Rapid Separation of Isobutene from Butene-1 by Gas Chromatography

W. Kladnig

Institut für Physikalische Chemie, Technische Hochschule Wien, Austria

The separation of isobutene from butene-1 by gas-liquid-chromatography (GLC) was a problem which had not been solved satisfactorily*. Since many stationary liquids like dimethylsulfolane, acetonylacetone, tetra-isobutylene, dinonylphthalate or bis-2-methoxyethyladipate-di-2-ethylhexylsebacate and others are useful for separating linear butenes, i. e. butene-1, cis-butene-2, trans-butene-2 in a reasonable time, separation of isobutene from butene-1 seemed to need unusually long columns and very long retention times. For instance *Bober* [1] describes a separation of isobutene from butene-1 over 30 % dimethylsulfolane on Firebrick 42/60 mesh with a 15.6 m (1/4") column at 0 °C with a retention time of about 48 minutes for isobutene. *Leibrand* [2] mentions 11 % AgNO₃ + 29 % benzyl cyanide on Chromosorb P 80/100 mesh, column: 9 m x 1/8" at 20 °C in about 25 minutes for isobutene. Diethyleneglycol + AgNO₃ is often used for this separation, but columns with this stationary phase are notorious for their temperature sensitivity and short life (bleeding).

The following method describes a separation of isobutene from butene-1 in a few minutes using propylene-carbonate as the stationary phase, which may be useful for technical application (routine analysis). Column: stainless steel; length: 8 m; 1/8". Stationary phase: 20 % Propylenecarbonate; Support: Chromosorb P-AW 60/80 mesh. Carrier gas: nitrogen; flow: 30 cm³/min Pressure: 22 psi Temperature: 0 °C Detector: FID

Preparation of the column material was carried out in chloroform at 30 °C following the method of *R. Kaiser* [3].

The separation of isobutene from butene-1 is shown in Fig. 1. Retention times:

butene-1:	6 min 18 s
isobutene:	6 min 49 s
trans-butene-2:	7 min 37 s
cis-butene-2:	8 min 55 s

Fig. 1

● Separation of isobutene from butene-1

Literature

- [1] *H. Bober*: Beckman Application Report No. 1615, Beckman Instruments, Munich 1966.
- [2] *R. J. Leibrand*: Atlas of Gas Analyses by Gas Chromatography, Applications Laboratory Report 1006, Hewlett-Packard, 1966.
- [3] *R. Kaiser*: Chromatographie in der Gasphase III/1, Bibliographisches Institut, Mannheim 1969

Received: Feb. 27, 1973

Accepted: March 9, 1973

* See however separation in packed capillaries: *I. Halász*, Adv. in Chrom. IV (1968), 248