

Bio-scouring on Cotton Fiber to Save the Environment from the Pollution of Water

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Abstract -The process of removing Wax, Oil, Fatty acid from the fibers by the chemical treatment known as scouring. For scouring caustic soda (NaOH) by maintain high PH rate (9.2-10.5) and the liquor of this high alkaline water is to drain out and that causes environment pollution. If enzyme is used to remove the impurities (Wax, Oil, Fatty acid) then it is known as Bio-Scouring. The rest of the liquors are not need to drain out so there is no environmental as well as reducing the wastages of water. On the other hand the low PH rate (7-9) is required for Bio-Scouring process. As rising the essential requirement for textile industries to reduce infectivity in textile manufacture, the applications of enzymes in the chemical processing of fibers and textiles is quickly in advance wider approval because of their non-toxic and eco-friendly uniqueness. In the nineteenth century Enzymes were exposed and routinely used in numerous environmentally friendly and economic industrial sectors. There is growing demand to remove ligninases pectinases, laccases and xylanases by special scouring known as bio-Scouring (Enzyme scouring) due to save the environment (Reduce the wastages of alkaline water) instead of using traditional scouring process (Alkaline Scouring process).

Keywords-Bio-scouring, Enzyme, Temperature, eco-friendly, non-toxic, reduces waste water, remove impurities.

I. INTRODUCTION

Cotton is the most important fiber in the fiber world. It is collected from natural source. Naturally it contains wax, oil, fatty acid in it. So, before wet processing technology (Coloration) the impurities like wax, oil, and fatty acid should be removed due to increase the water absorbency as well as proper dyeing or even dyeing with desired shade. To remove the impurities the fibers are to wash with the alkaline solution. The alkaline solution has great impact pollution in the environment. So that the aim of this research is to save the water from the pollution by replacing the alkaline scouring process with the enzyme scouring process. Because the solution of scouring chemical need not to drain out when it is done with the help of bio-scouring.

II. ENZYMES

- Reduces the wastages of chemical
- Reduces the waste of water
- Safe the processing or used water

- Organic catalysts are used instead of chemicals.
- Biodegradable molecules
- Safer processing conditions
- Less problems regards waste matter
- Enzyme has Low environmental impact
- Environmental friendly
- Reduction of cost

III. PROPERTIES OF ENZYME

- Enzyme speed up the reaction
- Enzymes operate under mild conditions
- Alternative for polluting chemicals
- Enzyme acts only on specific substrate
- Enzyme are easy to control
- Enzymes are biodegradable

IV. PROCESS

In the bio-scouring process we take the recipe first where the used chemicals are Enzyme, Wetting agent, Sequestering agent as well as De-foaming agent. We have done several tests in the lab in sample machine where 5 gram fabrics have been taken for bio-scouring process. So that previous to the scouring process the material was washed in distilled water to remove the water soluble ingredient and then dried in oven dryer of lab. After washing and drying the oven dry weight of the samples were measured in an Electric Balance.

V. RECIPE FORMULATION

Enzymatic scouring was carried out by the following recipe-

Enzyme 2-3 g/L

Wetting agent: 1.0 g/L

Sequestering agent 0.5-1.0 g/L

Temperature 60°C

PH 8-9

Time 20 minutes

M:L 1:8

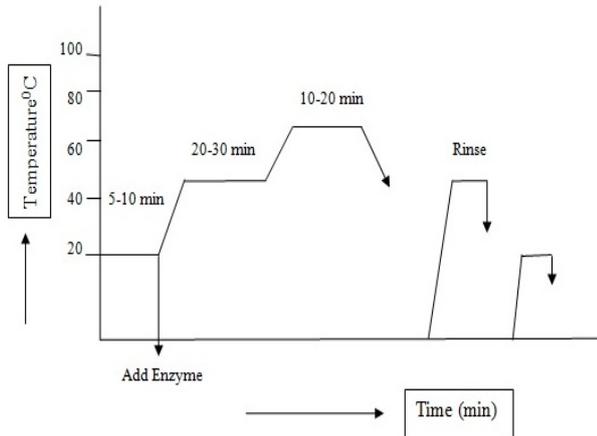


Figure: Bio-scouring Curve.

VI. MECHANISM

For Bio scouring at first the required amount of water, enzyme & chemicals were taken for each sample in the individual bath of Washing and dry cleaning color fastness. Then the sample were immersed in the solution of liquor as well as stirred properly in the bath. Then the samples were treated in the bath according to the curve.

For bio scouring at first the sample is being loaded in the machine in the room temperature and the machine is run for 5-10 minutes in the same temperature for proper wetting of the fabric.

The enzyme is to add according to recipe at room temperature (20⁰c) in the bath for removing wax, oil, fatty acid and other impurities.

Then the temperature will be raised up to 45⁰c and the same temperature the fabric is washed for 20-30 minutes.

After this, again the temperature is raised up to 60⁰c and the machine is being run for 10-20 minutes.

The fabric is being tested after 20 minutes as the scouring is done properly.

If the scouring process (removed the impurities) is being done properly then the temperature of the bath reduced.

Finally the scoured fabric is being washed at hot water (45⁰c) for 10 minutes.

Once a again for proper washing the fabric is being washed for 10 minutes at room temperature 20⁰c (cold wash).

By this way the bio scouring will be completed and the fabric is being ready for next process.

VII. WASHING AND DRYING (AFTER TREATMENT)

After the completion of the bio-scouring process the samples were washed with hot water at 45⁰c for 10

minutes. Then the samples were treated with Acetic acid and washed with cold water (20⁰c) and squeezed properly. Then the oven dryer is being used for drying the samples in laboratory. After washing and drying the oven dry weight of the bio-scoured samples were measured with the help of an Electric Balance weather the bio scouring is done or to take corrective actions.

VIII. CONCLUSION

Bio scouring is played crucial role to save the environment by reducing the waste of water due to no alkali in the solution. Because the solutions of enzyme chemicals need not to drain out after completion the scouring process. As a result the chemical as well as the water will be able to use for the remaining process. For this the processing cost will be reduced and the environment will save from the highly alkaline polluted water.

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