Turkish Journal of Chemistry

Turkish Journal

of

Chemistry

Keywords
Authors

chem@tubitak.gov.tr

Scientific Journals Home Page

## Diffusion Effect on the Anodic Reactions of Tungsten

Mustafa ANIK, Tuba CANSIZOĞLU and Sinem ÇEVİK
Metallurgy Institute, Osmangazi University, 26480, Eskişehir-TURKEY
e-mail: manik@ogu.edu.tr

**Abstract:** Potentiodynamic and potentiostatic polarizations, and a rotating disk electrode technique were used to study the influence of diffusion on the anodic reactions of tungsten (W) in a broad pH range (\sim 0.3--13.5) in $H_3PO_4$ buffered solutions. The anodic current was controlled totally by the kinetics of $H^+$ -assisted dissolution below pH 1 (Region A). At around pH 2.5 (Region B), in addition to the kinetics of $H_2O$-assisted dissolution, specimen rotation had an effect on the current. This observation was attributed mainly to the physical damage to an oxide phase by hydrodynamic effects and partly to the diffusion of surface $H_2WO_4(aq)$ species. The anodic current was under the mixed control of the kinetics of $OH^-$-assisted dissolution and slow diffusion of surface $WO_4^{2-}$ ions between pH 4 and 7 (Region C). The kinetics of the $H_2WO_4(s)$ solubilization and slow diffusion of surface $WO_4^{2-}$ ions were observed to influence the anodic current between pH 7.5 and 11.5 (Region D). In highly alkaline solutions (pH > 12; Region E), however, W anodic current was controlled totally by the slow diffusion of bulk $OH^-$ ions to the electrode surface.

**Key Words:** Tungsten, Anodic Reactions, Diffusion

Turk. J. Chem., **28**, (2004), 425-440.
Full text: pdf
Other articles published in the same issue: Turk. J. Chem.,vol.28,iss.4.