03.71.22

C.N.E.A. Biblioteca
ARCHIVO PUBLICACIONES
Nº 1 AÑO 1971

SHORT COMMUNICATIONS

A Method for Labelling Iodobenzene with ^{131}I

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(Received December 21, 1970)

Isotopic exchange reaction between iodobenzene and I_2 was studied by several authors [1–6]. MACRAE and SHAW [1] showed that the yield of this reaction is 34% at 100 °C in 5 min in absence of light, and 50% at room temperature with 8 h irradiation with U.V. light. The exchange yield is negligible with diffuse light during 25 min. ELIAS [2, 3] obtained exchange yields near to 90% by irradiation with gamma rays, where the final product was contaminated by radiolysis products.

Using $C^{131}I$ instead of $^{131}I_2$ MARCILIO and BARBERIO [4] obtained a 75% yield with 5 h irradiation with a tungsten lamp. In this experiment the main reaction is an interchange between chlorine and iodine with a yield higher than 98% [5, 6]; it causes, however, contamination of iodobenzene with chlorobenzene.

We have developed a simple and quick method, free of secondary reactions, for the labelling of iodobenzene with a high yield.

Experimental

Iodobenzene a. r.: distilled in a spinning band column and redistilled twice at low pressure in presence of mercury in a nitrogen stream.

Purity: 99.98%, benzene: 0.01%.

Chloramine T.: purity 99.95% determined by titration.

$Na^{131}I$, carrier-free from CEA, Saclay, France.

All organic products were analyzed by gas-liquid chromatography in a Varian Aerograph 1520, with a 2 m by 3.2 mm column packed with 30% silicone grease DC 11 on Chromosorb W. The temperature was 200 °C, a flame ionization detection system was used.

Radioactivity measurements were performed in a Nuclear Chicago ionization chamber, Mediac 6362.

Procedure: 0.5 ml of iodobenzene were mixed with 1 mCi of $Na^{131}I$ (0.008 μg) and 0.04 ml Chloramine T solution (4 mg/ml) and stirred then 0.2 ml of 0,1 M sodium thiosulphate solution were added. Distilled water was added and the organic phase was removed and washed several times with water until no more radioactivity was detected in the aqueous phase. The radioactivity of the organic phase was then measured. The radiochemical yield was 95%.

The organic phase was analyzed by repeating our labelling procedure using inactive NaI, in order to determine whether the causes of high labelling yields are iodobenzene dihalogenation or halogenation of impurities. Analysis of the organic phase by G.L.C. before and after the labelling reaction showed neither the appearance of new peaks nor variations in the original ones. Since the limit of detection of diiodobenzene in iodobenzene was 1:50.000 (0.002%) in our working conditions, we have at most 5% of dihalogenation, if any. The same results were obtained by increasing the relative amounts of inactive NaI (0.008 mg and 0.008 g) in the labelling reaction.

Our conclusion is that the labelling process is an isotopic exchange reaction.

The iodobenzene ^{131}I (specific activity 5 mCi/mM) was kept in the absence of light at room temperature. During 3 weeks the material did not decompose to a noticeable degree.

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