REF:TT/ FEB 2012/ WK 1

HYDROGEN PEROXIDE BLEACHING IN COTTON-Part-1

What is Bleaching?

- Bleaching is the process of improving the whiteness of the fabric by removing the natural colouring compound on the fabric.
- To make the fabric ready for dyeing or finishing.

Hydrogen peroxide:

- It has powerful Oxidising properties. Due to this it has a bleaching action on textile substrate. It's a universal bleaching agent.

Peroxide Bleaching in Acidic pH:

- In acidic pH ,H202 is stable but in a neutral aqueous solution, hydrogen peroxide is ionized in to per hydroxyl and hydrogen ions

$$H_2O_2 \rightarrow HOO^- + H^+$$

- This per hydroxyl ion is supposed to be the active bleaching agent.
- But the bleaching effect is dependent greatly on the pH of the solution.
- In acidic or neutral pH, per hydroxyl and hydrogen ions are found in solution.
- The hydrogen ions have a tendering effect on cellulose due to its acidic nature. It is found that in acidic or neutral pH tendering effect of H+ ions is more than the bleaching effect of the HOO-
- This tendering will in turn impart yellowness to the cotton substrate it is not recommended to carry out bleaching in acidic conditions.

Technical Tuesday

Why H2O2 bleaching is carried out in alkaline pH?

- In alkaline condition following reaction exists:

$$H_2O_2 + OH^- \rightarrow HOO^- + H_2O$$

- Here we can see that along with per hydroxyl ion and water molecules are in equilibrium
- Due to this in alkaline pH we get more bleaching effect.
- This is the reason why H202 bleaching is carried out in alkaline pH.

Why we are using Stabilizer in peroxide bleaching?

- The Presence of water hardness and the iron contamination in commercial processes further enhances the action of peroxide decomposition. If the bleaching is continued in such a way, that not only the bleaching efficiency will be hampered but also the uniformity of bleaching will not be good.
- Such material when taken for further dyeing will lead to problems like lesser depth, patchy dyeing etc...
- So it becomes mandatory to use a stabilizing agent in bleaching baths to get good bleaching performance.

pH suitable for Peroxide Bleaching of textiles

- At pH < 10, H202 is the major specie so it is inactive as a bleach.
- At pH 10.2-10.7 sufficient concentration of perhydroxyl ion for textile bleaching is formed.
- At pH >11,rapid generation of perhydroxyl ion
- At pH 11.8 all the H202 is converted in to perhydroxyl ion, the bleaching is out of control.

The pH range of 10.2-10.7 is the most suitable pH for bleaching the textiles using peroxide bleaching agent.

Have a happy week ahead"

To Be Continued…

Part-2: Determination of H2O2 in Bleaching Bath & Fabric.

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