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Extractive-Spectrophotometric Determination of Vanadium(IV/V) in Catalysts Using 4-(2-Pyridylazo)-resorcinol and Tetrazolium Violet

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An extractive-spectrophotometric method for determination of V(V) and V(IV) has been developed. V(V) was converted to ternary ion-associate complex with 4-(2-pyridylazo)-resorcinol and tetrazolium violet. In the presence of diaminocyclohexanetetraacetic acid and NH_4F as the masking agents determination of V(V) was highly selective, and V(IV) was among the masked ions. Due to this fact V(IV) could be determined indirectly from the difference in the absorbance measured in the presence and absence of the oxidizing agent, which oxidised V(IV) to V(V). The factors influencing determination of V(V) in the presence of large excess of V(IV) have been investigated. The method was applied to the determination of V(IV/V) in catalysts used for oxidation of SO_2 to SO_3. The precision and accuracy were satisfactory (R.S.D ≤ 1.9%). Detection limit of V(V) was 3.3 ng mL^{-1}. Beer's law was obeyed up to V(V) concentration of 1.45 μg mL^{-1} in dichloroethane extract. The corresponding molar absorptivity coefficient was 3.05×10^4 L mol^{-1} cm^{-1}.