Triphenylmethane Dyes as Redox Indicators in Cerate Oxidimetry

Titration of Fe(II), U(IV), V(IV), As(III),
Oxalate and Hydroquinone

Triphenylmethanfarbstoffe als Redoxindikatoren
in der Cerat-Oxydimetrie. Titration von Fe(II), U(IV),
V(IV), As(III), Oxalat und Hydrochinon

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The triphenylmethane dyes Setoglaurine O, Setocyanine Supra, Fast Green FCF and Night Blue (Colour Index Nos. 42025, 42140, 42053 and 44085) have been successfully employed as indicators in the titration of Fe(II), U(IV), V(IV), As(III), oxalate and hydroquinone with ammonium hexanitratocerate(IV) in perchloric acid medium. The results obtained were in very good agreement with those obtained by other standard methods.

General Procedure. Add enough perchloric acid (sp. gr. 1.6) to the sample solution such that the acidity is between 0.5 and 4.0 N and add also 0.5 ml of 0.1% aqueous solution of one of the above dyes. Titrate with 0.05 N $(\text{NH}_4)_2[\text{Ce}(\text{NO}_3)_6]$ solution in 1 N HClO_4 . The colour change at the end-point is very sharp. It is yellow to reddish-brown for Setoglaurine O,

yellow to orange-red for Setocyanine Supra, yellow to rose-red for Fast Green FCF and green to pink for Night Blue.

In the case of *V(IV)* the acidity should be 0.2–0.5 N, 0.5 to 1.0 ml of 1% $\text{K}_3[\text{Fe}(\text{CN})_6]$ solution should be added as catalyst and the cerate solution should be added only dropwise towards the end waiting for 5–10 sec after each addition. When using Night Blue, this should be added near the end-point.

In the case of *As(III)* the acidity should be 0.5–1.0 N, OsO_4 should be used as catalyst and the concentration of As should not exceed 0.25 mmoles. Night Blue is not suitable in this titration.

In the case of *oxalate* and *hydroquinone*, the indicator should also be added near the end-point. Night Blue, is not suitable for oxalate titration.

When employing 0.01 N cerate solution an indicator correction of 0.1 ml has to be applied for 0.5 ml of the indicator solution. Reverse titrations are not possible because of oxidation of the dyes.

The transition potentials of the above dyes have been found to be in the range of 1060 ± 20 to 1075 ± 20 mV (vs. N.H.E.).

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