Use of low cost biodegradable salts for cotton dyeing

By:

Muhammad Umair

ID: 15005140036

SUPERVISOR:

Dr. Sohail Nadeem

DEPARTMENT OF CHEMISTRY
SCHOOL OF SCIENCE
UNIVERSITY OF MANAGEMENT AND TECHNOLOGY,
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SCHOOL OF SCIENCE
UNIVERSITY OF MANAGEMENT AND TECHNOLOGY,
LAHORE, PAKISTAN

In the Name of Allah, the Most Gracious, the Most Merciful

RESEARCH COMPLETION CERTIFICATE

Certified that the research work contained in this thesis titled, **"Use of Low Cost Biodegradable Salts for Cotton Dyeing"** has been carried out and completed by Muhammad Umair, ID: **15005140036**. The quantum and the quality of the work contained in this thesis is adequate for the award of degree of MS**.**

_____

Supervisor
Dr. Sohail Nadeem
Associate Professor
Department of Chemistry,
UMT, Lahore

_____

External Examiner

_____

Chairperson
Dr. Sammia Shahid
Associate Professor
Department of Chemistry,
UMT, Lahore

_____

Dean
Dr. Muhammad Azhar Iqbal
Professor
School of Science,
UMT, Lahore

DECLARATION

I Muhammad Umair S/O Abdul Majeed ID: 15005140036

Session **2015-2017** hereby declare that the matter printed in the thesis titled "**Use of Low Cost Biodegradable Salts for Cotton Dyeing** "is my own work and has not been printed, published and submitted as research work, thesis or publication in any form in any University, Research institution etc. in Pakistan or Abroad.

Dated: _____ _____

(Muhammad Umair)

Dedication

This thesis work is dedicated to my parents, who have always loved me unconditionally and whose good examples have taught me to work hard for the things that I aspire to achieve.

This work is also dedicated to my supervisor **Dr. Sohail Nadeem** and my sweet friend **Muhammad Farooq** who have been a constant source of support and encouragement during the challenges of this thesis work.

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All praises are for Almighty ALLAH, the most Merciful, Compassionate and Gracious. Creator of the entire universe with its amazing and unresolved mysteries, who guides us in the ocean of darkness and enables us to overcome the difficulties. In crucial situations, who blessed the researcher with the courage and power to complete his research and all respect and love for our HOLY PROPHET HAZRAT MUHAMMAD (PBUH), who enables us to understand the philosophy of life. I seek His succor and courage to explore the secrets of nature and the strength to follow the HOLY PROPHET HAZRAT MUHAMMAD (PBUH).

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Muhammad Umair

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List of Abbreviation

SA3=	Sodium Acetate $3H_2O$
SC=	Sodium Chloride
TDS=	Total Dissolve Solid
CI=	Color Index
K/S=	Color Strength Value
e.g. =	Example
g/l=	Gram per liter
H_2O=	Molecular formula of water
Mins=	Minutes
λmax=	Maximum absorption wavelength
Vs=	Versus

Abstract

Biodegradable salts was used for the dyeing of cotton with exhaust method that help to reduce the effluents and environment friendly. Sodium acetate trihydrate ($C_2H_9NaO_5$) mixed with soda ash($NaHCO_3$) for maintaining the pH of dyeing solution for completion of reaction, clear and even dyeing occur. The analysis of color fastness to laundering (SDC multifiber strips were used for staining test), color fastness to crocking (dry crocking and wet crocking was investigated) and color fastness to light (blue wool reference scale was used for detection of color change) were studied. All dyed fabric specimens showed excellent results as compared to inorganic salts.

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Introduction

Role of salts in dyeing

The physical-chemical requirement of the utilization of salt and soda in reactive coloring is standard to any or all technicians. Salt is used as exhausting agent to push the color towards polysaccharide molecules and the alkali (soda ash) is hydrolyzing agent for the reactive color.Salt may be a mineral comprised chiefly of the two components, metallic element and chloride. Common salt is that the substance composed of the weather metallic element and chloride. Common salt crystals are solid consists of small cubes tightly held together through ionic bonding of the metallic element and chloride ions (Pearce, Lloyd et al. 2003)So as to know the depth of the topic one should know the fundamentals behind the term "salt" with relation to textile process.The textile substrate and dye molecule, not essentially ought to have of uniform characteristics to mix with one another. In such case, we tend to need some catalyst to facilitate coloring action on material. Salt plays this significant role of catalyst. Salt has an especially high affinity for water. Salt is critical in three ways, firstly, to drive dye into textile throughout the coloring method in textile. Secondly, use of salt results in most exhaustion of dye molecules throughout coloring method in textiles (Acharya, Abidi et al. 2014)Third it's used as Associate in nursing solution for migration, sorption and fixation of the coloring material to the polysaccharide material. Salt increase the exhaustion and the attraction between the dye molecule and textile material (Jiraratananon, Sungpet et al. 2000). Typically dye (direct & reactive) molecules have charges and therefore the material has also negative charge on its surface. Salt decreases the repulsion of negative-negative charges and hence improves exhaustion(Iqbal, Rudroff et al. 2012).