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Determination of Urea in Serum Based on the Combination of an Enzymatic Reaction with Immobilized Urease and Ion Chromatographic Analysis

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A quantitative method for the determination of urea in serum was studied. An ion chromatograph (IC) with a conductivity detector was used in this method, where the chromatograph was modified by placing an immobilized urease column between the injection loop and a guard column of the cation analysis column. Immobilized urease was prepared by the adsorption of urease on cedar sawdust with triethylenetetramine. The adsorption capacity of urease was 190 mg g^{-1}, and its activity was 3500 U g^{-1}. The conversion efficiency of urea to ammonium ion was 100%, and the half life of immobilized urease was 60 days. It was possible to use the immobilized urease in a pH range of 3.0 to 9.0, and at temperatures up to 60°C. The determination of urea was attempted by IC attaching an immobilized urease column. The limit of detection of urea was 0.2 mg L^{-1}, and the calibration curves of urea were very linear over 0.8 − 25 mg L^{-1}. The urea concentration in the human serum could be determined with a standard deviation of 0.06 − 0.13 within 5 min after injecting the serum sample.

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