

PRE-TREATMENT OF DIFFERENT FIBERS – PART XIII

REF: TT/ FEBRUARY 2021/ WK 3

ROLE OF STABILIZERS IN PEROXIDE BLEACHING

Hydrogen Peroxide solutions are unstable in alkaline solution. The rate of decomposition of peroxide increases in presence of metallic salts. Copper/iron ions present in the solution or fiber acts as catalysts in the process of decomposition. To neutralize this catalytic process, a variety of stabilizers are being used. Silicates, Phosphates, polycarboxylic acids are some of the chemical products which show stabilizing property. Sodium silicates are the most excellent stabilizers for hydrogen peroxide. They are economical, acts as a buffering agent to control pH and reduce the fiber degradation; thus prevents strength loss of the fiber.

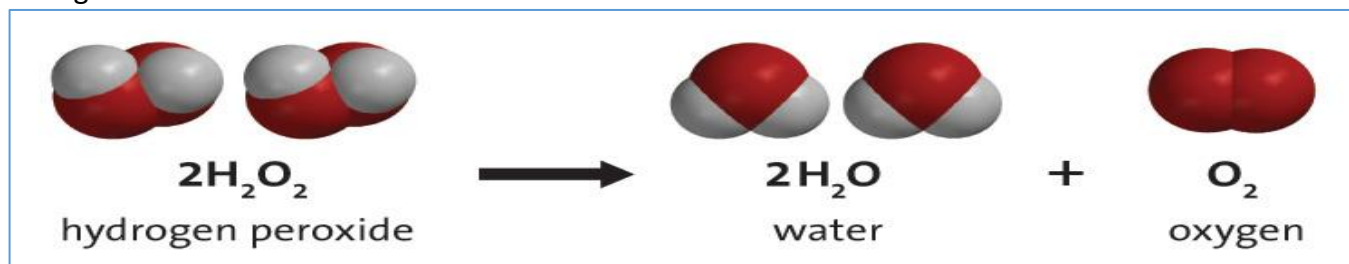
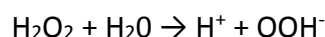


Fig 1.1 Decomposition of Hydrogen Peroxide

Ref: socratic.org

Sodium silicates are the most commonly used and most effective hydrogen peroxide bleach stabilizers. They are used as colloidal silicate, ortho silicate or meta silicate.

Mechanism of Stabilizers - Silicates have a natural affinity for ferrous ions which are present in cotton. Hydrogen peroxide is a weak acid and ionizes in water to form a hydrogen ion and per hydroxyl ion which is an active bleaching agent.



The above reaction is catalyzed by metal ions like ferrous ions and causes fiber damage. Silicates are adsorbed onto the ferrous ions in the fiber, producing a species that catalytically enhances bleaching while reducing bleach decomposition and fiber damage. Stabilization is enhanced by the presence of magnesium ions. Magnesium serves as a pH buffer. As the concentration of OOH^- rises during bleaching, magnesium hydroxide precipitates. This reduces the OOH^- concentration. Magnesium salts are used in bleaching as pH buffers.



The disadvantage of silicate stabilizer is to create hard scales on the processing machine parts. There is a tendency of deposition of silicate onto the fiber. This may result into poor handle to the fabric and also problem in the further processes such as dyeing and printings.

IMPORTANT PARAMETERS IN PEROXIDE BLEACHING

The important parameters for bleaching with hydrogen peroxide are –

1. Concentration of hydrogen peroxide
2. Concentration of alkali – Beside desired scouring action, the concentration of alkali in the bleaching bath is important to maintain a constant pH throughout the bleaching cycle. The concentration of the alkali to be added depends on the quality of the fabric and the finish required.
3. pH of the bath - The pH value in peroxide bleaching is very important. pH affects the bleaching efficiency, fiber degradation and peroxide stability.
4. Bath Temperature – At high temperature, the degree of whiteness and its uniformity increases. However, at very high temperature, degree of polymerization of the cotton will decrease, fiber becomes harsh and the sew ability of woven cotton fabrics also decrease.
5. Processing Time
6. Water hardness
7. Present of different impurities - Impurities such as iron, copper and manganese have very harmful effect. It results into catalytic decomposition of hydrogen peroxide that leads to fiber damage.
8. Uses of different auxiliaries – Other than stabilizer, different auxiliaries are also used in the bleaching process. These may include surfactants and chelating agents. The type and concentration of these auxiliaries also plays an important role in the bleach effect obtained.

References:

1. <https://textileinsight.blogspot.com>
2. <http://dyeingworld1.blogspot.com/>
3. <https://medcraveonline.com/>
4. <https://www.fibre2fashion.com/>

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

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EROXPIDE

Last week`s Answers: 1) CHROMOPHORE 2) OPTIMUM 3) ANTICHLOR 4) BLEACHING

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