

MASS TRANSFER IN CIRCULAR TUBE USING PERFORATED DISC AS TURBULENCE PROMOTER

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ABSTRACT

Mass transfer data were obtained in circular conduit using an electrochemical technique with a potassium ferri-ferro cyanide couple. In circular conduit coaxially placed entry region perforated disc was used as turbulence promoter. The study comprised of evaluation of mass transfer rates at the outer wall of the electrochemical cell. Mass transfer coefficients were evaluated from the measured limiting currents. The study covered a wide range of geometric parameters such as diameter of the disc (d_d), thickness of the disc (d_t) and distance of the disc from the entrance of the test section (h). The results revealed that the mass transfer coefficient increased with increase in velocity, diameter of the disc (d_d), thickness of the disc (d_t) and decreased with increase in distance of the disc from the entrance of the test section (h). Within the range of variables covered, the augmentation achieved in mass transfer coefficients were up to 2.1 fold over the tube flow in absence of promoter. The entire mass transfer data were correlated with Colburn J_D factor and *Reynolds number*. The following correlation was reported out of the study.

$$J_D = 0.155(\text{Re})^{-0.9432}(\phi_1)^{0.641}(\phi_2)^{0.4658}(\phi_3)^{-0.3775}(\text{Sc})^{1.1521}$$

Where $\phi_1 = d_d/d$, $\phi_2 = d_t/d$, $\phi_3 = h/d$ are dimensionless groups. d is diameter of test section

KEYWORDS: Mass transfer, perforated disc, turbulence promoter