

## Extraction-Spectrophotometric Determination of Molybdenum, Tungsten and Vanadium in Products of Ferrous Metallurgy as Ternary Complexes with Polyphenols and Tetrazolium Salts

Demir Çelik Metalurjisi Ürünlerinin Polifenoller ve Tetrazolium Tuzları ile Üçlü Bileşikler Olarak Elde Edilmesi ve Spektrofotometrik Yöntemle Tayini

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### Abstract

Polyphenols (PPh) are of great importance in inorganic analysis. Alone, or in combination with organic bases they are widely used for solvent extraction and spectrophotometric determination of many metal ions. In presence of tetrazolium salts (TS) PPh form ternary ion-association complexes with molybdenum(VI), tungsten(VI) and vanadium(IV,V) having good analytical characteristics. The anionic part (metal-PPh chelate) gives intensive coloration, and the cationic part (tetrazolium cation), in its turn, guarantees a good extraction ability of the compounds. The following is a brief introduction and a short review of these complexes concerning their composition, optimum conditions for formation and extraction, equilibrium constants, analytical characteristics and application for extraction-spectrophotometric determination of Mo, W and V in products of ferrous metallurgy. The complexes of following PPh and TS are discussed:

i) PPh: catechol; pyrogallol; 4-nitrocatechol; 3,5-dinitrocatechol; 2,3-dihydroxynaphthalene; 4-(2-pyridylazo)resorcinol; 4-(2-thiazolylazo)resorcinol;

ii) TS: 2,3,5-triphenyltetrazolium chloride; 3-(2-naphthyl)-2,5-diphenyltetrazolium chloride; 3-(4,5-dimethyl-2-thiazol)-2,5-diphenyltetrazolium bromide; 2-(4-Iodophenyl)-3-(4-nitrophenyl)-5-phenyltetrazolium chloride; 3,3'-(4,4'-biphenylene)bis(2,5-diphenyltetrazolium) chloride; 3,3'-[3,3'-Dimethoxy(1,1'-biphenyl)-4,4'-diyl]bis(2,5-diphenyltetrazolium) chloride.

About 50 references, mainly published in the last twenty years, are presented.

**Keywords:** Molybdenum, tungsten, vanadium, steels, extraction-spectrophotometric determination, ternary complexes.