

485g Measurement of the Zeta Potential of Planar Solid Surfaces by Means of a Rotation Disk

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A method of measuring the zeta potential of disks is described. Combining the hydrodynamic properties of a rotating disk, the solution of Laplace's equation for the potential, and the electrokinetic boundary condition, an equation relating the zeta potential of the disk to the streaming potential is obtained. Theory predicts the streaming potential is proportional to the rotation rate raised to the 3/2 power. Placing an electrode near the disk surface and a reference electrode at infinity is shown to be the ideal place to make the streaming potential measurement. Experimental measurements of the streaming potential are made on silicon oxide disks in a dilute potassium chloride solution. The experimental results are shown to agree very well with theory. Determination of the zeta potential using streaming current measurements is also possible, but a current collection efficiency must first be determined because not all the current from a disk flows through the auxiliary electronic current path. Experimental results are shown to agree with published data.