

EFFECT OF SULPHURIC ACID ON NIGERIAN RABBIT HAIR FIBRES

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Abstract

The effect of sulphuric acid on Nigerian rabbit fibres has been studied. The hair fibres were pretreated thoroughly to remove the inherent and acquired impurities on the fibres before treating with sulphuric acid. The effect of sulphuric acid on the fibres was analyzed by varying the concentration of the sulphuric acid at constant time of 5 minutes, 10 minutes, 15 minutes, 20 minutes and 25 minutes respectively and also varying the time of treatment at constant concentrations of 1%, 2%, 3%, 4%, and 5% respectively. The results show that both increase in time and concentration have effects on the hair fibres which causes it to fully disintegrate at time of 25 minutes and at 5% concentration of the sulphuric acid.

1.0 INTRODUCTION

Rabbit hair is commonly considered a by-product of the ordinary process of breeding rabbits for meat, and as such is manufactured in vast quantities in England and more than seventy million pelts a year in France alone (Schlink *et al*, 2003).

Angora rabbits produce fibers called Angora, which belongs to the luxury animal fibers category. The Angora rabbit fleece is made of different kinds of medullated fibers that have a variable cross-section shape between and along the fibre (Ossard *et al*, 1999). Angora is a keratinous textile material, produced by the long-haired Angora rabbit. The combination of lightness and high thermal properties of angora fibers makes them exceptional and it is categorized as luxury fibre (Franck, 2001).

Angora rabbit fibre has a good potential for producing textiles with special properties. It is extremely fine, soft, antistatic, lustrous and durable, while giving high insulation and a warmer feeling to the garments due to medulla structure in the core of the fiber (Oglakcioglu *et al*, 2009).

Today angora fiber is principally produced in China but small quantities are also farmed in South America, Korea and Europe. Fashion trends have big effects on the demand for angora and therefore this cause variation in world prices.

Demand has increased over the past decade and angora has always commanded high prices as a specialty animal fiber (McGregor *et al*, 2002).

This research work shows the effect of sulphuric acid treatment on the fibres at various concentration and time.

2.0 MATERIALS AND METHODS

2.1 MATERIALS

Rabbit fibres from a local abattoir in Samara, Zaria.

Hand gloves

Nose mask

Laboratory glass wares

Mixing bowls and buckets

Sulphuric acid

2.2 METHOD

2.2.1 Raw material preparation:

The fibre was sheared out from the skin using a very sharp razor blade, it was then soaked for 24 hours to remove the inherent and acquired impurities. This was followed by washing, rinsing and drying.

2.2.2 Sulphuric acid treatment:

1g each of the cleaned fibres samples were immersed in sulphuric acid solution at different concentration (1%, 2%, 3% 4% and 5% respectively) and different times (5 minutes, 10 minutes, 15 minutes, 20 minutes and 25 minutes). It was then rinsed with distilled water and dried.

This is also to determine the effect of time and the acid concentration on the rabbit fibres.

3.0 Result and discussion

TABLE 1: EFFECT OF SULPHURIC ACID ON RABBIT FIBRES AT DIFFERENT CONCENTRATION AND CONSTANT TIME (5 minutes)

CONCENTRATION AND TIME	RABBIT FIBRES
1% for 5 minutes	Does not dissolve
2% for 5 minutes	Does not dissolve
3% for 5 minutes	Does not dissolve
4% for 5 minutes	Does not dissolve
5% for 5 minutes	Partially dissolves

TABLE 2: EFFECT OF SULPHURIC ACID ON RABBIT FIBRES AT DIFFERENT CONCENTRATION AND CONSTANT TIME (10 minutes)

CONCENTRATION AND TIME	RABBIT FIBRES
1% for 10 minutes	Does not dissolve
2% for 10 minutes	Does not dissolve
3% for 10 minutes	Does not dissolve
4% for 10 minutes	Partially dissolves
5% for 10 minutes	Dissolves

TABLE 3: EFFECT OF SULPHURIC ACID ON RABBIT FIBRES AT DIFFERENT CONCENTRATION AND CONSTANT TIME (15 minutes)

