

## A Method for Dielectric Loss Measurements by a Microwave Cavity in Fixed Resonance Condition

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A method for the measurement of dielectric losses at microwave frequencies for small samples inserted in a resonating cavity is discussed. The method allows static and dynamic determinations of  $\epsilon''$  by power reflection coefficient measurements in resonance condition and is suitable for experimental setup that use either active or passive frequency techniques. An X-band microwave apparatus based on the passive frequency technique and built up with a right cylindrical cavity resonating in the TE/sub 011/ mode is presented. By means of this apparatus, simultaneous measurements of  $\epsilon'$  and  $\epsilon''$  can be performed. Since each determination of the complex permittivity requires times of the order of 1 ms, and the setting is carried out at the beginning of the experiment only, the apparatus is very suitable for dynamic process measurements. The error sources, the overall accuracy, and resolution are discussed and compared with performance achievable with the basic cavity perturbation method. The efficacy of the proposed method is demonstrated by measurements performed on polar liquid mixtures in perturbed cavity conditions.

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