
**Processing photographic wastes —
Analysis of cyanides — Determination of
hexacyanoferrate(II) and
hexacyanoferrate(III) by spectrometry**

*Effluents de traitement photographiques — Analyse des cyanures —
Détermination de l'hexacyanoferrate(II) et de l'hexacyanoferrate(III) par
spectrométrie*



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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 7766 was prepared by Technical Committee ISO/TC 42, *Photography*.

Introduction

This International Standard is devoted to the analysis of photographic wastes; it encompasses the analysis of complexed iron cyanides (hexacyanoferrates) in photographic effluents.

Some of the chemicals specified in the test procedures are caustic, toxic, or otherwise hazardous. Specific warning, caution and danger notices are noted but, in addition, the normal precautions required during the performance of any chemical procedure should be exercised at all times.

In the case of effluents, the photographic laboratory can best establish conformity to regulations by appropriate chemical analysis. In some cases, in-house analyses will be possible; but the use of an outside laboratory will often be required.

Complexed cyanides are used in the bleaching stage of colour photographic processing and it is, therefore, possible for the cyanide portion of the resulting photographic effluent to reach a reportable level. Complexed cyanides contribute to the total cyanides in those tests in which the sample preparation breaks down the complexed cyanides. It is the purpose of this International Standard to provide a method giving an independent determination of the cyanide present as hexacyanoferrate complexes. Due to the chemical behaviour of cyanide complexes, it is not possible to specify a single method for the quantitative determination of complexed cyanides in these effluents.

The analysis of cyanide is covered in various aspects in the following International Standards:

- ISO 6703-1:1984, *Water quality — Determination of cyanide — Part 1: Determination of total cyanide*;
- ISO 6703-2:1984, *Water quality — Determination of cyanide — Part 2: Determination of easily liberatable cyanide*.

NOTE 1 Easily liberatable cyanides are defined as substances with cyanide groups and a measurable hydrocyanic acid vapour pressure at pH 4 and room temperature.

NOTE 2 Cyanide diffuses as hydrogen cyanide (HCN) at room temperature from a solution at pH 6; the procedure determines cyanide from simple compounds of cyanide and easily dissociated complexes.

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Processing photographic wastes — Analysis of cyanides — Determination of hexacyanoferrate(II) and hexacyanoferrate(III) by spectrometry

1 Scope

This International Standard establishes a test method for the determination of hexacyanoferrate(II) (ferrocyanide) and hexacyanoferrate(III) (ferricyanide), referred to hereafter as $\text{Fe}(\text{CN})_6$, in photographic processing effluents¹⁾. Results are reported as hexacyanoferrate, $\text{Fe}(\text{CN})_6$.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 5667-1:1980, *Water quality — Sampling — Part 1: Guidance on the design of sampling programmes*

ISO 5667-2:1991, *Water quality — Sampling — Part 2: Guidance on sampling techniques*

ISO 5667-3:1994, *Water quality — Sampling — Part 3: Guidance on the preservation and handling of samples*

ISO 6353-1:1982, *Reagents for chemical analysis — Part 1: General test methods*

ISO 6353-2:1983, *Reagents for chemical analysis — Part 2: Specifications — First series*

ISO 6353-3:1987, *Reagents for chemical analysis — Part 3: Specifications — Second series*

ISO 10349-1:2002, *Photography — Photographic-grade chemicals — Test methods — Part 1: General*

3 Safety and operational precautions

3.1 Hazard warnings

Some of the chemicals specified in the test procedures are caustic, toxic, or otherwise hazardous. Safe laboratory practice for the handling of chemicals requires the use of safety glasses or goggles and, in some cases, other protective apparel such as rubber gloves, face masks and aprons. Specific danger notices are given in the text for particularly dangerous materials, but normal precautions are required during the performance of any chemical procedure at all times.

1) Significant levels of thiosulfate (hypo) can result in interference. Significant levels of thiosulfate in processing-machine effluents result in oxidation of the thiosulfate by iron (III). Sulfur will form, increasing the spectrophotometric absorbance which is measured. Also, thiosulfate may deplete the added iron (III) leaving nothing for the colour reaction. The method is applicable to effluents from buildings where the thiosulfate would be diluted by the rest of the building wastes and this would eliminate the interference.