COMMUNICATIONS TO THE EDITOR

3-FURALDEHYDE (3-FURFURAL)

Sir:

"Furfural" or 2-furaldehyde was first obtained one hundred years ago [Döbereiner, *Ann.*, **3**, 141 (1832)]. Its isomer, 3-furaldehyde or 3-furfural, has now been synthesized by the following sequence of reactions: malic acid ⟶ coumalic acid ⟶ methyl coumalate ⟶ methyl bromocoumalate ⟶ 2,4-furandicarboxylic acid ⟶ 3-furancarboxylic acid ⟶ 3-furoyl chloride ⟶ 3-furaldehyde.

The odor of 3-furaldehyde is more remindful of benzaldehyde than is 2-furaldehyde. Some physical constants are: b. p. 144° (732 mm.); n_D^{20} 1.4945; sp. gr. $^{20}_{20}$ 1.111. The phenylhydrazone melts at 149.5°.

3-Furanaldehyde responds to the usual aldehyde tests but *unlike* 2-furanaldehyde it gives no color test with aniline acetate. We have also noted that 2,4-dimethyl-3-furfural gives no aniline acetate test. The new aldehyde appears to be more highly resistant to auto-oxidation than might have been predicted, and is more stable than its isomer.

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THE VELOCITY OF DISSOCIATION OF NITROGEN TETROXIDE BY THE METHOD OF SOUND WAVES

Sir:

In a communication from this Laboratory [Kistiakowsky and Richards, THIS JOURNAL, **52**, 4661 (1930)] it has been demonstrated that with an experimental accuracy of 0.5%, no change in the velocity of sound in nitrogen tetroxide is detected at 25° with frequencies between 9 and 80 k.c. The lower limit thus set for the velocity of dissociation ($k = 5 \times 10^4$) according to the reasoning of Einstein [*Sitz. Akad.*, 380 (1920)] closely approximates the value (k = about 1×10^5) which is obtained from the kinetic theory of gases as the maximum reasonable upper limit. Brass and Tolman [THIS JOURNAL, **54**, 1003 (1932)] by another method have recently obtained positive evidence of the rate of dissociation, and assign to the velocity constant at 25° an order of magnitude (k = 2.2 to 8.4×10^4) which accords with these conclusions.

It is now possible to obtain more specific information concerning this reaction by the acoustical method. Apparatus of special design has permitted the study of the velocity of sound in nitrogen tetroxide between 1.0 and 30° and from 130 to 760 mm. pressure at frequencies between 9 and 93 k.c. At 260 mm. pressure and 30° a further study has been made