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Suez Canal University

Faculty of Petroleum and Mining Engineering

Chemical Engineering and Petroleum Refining Department

SOME CHEMICAL MODIFICATIONS OF POLYAMIDE FIBRES

A Thesis

Submitted to

Chemical Engineering and Petroleum Refining Department

Suez Canal University

For

The Master Degree Of Science

In

Chemical Engineering

By

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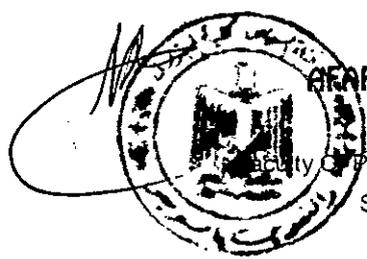
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Abstract

In recent years , chemical modification of polyamide fibres by graft copolymerization has received considerable interest. Among various types of monomers acrylonitrile has an important place because of its specific properties .the present work aims at increasing the rate of grafting of acrylonitrile onto nylon-6 fibres without homopolymer as an attempt for caring out grafting during finishing process on the production line. Grafting was carried out onto modified nylon-6 fibres .containing chemically bonded quaternary ammonium groups(these groups were introduced by impregnation of fibres with an aqueous solution of diallyldimethyl ammonium chloride) using $K_2S_2O_8 - CU^{2+}$ redox system as initiator. The general kinetics of the grafting was investigated. The apparent activation energy was calculated. The effect of polymerization of DADMAC-AN with nylon-6 fibres on some properties of the latter was investigated.

Key words

Nylon-6 Fibres – Grafting – DADMAC – PDADMAC –AN – PAN –Initiating system – Reaction order – Copper Sulphate – Quaternary Ammonium Salt Quaternary Ammonium Group (QAG) – Surface Active Substance (SAS) - Potassium Persulphate – X-ray – Surface Topography (SEM) – Mechanical Properties- Thermal Properties.

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Aim Of The Work

The present work aims at increasing the rate of grafting of acrylonitrile onto nylon-6 fibres without homopolymer formation as an attempt for carrying out grafting during the finishing process on the production line of nylon-6 staple fibres. To achieve this, grafting of acrylonitrile was carried out onto modified nylon-6 fibres, containing chemically bonded quaternary ammonium groups, using $K_2S_2O_8 - Cu^{2+}$ redox system as initiator, instead of those containing quaternary ammonium salt in the form of physical mixture with the fibres.