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SILICA-BASED ANION EXCHANGER FOR ION CHROMATOGRAPHY

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A typical environmental pollution analysis requires the determination of chloride, nitrate, and sulphate concentrations in water. This may be done by ion chromatography. However, the analytical columns for ion chromatography are, as a rule, expensive, their cost is often in the range US$ 500–1200 per column. In order to overcome this economic problem, we have developed a method of preparing a much cheaper sorbent for packing the ion exchange columns, suitable for the determination of inorganic anions.

According to our method silica gel (12–17 μm) is treated with paraffin solution in toluol to produce a material with a 2.0–2.4% paraffin content. After the evaporation of the toluol, this material is first heated at 110 °C and after that treated with *c.* 1.2–1.6% (w/w) aqueous solution of a water-soluble anion exchanger BA-2 (from the Olaine Chemical Factory, Latvia). The final step of the preparation of the ion exchanger consists in drying this material and heating it at 110 °C for 8–20 hours. In this way an ion exchanger is obtained, showing the properties presented in Figs. 1–3.

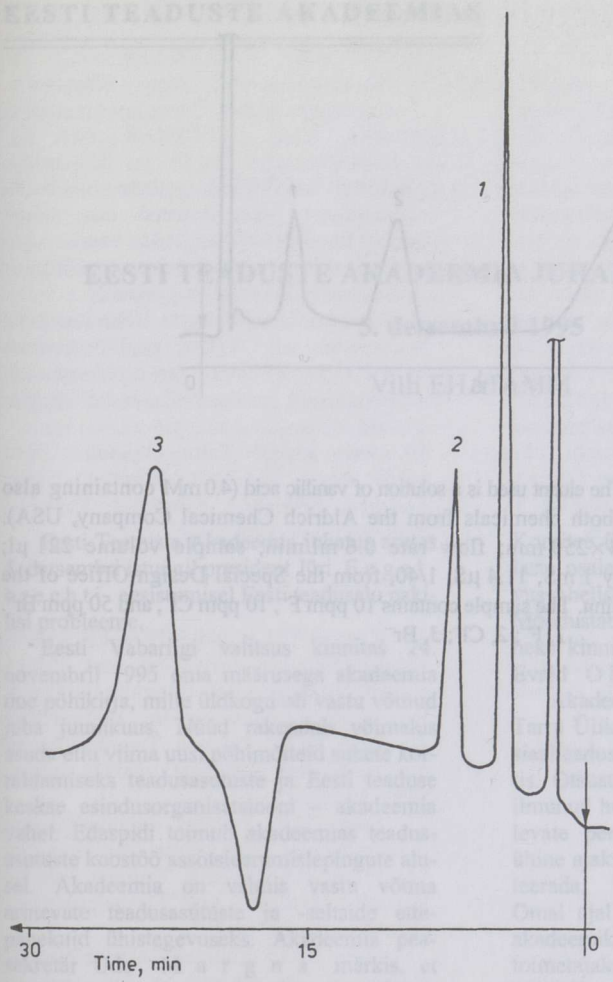

Fig. 1

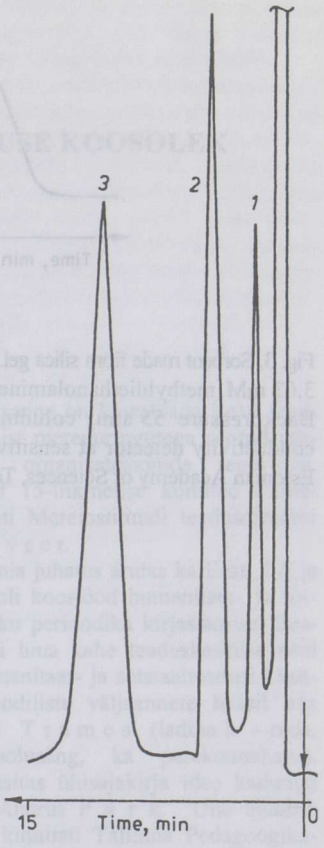

Fig. 2

Fig. 1. Sorbent made from silica gel. The eluent used is a solution of phthalic acid (661 mg/l containing also 227 mg/l monoethanolamine). Backpressure 25 atm; column 4×250 mm; flow rate 1.5 ml/min; sample volume 221 µl; conductivity detector at sensitivity 1 mS, 37.7 µS, 1/40, from the Special Design Office of the Estonian Academy of Sciences, Tallinn. The sample contains 51 ppm Cl^-, 50 ppm NO_3^-, and 98 ppm SO_4^{2-}.
1, Cl^-; *2*, NO_3^-; *3*, SO_4^{2-}.

Fig. 2. Sorbent made from silica gel. The eluent used is a solution of vanillic acid (5.0 mM containing also 4.03 mM methyldiethanolamine, both chemicals from the Aldrich Chemical Company, USA). Backpressure 55 atm; column 4×250 mm; flow rate 0.6 ml/min; sample volume 221 µl; conductivity detector at sensitivity 1 mS, 27.3 µS, 1/40, from the Special Design Office of the Estonian Academy of Sciences, Tallinn. The sample contains 35 ppm F^-, 41 ppm Cl^-, and 105 ppm SO_4^{2-}.
1, F^-; *2*, Cl^-; *3*, SO_4^{2-}.

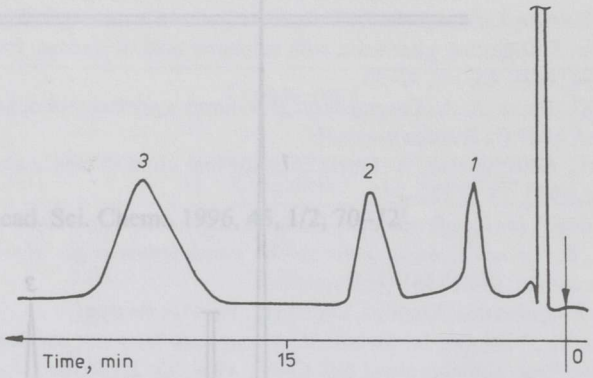

Fig. 3. Sorbent made from silica gel. The eluent used is a solution of vanillic acid (4.0 mM containing also 3.03 mM methyldiethanolamine, both chemicals from the Aldrich Chemical Company, USA). Backpressure 55 atm; column 4×250 mm; flow rate 0.6 ml/min; sample volume 221 µl; conductivity detector at sensitivity 1 mS, 11.4 µS, 1/40, from the Special Design Office of the Estonian Academy of Sciences, Tallinn. The sample contains 10 ppm F^-, 10 ppm Cl^-, and 50 ppm Br^-. *1*, F^-; *2*, Cl^-; *3*, Br^-.