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Capillary Chromatography Based on Tube Radial Distribution of Aqueous–Organic Mixture Carrier Solvents: Introduction of Double Tubes Having Different Inner Diameters to the System

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A tube radial distribution chromatography (TRDC) system was previously developed using an open capillary tube and an aqueous–organic solvent (water–acetonitrile–ethyl acetate) mixture as a carrier solution. In this study, we introduced double capillary tubes having different inner diameters to the system. The tubes were fused-silica capillary tubes with 100 and 250 μm i.d.; the smaller tube was inserted into the larger one through a T-type joint. Water–acetonitrile mixture (volume ratio 3:1) and acetonitrile–ethyl acetate mixture (volume ratio 4:1) solutions were delivered into the large tube from the inside through the small tube and from the outside through the joint, respectively, and then mixed through the large tube to provide a water–acetonitrile–ethyl acetate carrier solution. The carrier solution was further fed into the large tube and then to an absorption detector. By changing the flow rates of the mixture solutions in both tubes, we could control the component ratio of carrier solvents in the carrier solution, yielding either organic solvent-rich, water–acetonitrile–ethyl acetate (volume ratio 3:33:8) or water-rich, water–acetonitrile–ethyl acetate (volume ratio 24:12:1). A model analyte-mixture solution of 1-naphthol and 2,6-naphthalenedisulfonic acid was eluted in this order with the organic solvent-rich carrier solution and eluted in the reverse order with the water-rich carrier solution. We discussed the chromatographic data together with the analytical conditions from the viewpoint of the tube radial distribution of the carrier

solvents.



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