ELECTROCHEMICAL REDUCTION OF FURFURAL

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The initial products formed by the electrochemical reduction of furfural are furfuryl alcohol and hydrofuroin. Polymeric products are formed only during the work up procedure. Furfural was reduced at a cylindrical lead cathode with a constant current density of 0.005A/cm^2 using a 10% potassium dihydrogen or the phosphate solution as electrolyte. Anode and cathode compartments were separated by a porous pot, in which the anode was placed. The solution in the cathode compartment was agitated throughout the reaction using a magnetic stirrer. The reaction was folowed by ^{1}H NMR spectroscopy.

Tabe 1 shows the variation of product ratio with time when the initial furfural concentration is 0.08 mol l^{-1}.

Table 1

Reaction time (hr)	Molar product ratio Hydrofuroin : Furfuryl alcohol
1	2.25 : 1.0
2	1.33 : 1.0
3	1.0 : 1.17
4	1.0 : 1.20
5	1.0 : 1.20

This data suggests that higher concentrations of furfural will favour hydrofuroin formation. We found that the final product ratio increased to 2.0 : 1.0 when the initial furfural concentration was increased to 0.4 mol l^{-1} from 0.08 mol l^{-1}.

Hydrofuroin is a compound of potential industrial importance. By suitably modifying the experimental conditions, isolated yield of hydrofuroin upto 56% could be obtained. The 300 MHz spectrum of hydrofuroin clearly showed two signals of equal intensity at δ : 4.90, 4.95 for the two diastereomeric products, meso and racemic hydrofuroin. The signals were assigned by analysing their shifts in the presence of a chiral shift reagent.

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