CONCENTRATION AND TIME	RABBIT FIBRES
1% for 15 minutes	Does not dissolve
2% for 15 minutes	Does not dissolve
3% for 15 minutes	Partially dissolves
4% for 15 minutes	Dissolves
5% for 15 minutes	Slightly disintegrates

TABLE 4: EFFECT OF SULPHURIC ACID ON RABBIT FIBRES AT DIFFERENT CONCENTRATION AND CONSTANT TIME (20 minutes)

CONCENTRATION AND TIME	RABBIT FIBRES
1% for 20 minutes	Does not dissolve
2% for 20 minutes	Partially dissolves
3% for 20 minutes	Dissolves
4% for 20 minutes	Slightly disintegrates
5% for 20 minutes	Disintegrates

TABLE 5: EFFECT OF SULPHURIC ACID ON RABBIT FIBRES AT DIFFERENT CONCENTRATION AND CONSTANT TIME (25 minutes)

CONCENTRATION AND TIME	RABBIT FIBRES
1% for 25 minutes	Partially dissolves
2% for 25 minutes	Dissolves
3% for 25 minutes	Slightly disintegrates
4% for 25 minutes	Disintegrates
5% for 25 minutes	Fully disintegrates

TABLE 6: EFFECT OF SULPHURIC ACID ON RABBIT FIBRES AT DIFFERENT TIME AND CONSTANT CONCENTRATION (1%)

CONCENTRATION AND TIME	RABBIT FIBRES
1% for 5 minutes	Does not dissolve
1% for 10 minutes	Does not dissolve
1% for 15 minutes	Does not dissolve
1% for 20 minutes	Does not dissolve
1% for 25 minutes	Partially dissolves

TABLE 7: EFFECT OF SULPHURIC ACID ON RABBIT FIBRES AT DIFFERENT TIME AND CONSTANT CONCENTRATION (2%)

CONCENTRATION AND TIME	RABBIT FIBRES
2% for 5 minutes	Does not dissolve
2% for 10 minutes	Does not dissolve
2% for 15 minutes	Does not dissolve
2% for 20 minutes	Partially dissolves
2% for 25 minutes	Dissolves

TABLE 8: EFFECT OF SULPHURIC ACID ON RABBIT FIBRES AT DIFFERENT TIME AND CONSTANT CONCENTRATION (3%)

CONCENTRATION AND TIME	RABBIT FIBRES
3% for 5 minutes	Does not dissolve
3% for 10 minutes	Does not dissolve
3% for 15 minutes	Partially dissolves
3% for 20 minutes	Dissolves
3% for 25 minutes	Slightly disintegrates

TABLE 9: EFFECT OF SULPHURIC ACID ON RABBIT FIBRES AT DIFFERENT TIME AND CONSTANT CONCENTRATION (4%)

CONCENTRATION AND TIME	RABBIT FIBRES
4% for 5 minutes	Does not dissolve
4% for 10 minutes	Partially dissolves
4% for 15 minutes	Dissolves
4% for 20 minutes	Slightly disintegrates
4% for 25 minutes	Disintegrates

TABLE 10: EFFECT OF SULPHURIC ACID ON RABBIT FIBRES AT DIFFERENT TIME AND CONSTANT CONCENTRATION (5%)

CONCENTRATION AND TIME	RABBIT FIBRES
5% for 5 minutes	Partially dissolves
5% for 10 minutes	Dissolves
5% for 15 minutes	Slightly disintegrates
5% for 20 minutes	Disintegrates
5% for 25 minutes	Fully disintegrates

Tables 1 to 10 show the results of the effect of sulphuric acid on rabbit fibres at different concentration and time. It explains vividly that increase in time and concentration has steady increasing effect on the fibres and above 5% concentration and 25 minutes time it fully disintegrates. This is attributable to the fact that Sulphuric acid hydrolyzes the disulphide bonds, hydrogen bonds and salt linkages of hair fibres which causes disintegration of the fibres. This Hydrolysis of the fibres leads to fragmentation and total destruction of the fibres. This however, increases with increase in concentration and time.

CONCLUSION

Conclusively, rabbit fibres as with other keratinous fibres have low resistance to acid attack and can disintegrate at a certain temperature and time of treatment as explained in this research.

However, as the time of treatment and concentration increases, the rate of hydrolysis of the peptide bond increases and thus causes disintegration of the fibres.

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