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Improved Solid-phase Spectrometry for the Microdetermination of Total and Dissolved Phosphate

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Solid-phase spectrophotometry has been improved for the determination of the total and dissolved phosphate in water. The target phosphate-P at sub-μg dm^{-3} to μg dm^{-3} levels in a 20-cm^3 water sample was concentrated as the molybdenum blue species to 0.06 or 0.12 cm^3 using a Sephadex G-25 within 30 min, and gel beads were introduced to a 1.5-mm or 3-mm diameter flow cell having a 10-mm light path length. To minimize the error caused by any difference in the packing state of the gel beads in the cell for each measurement, the absorbances of the blue color were directly measured at 836 nm and at 450 nm using a UV-visible spectrophotometer. The absorbance difference (ΔA) of the two wavelengths was used for determining the trace amounts of P. The sensitivity achieved by this procedure was higher by a factor of over 100 for a 20-cm^3 sample compared to that of the corresponding solution method using a 10-mm cell, and the detection limit was as low as 0.1 μg dm^{-3}. Higher sensitivity was obtained using 100 cm^3 water samples. Trace levels of the total and dissolved phosphate at sub-μg dm^{-3} to μg dm^{-3} levels in samples from mountainous small streams were directly determined without any preconcentration procedures.

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