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A Continuous Electrophoretic Separation of the Radioactive Mixture ^{115}Cd- ^{114}In

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A continuous electrophoretic separation of the mixture ^{115}Cd -^{114}In in a 0.1 *N* solution of KI in 0.01 *N* HBr, at a rate of 108 mg. of Cd -172 mg. of In, and 4000 mg. of Cd - 396 mg. of In in 24 h. is described.

INTRODUCTION

Continuous electrophoretic separations of mixtures of radioactive inorganic ions were described by H. H. Strain *et al.*[1,6,7], M. Lederer[2], and Z. Pučar and Z. Jakovac[3]. In the present paper we tried continuous electrophoretic separations of model mixtures of ^{115}Cd and ^{114}In. The relative concentrations of the components of the mixtures and the pumping rate of the mixture were also varied. The reason of this investigation was to find out the experimental conditions for a possible preparative separation of ^{111}In and ^{114}In from a Cd-cyclotron target.

EXPERIMENTAL

The apparatus used for continuous preparative electrophoretic separations was described by one of us earlier[4]. The electrodes, consisting of Pt wires, were placed along the sides of a filter paper curtain and were rinsed continuously with the solution of the basic electrolyte. The filter paper curtain was stretched freely between the two electrode channels in the wet chamber without an artificial cooling. The mixture to be separated was pumped continuously at a controlled rate by means of an electrically driven syringe (Manufactured by Bender & Hobein, Munich, Germany).

The basic electrolyte was a 0.1 *N* solution of KI in 0.01 *N* HBr. The filter paper used was Munktell No. 20/350. The distance between the electrode channels, *i. e.* the free width of the filter paper curtain was 300 mm., and the distance between the starting point and the lower edge of the paper, *i. e.* the free height of the curtain was 320 mm. Using Munktell No. 20/350 the vertical speed of flow of the basic electrolyte, *i. e.* the time interval between the input and the outlet of the substance to be separated, was 2 h. The electrode channels were sealed with a cellophane tape of 3/4 in. width, which acted as a membrane[5].

The solutions from the collecting tubes, corresponding to a 30 min. run were evaporated on aluminum discs under infrared lamps. The radioactivity of the aluminum discs was then measured by means of a Geiger-Müller counter with a mica window. To prepare the radioautographs of the separation processes, the filter paper curtains were dried in a stream of hot air, laid in cellophane bags, and then exposed to Supervidox X-ray films 30 × 40 cm, for about 16 h.

Fig. 1 represents the separation of 172 mg. of In from 108 mg. of Cd in 24 h., and Fig. 2 represents the same separation, but at a rate of 396 mg. of In from about 4000 mg. of Cd in 24 h. Both separations were complete.

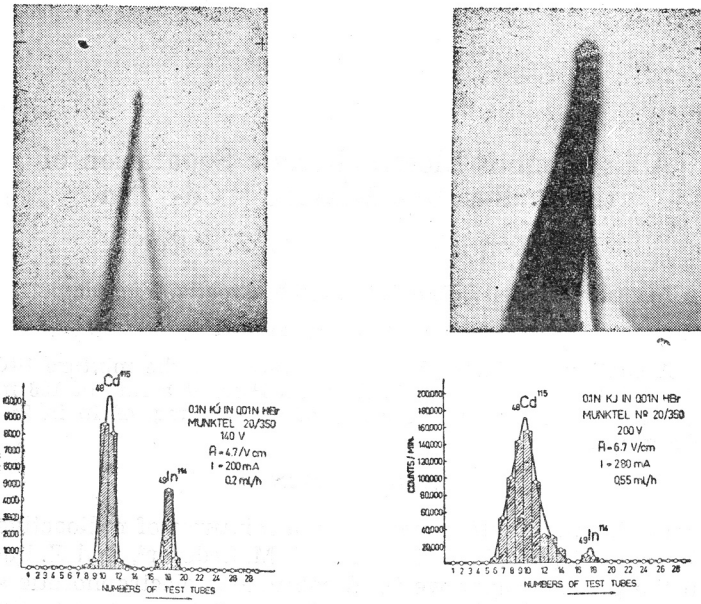

Fig. 1. Radioautograph of the continuous electrophoretic separation at a rate of 172 mg. of In from 108 mg. of Cd in 24 h. The diagram below represents the activities detected in the collecting glasses during a collecting time of 0.5 h.
Basic electrolyte, 0.1 *N* solution of KI in 0.01 *N* HBr; filter paper curtain, Munktell No. 20/350; voltage drop, 140 V; mean electrical field strength, 4.7 V/cm.; electrical current, 200 mA; pumping rate, 0.2 ml./h.

Fig. 2. Radioautograph of the continuous electrophoretic separation at a rate of 396 mg. of In from about 4000 mg. of Cd in 24 h. The diagram below represents the activities detected in the collecting glasses during a collecting time of 0.5 h.
Basic electrolyte, 0.1 *N* solution of KI in 0.01 *N* HBr; filter paper curtain, Munktell No. 20/350; voltage drop 280 V; mean electrical field strength, 6.7 V/cm.; electrical current, 280 mA; pumping rate, 0.55 ml./h.

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IZVOD

Kontinuirana elektroforetska separacija radioaktivne smjese ^{115}Cd — ^{114}In

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Opisana je metoda kontinuirane elektroforetske separacije radioaktivne smjese ^{115}Cd — ^{114}In u otopini, koja je 0,1 *N* KJ i 0,01 *N* HBr. U takvoj otopini vršeni su eksperimenti separacije smjese Cd—In brzinom od 108 mg Cd sa 172 mg In, te 4000 mg Cd sa 396 mg In u 24 sata. Utvrđeno je, da je ovom metodom moguće postići potpunu separaciju Cd od In.

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ZAGREB

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