S.G.V.C. Vidya Prasarak Trust's

M.G.V.C ARTS, COMMERCE AND SCIENCE COLLEGE

MUDDEBIHAL-586212

DEPARTMENT OF CHEMISTRY

M.G.V.C. Arts, Commerce & Science College MUDDEBIHAL -586212 Dt: Vijayapur.

CERTIFICATE

Examination Seat No: **S1827789**

Class: **B.Sc VI Sem**

This is to certify that, Mr/Mrs. **Suman V Shastri** has satisfactorily completed the project work on **"Study the Effect of Acids and Bases on Tensile Strength of the Fibres"** under my supervision in M.G.V.C Arts, Commerce and Science College, Muddebihal for the year 2020-21.

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Study the effect of Acid & Bases on Tensile Strength of Fibres

Objectives:

"Project Report Effects of Acids & Bases on the Tensile Strength of Fibres"

The aim and objective of this project is to

(i) Compare the tensile strength of given samples of nylon and cotton fibres.

(ii) To investigate the Effect of Acids and Alkalies on the tensile strength of these fibres.

Introduction:

Depending upon the sources, the various types of fibres can be classified into the following three main categories :

(i) Animal fibres e.g. Wool & Silk.

(ii) Vegetable Fibres e.g. Cotton & Linen.

(iii) Synthetic Fibres e.g. Nylon & Polyester.

Besides their chemical composition and properties, most important property of these fibres is their tensile strength. Tensile strength mean the extent to which a fibre can be stretched without breaking and it is measured in terms of minimum weight required to break the fibre. To determine the tensile strength of any fibre, it is tied to a hook at one end and weighted are slowly added to the other end until the fibre break.

Since peptide bonds are more easily hydrolyzed by bases than acids therefore wool and silk are affected by basis not by acids. It is because of this reason that wool and silk threads breakup into fragments and ultimately dissolve in alkalines.

In other words alkalines decreases the tensile strength of animal fibres (wool & silk). Vegetable fibres (cotton & linen), on the other hand, consist of long polysaccharide chains in which the various glucose units are joined by ethers linkage. Since ethers are hydrolised by acids and not by bases therefore, vegetable fibres are affected by acids but not by bases. In other words acids decreases the tensile strength of vegetable fibres. In contrast, synthetics fibres such as nylon & polyester practically remains unaffected by both acids and bases.

Experiment-1 [Acid and Bases]
Requirements:

(a) Apparatus: Hook, Weight hanger and weights.

(b) Materials: Cotton, Silk and Nylon fibres.

Chemistry Experiment Acid and Bases Procedure

(i) Cut out equal lengths of a cotton fibre, nylon fibre and silk fibre from the given sample of nearly same dia.

(ii) Tie one end of cotton fibre to a hook which has been fixed in a vertical plane. Tie a weight hanger to the other end. The thread get straight.

(iii) Put a weight to the hanger and observe the thread stretch. Then, increase the weights gradually on the hanger until the breaking point reaches and note the minimum weight needed for breaking the cotton fibre.

(iv) Repeat the above experiment by tying nylon and silk fibres to the hook separately.

Sl. No.	Type of Fibre	Minimum Weight
1.	Cotton 75 g.	
2.	Nylon 375 g.	
3.	Silk 150 g.	

Precautions:

(i) Thread must be of identical diameters.

(ii) Always take the same length of the threads.

(iii) Add the weights in small amounts very slowly.

Experiment - 2

Requirements:

(a) Apparatus: Hook, Weight Hanger and Weights.

(b) Materials and Chemicals: Wool, Cotton and Nylon Fibres, dilute solution of hydrochloric acid and sodium hydroxide.

Procedure:

(i) Cut out equal lengths of wool, cotton and nylon threads from given sample of nearly same diameter.

(ii) Determine the tensile strength of each fibre as explained in experiment-1.

(iii) Soak the woolen thread in a dilute solution of sodium hydroxide for five minutes. Take it out from hydroxide solution and wash it thoroughly with water and then dry either by keeping it in the sun or in an over maintained at a temperature of about 400C. Determine its tensile strength again as explained in Experiment-1.

(iv) Now take another piece of woolen thread of the same size and diameter and soak it in a dilute solution of hydrochloric acid for five minutes. Take it out, wash thoroughly with water, dry and determine the tensile strength again.

(v) Repeat the above procedure for the samples of cotton and nylon fibre.

Result:

Sl.No	Type of Fibre	Wt. required to break the untreated fibre	Wt. required to break the fibre after soaking in dilute alkali	Wt. required to break the fibre after soaking in dilute acid
1	Wool	750 g.	700 g.	750 g.
2	Cotton	75 g.	75 g.	50 g.
3	Nylon	375 g.	375 g.	375 g.

(i) The tensile strength of woolen fibre decreases on soaking in alkalies but practically remains unaffected on soaking in acids.

(ii) The tensile strength of cotton fibre decreases on soaking in acids but remains practically unaffected on soaking in alkalies.

(iii) The tensile strength of nylon fibres remain practically unaffected on soaking either in acids or in alkalies.

Precautions:

(i) Thread must be of identical diameters.

(ii) Always take the same length of the threads.

(iii) Add the weights in small amounts very slowly.

References:

1. www.scribd.com
2. www.wikipedia.com