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STUDIES ON COLD VULCANISATION OF NATIVE VEGETABLE OILS

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Aim of the Work:

Since the local rubber industry is importing white factice for com pounding with rubber and since white factice is produced abroad from unsaturated natural oils mainly : linseed, rape seed, and fish oils, the aim of the present work is to investigate the suitability of local vegetable oil for producing white factice.

For this purpose seven oils were chosen namely; Linseed, Cotton seed, Sesame, Olive, Corn, Castor, and grape seed oils.

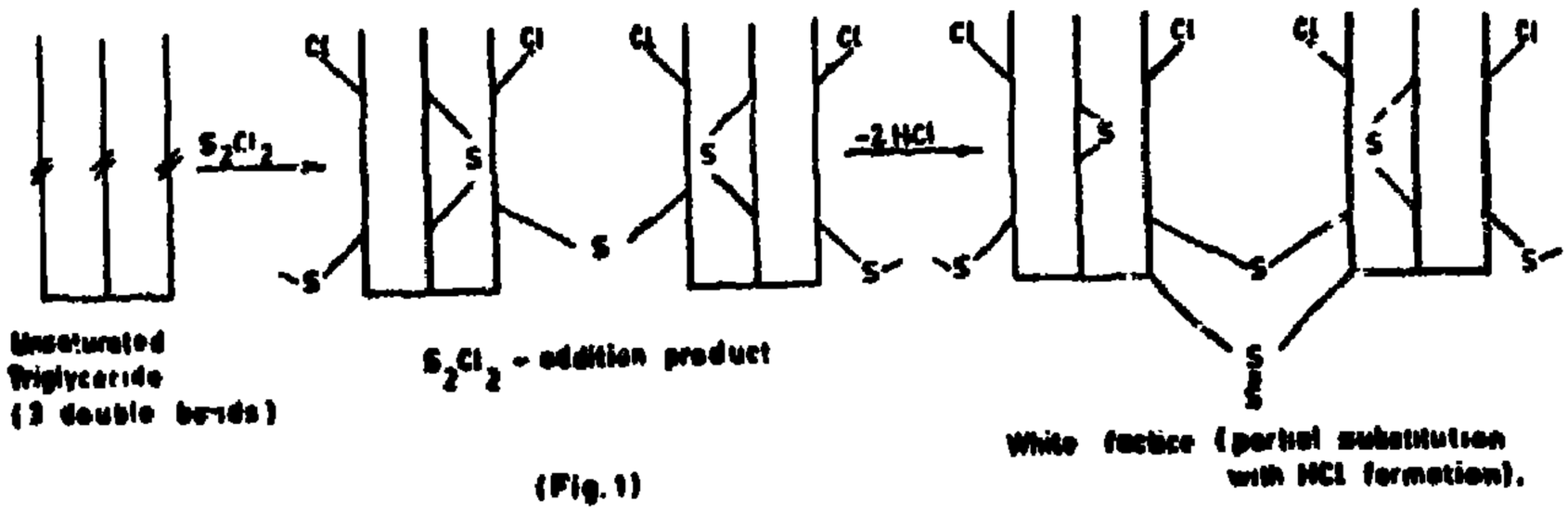
Since the published literature concerning vulcanized oils in general, and particularly white factice are few, it was also the target of this work to study the sulphurisation reaction of S_2Cl_2 with the before mentioned local vegetable oils and to find out the optimum conditions which lead to production of light coloured and thermally stable products, which can find wider application in the rubber industry.

SUMMARY OF THE ORIGINAL WORK

In this study a simple method for preparation of S_2Cl_2 by direct chlorination of elementary sulphur at room temperature was devised.

In analogy to natural rubber, Vegetable oils can react at room temperature with sulphurising (vulcanising) agents such as sulphur monochloride (S_2Cl_2) giving rise to polymeric rubber-like products which are jknown as white factice.

In this reaction, which is mainly an addition one, S_2CI_2 adds to the double bonds of the unsaturated fatty acid moiety (Fig. 1).



(Fig. 1)

White factice was found to contain 6—12% combined sulphur and almost the same percentage of chlorine.

In this study the following native oils were subjected to sulphurisation by means of S_2CI_2 :

Linseed, Cotton seed, Sesame, Olive, Corn, Castor and Grape seed oils and the resulting products were analysed.

Sulphurisation of vegetable oils was carried out with different ratios of sulphur monochloride to trace the effect of increase of $S_2\,CI_2$ on the combined sulphur-content and the properties of white factice.

It was found that white factice can further react with excessive amounts of $S_2\,CI_2$ loosing its elastic properties and becoming hard and brittle.

No relationship between the degree of unsaturation of the oil (as shown by the iodine number) and the consumption of $S_2\,CI_2$ (as shown by the percentage of sulphur in the sulphurised product) has been discovered.

However, it was found that the colour of white factice is clearly linked with the iodine number of the saturated glyceride; the higher the iodine number, the darker is the factice. Thus the iodine number of the unsaturated glyceride is without a significant effect on factice qualities other than the colour.

Since the addition of $S_2\,CI_2$ to the before mentioned vegetable oils is strongly exothermic, and since the reaction mass had a tendency to darken considerably when getting hot, some means were devised to keep

the temperature during the reaction as low as possible. This was succe–ssfully achieved first by keeping the Batch small and secondly by diluting the vegetable oil before sulphurisation with a suitable solvent or diluent.

The diluents tested in this work were : Carbon tetrachloide, Hexane, and Ice water. Since the sulphurisation product is not thermally stable and gave off HCL when warmed, it was found essential to add magensia (MgO) as a stabilizer to the oil before sulphurisation, to bind any occl–uded HCL, thus inhibiting the auto-decmposition, and consequently the darkening of the whitfactice.

The resulting white factice was tested locally on a pilot scale for its suitability for compounding with rubber in the production of erasers and soft rubber articles such as rubber hoses and was found to be the same quality as the imported, product.