ALKANEPERSULFONIC ACID–SO_2 SYSTEM AS A NEW SULFONATING REAGENT

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In the present work, we are the first to report that the alkanepersulfonic acid–SO_2 system efficiently sulfonates saturated hydrocarbons.

The reaction was studied in the case of the reaction of a mixture of decanepersulfonic acid ($C_{10}H_{21}SO_2OOH$)–SO_2 with cyclohexane at 273-313 K. The experiments were carried out in cyclohexane with continuous introduction of an SO_2–argon gas mixture. The SO_2 content in the solution ranged from 0.03 to 0.3 mole/liter. The initial concentration of $C_{10}H_{21}SO_2OOH$ was 0.05-0.2 mole/liter. Under these conditions, $C_{10}H_{21}SO_2OOH$ is consumed almost completely over 0.5-1.5 h. ^1H and ^{13}C NMR spectroscopy was used to show that this reaction gives $C_{10}H_{21}SO_3H$, cyclo-$C_6H_{11}SO_3H$, and small amounts of sulfuric acid. The yield of cyclo-$C_6H_{11}SO_3H$ relative to the starting persulfonic acid was from 30 to 60% depending on the reaction conditions, while the ([$C_{10}H_{21}SO_3H$] + [cyclo-$C_6H_{11}SO_3H$])/[H_2SO_4] ratio varied from 4 to 8. In the absence of SO_2, $C_{10}H_{21}SO_2OOH$ decomposes with half-life from 1 to 40 h to give $C_{10}H_{21}SO_3H$ and cyclohexanol [1]. Under these conditions, SO_2 does not undergo significant reaction with cyclohexane.

LITERATURE CITED

1. R. L. Safiullin, R. N. Zaripov, L. M. Khalilov, V. D. Komissarov, and G. A. Tolstikov, Izv. Akad. Nauk SSSR, Ser. Khim., No. 4, 973 (1989).

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