

Determination of the effective chloride diffusion coefficient in concrete via a gas diffusion technique

Sharif A., Loughlin K.F., Azad A.K., Navaz C.M.

ACI Materials Journal

Vol. 94, Issue.3, 1997

Abstract: A new experimental technique based on gas diffusion through a thin sample specimen is presented to evaluate the effective chloride diffusion ion in concrete. The counterdiffusion of two gases, helium and nitrogen, through a concrete disc is used to establish the porosity-to-tortuosity ratio ($\chi\mu/\tau$) of the concrete. From measurements of the porosity via porosimetry, the tortuosity of the concrete can be determined. The effective chloride ion diffusion in concrete is a function of ($\chi\mu/\tau$) ratio and the diffusion coefficient of chloride ion in water which is a known value. The test takes 3 to 4 hours to complete. Excellent results were obtained when correlated with the conventional diffusional measurement techniques for different water-cement ratios and cement content.