

YELLOWING OF DENIMS BY OZONE – PART I

REF: TT/ FEBRUARY 2020 / WK 4

Introduction

The various atmospheric pollutants cause yellowing, Ozone is one of them. Ozone is a tri-atomic molecule of oxygen.

It is produced naturally in the stratosphere layer of Earth's atmosphere. Where highly energetic solar radiation strikes molecules of oxygen, O_2 , and cause the two oxygen atoms to split apart in a process called photolysis.

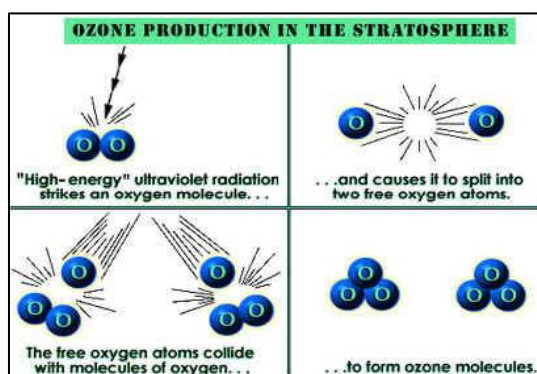


Fig 1.1 –Formation of Ozone in the atmosphere

How Ozone causes yellowing of Denims?

Indigo dyeing is carried out either in sheet form or in rope form. This kind of yarn dyeing is in ring-dyed form, where dyestuff is not allowed to diffuse inside.

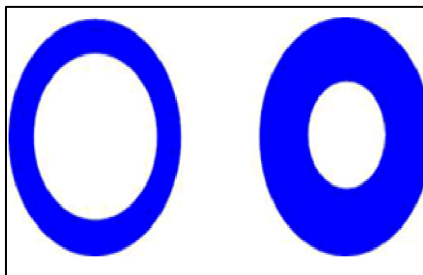


Fig 1.2 – Ring dyeing of denim

The ozone molecules present in the surface of the earth interact with the denim garments. These molecules oxidize the Indigo dye into Isatin and Antranilic acid and the complex of the two products. Isatin is yellow in color, so indigo dyed blue garment turns to yellow. This yellowing is an irreversible phenomenon.

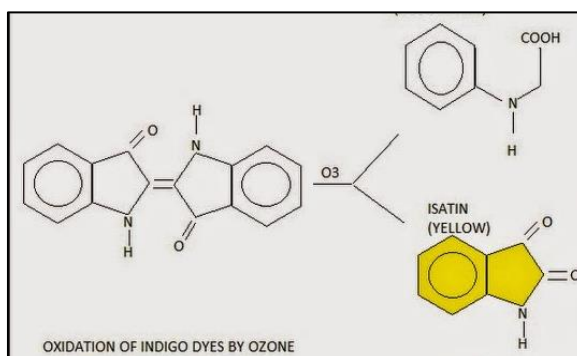


Fig 1.3 – Reaction of Indigo dyes and Ozone

Wishing you a great week ahead!

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