmsparmar.blogspot.com/>

.....To be continued.....

UNSCRAMBLE THE JUMBLE WORDS
NIAAMMO
QUIDLI
UTEJ
LOSICCELLULIGNO

Last week's Answers: 1) MERCERIZATION 2) CAUSTIC SODA 3) MORPHOLOGICAL 4) ALKALI

Wishing you a great week ahead!

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