

# UNITED STATES PATENT OFFICE

2,426,143

## STABILIZATION OF FURFURAL

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No Drawing. Original application May 31, 1940, Serial No. 338,274. Divided and this application July 6, 1944, Serial No. 543,736

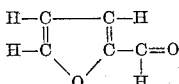
8 Claims. (Cl. 260—347)

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This invention relates to the stabilization of furfural.

Furfural is an organic liquid which is normally clear or colorless. It has many uses in modern technology, among which are its employment as a solvent or distributing agent and also as a base for certain synthetic resins. Furfural readily condenses with various reagents into larger molecular aggregates to form resinous plastics. However, furfural is normally unstable so that its tendency to resinify persists to an undesirable degree in the absence of the employment of stabilizing agents. Furfural becomes altered spontaneously even in storage, to produce gummy derivatives. These derivatives are dark in color and darken the furfural in which they are formed, even when present in considerable dilution. The dark color of furfural is, therefore, evidence of deterioration of the furfural.

It has heretofore been difficult to prevent this chemical alteration of furfural to form dark gummy products because the nature of this change is not known with certainty. It has been supposed to be due to oxidation. It is known that furfural is an organic compound of a heterocyclic system, and that its structure is that of an aromatic-like, five membered ring containing an oxygen atom in the ring, in which the carbon atoms attached to the oxygen are attached to other carbon atoms by double bond, so that furfural in structure is an unsaturated ring. The accepted chemical structure of furfural is:



An object of this invention is to stabilize furfural against alteration during storage. A further purpose is to maintain the clarity or colorless nature of furfural even in the presence of air.

A particular object is to prevent spontaneous formation of dark gummy derivatives in furfural through inhibition of the normal tendency of furfural to polymerize.

This invention accomplishes stabilization of furfural by incorporation therein of a small proportion of a hydrosulfite. A sufficient amount is used to substantially prevent polymerization. The hydrosulfites of the alkali metals are particularly effective, and of these, the preferred material is sodium hydrosulfite ( $\text{Na}_2\text{S}_2\text{O}_4$ ). The amount of stabilizer which is necessary to effect the desired result is relatively small—the function of the inhibitor probably is that of a catalyst rather than as an active reagent. A range of

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about 0.01% to 1.0% is effective to inhibit undesirable chemical deterioration of furfural, but ordinarily, a range of 0.01% to 0.1% is sufficient, and this latter range is preferred. In order to determine the efficacy of the alkali metal sulfite inhibitor in accordance with this invention, sodium hydrosulfite in the form of a 10% aqueous solution was added to various samples of furfural in test tubes, the test tubes closed, and then inspected after standing for nine months. Similar samples of the furfural were prepared containing no inhibitor. In those cases where no inhibitor was used, the furfural turned black and thickened materially, in some cases becoming almost solid. When an amount of sodium hydrosulfite solution was employed such that the sodium hydrosulfite amounted to 0.1% by weight, the furfural at the end of the test period was a light amber in color and remained in the form of a thin liquid. Similar results were obtained when 0.02% and 0.01% sodium hydrosulfite were employed. In the latter cases, however, the color of the furfural was slightly darker, the color ranging from a reddish amber in the case where 0.02% was used to a dark red amber when 0.01% was used. In both cases, the furfural remained in the form of a thin liquid. No solid deposits were observed in any case. From these results, it is apparent that sodium hydrosulfite possesses excellent properties for inhibiting the deterioration of furfural.

This application is a division of application, Serial Number 338,274, filed May 31, 1940.

While in accordance with the patent statutes, the principles of this invention have been set forth, and a preferred form thereof has been illustrated by specific examples, it will be apparent to those skilled in the art that modifications may be employed within the scope of the invention as defined in the following claims.

We claim:

1. A process of inhibiting the deterioration of normally unstable furfural comprising incorporating in the furfural a small proportion of hydrosulfite sufficient to substantially inhibit deterioration.

2. A process in accordance with claim 1 in which the hydrosulfite is an alkali metal hydrosulfite.

3. A process in accordance with claim 1 in which the hydrosulfite is an alkali metal hydrosulfite and is in amounts of approximately 0.01% to 1.0%.

4. A process of inhibiting the deterioration of normally unstable furfural comprising incorpo-

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rating in the furfural approximately 0.01% to 1% of sodium hydrosulfite.

5. A stabilized furfural comprising normally unstable furfural containing a small proportion of hydrosulfite, sufficient to substantially inhibit 5 deterioration of the furfural.

6. A composition in accordance with claim 5 in which the hydrosulfite is an alkali metal hydrosulfite.

7. A composition in accordance with claim 5 in 10 which the hydrosulfite is sodium hydrosulfite.

8. A stabilized furfural comprising normally unstable furfural containing approximately 0.01% to 1.0% of sodium hydrosulfite.

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