

A Disposable Single-Use Optical Sensor for Potassium Determination Based on Neutral Ionophore

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Abstract

A disposable single-use optical sensor to determine potassium based on an ion-exchange mechanism is described. The test strip is formed by a circular sensing film zone 6 mm in diameter and 4.7 μ m in thickness that contains all the reagents necessary to produce a selective response to potassium on a polyester sheet. The sensing zone is formed by a plasticised PVC that incorporates the cation-selective neutral ionophore dibenzo-18-crown-6, lipophilised Nile Blue, and a lipophilic salt.

At pH 9.0, the absorbance response of the test strip at 660 nm shows a good correlation with the theoretical behavior. All experimental variables that influence response, especially in terms of selectivity and response time, have been studied. The sensor responded linearly in activities in the range of 0.0125 and 76.8 mM. The detection limit is 0.0125 mM, the reproducibility intermembrane, at a medium level of the range, is 3.4%, as R.S.D. of $\log a_{K^+}$ and the intramembrane, 3.0%. The procedure was applied to the determination of potassium in different human plasma samples, pharmaceutical compounds and seawater samples, validating results against a reference procedure.