
International Standard



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Rubber, raw and rubber latex — Determination of iron content — 1,10-Phenanthroline photometric method

Caoutchouc brut et latex de caoutchouc — Dosage du fer — Méthode photométrique à la phénanthroline-1,10

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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 1657 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*.

This second edition cancels and replaces the first edition (ISO 1657-1975), clause 5 and sub-clause 7.3 of which have been technically revised.

Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

Rubber, raw and rubber latex — Determination of iron content — 1,10-Phenanthroline photometric method

1 Scope and field of application

This International Standard specifies a 1,10-phenanthroline photometric method for the determination of 5 to 1 000 mg/kg of iron in uncompounded natural rubber, uncompounded synthetic rubbers which do not contain chlorine, and in the corresponding uncompounded latices.

2 References

ISO 123, *Rubber latex — Sampling.*

ISO 124, *Rubber latices — Determination of total solids content.*

ISO 247, *Rubber — Ash content — Determination.*

ISO 1795, *Raw rubber in bales — Sampling.*

ISO 1796, *Raw rubber — Sample preparation.*

ISO 4793, *Laboratory sintered (fritted) filters — Porosity grading, classification and designation.*

3 Principle

Ashing of the raw rubber or the dried latex solids in a crucible. Extraction of the ash with hydrochloric acid and making up of the solution to standard volume. After adjustment of the pH by the addition of buffer solution, treatment of an aliquot part of the solution with hydroxylammonium chloride to reduce any iron(III) present to iron(II) and 1,10-phenanthroline with which the iron(II) forms an orange-red complex. Photometric measurement of the absorbance of this solution, which is proportional to the concentration of iron.

NOTE — The method used is closely similar to that given in ISO 6685, *Chemical products for industrial use — General method for determination of iron content — 1,10-Phenanthroline spectrophotometric method.*

4 Reagents

All reagents shall be of recognized high purity analytical quality suitable for use in trace metal analysis. Distilled water or water of equivalent purity shall be used whenever water is specified.

4.1 Hydrochloric acid, ρ 1,19 g/cm³*.

4.2 1,10-Phenanthroline, solution.

Dissolve 0,5 g of 1,10-phenanthroline monohydrate in hot water and, after cooling, provided that this does not cause precipitation, dilute the solution to 500 cm³.

Store the solution away from the light and use only colourless solutions.

4.3 Hydroxylammonium chloride, solution.

Dissolve 10 g of hydroxylammonium chloride in 100 cm³ of water.

4.4 Buffer solution.

Dissolve 164 g of anhydrous sodium acetate in approximately 250 cm³ of water and to the solution add 28,5 cm³ of glacial acetic acid, ρ 1,05 g/cm³. Dilute this mixture to 500 cm³ and filter immediately before use if it is cloudy. If this buffer solution gives highly coloured reference solutions in the preparation of the calibration curve, an alternative buffer solution may be prepared by dissolving 80 g of sodium hydroxide or 106 g of anhydrous sodium carbonate in 200 cm³ of water, adding 142,5 cm³ of glacial acetic acid, ρ 1,05 g/cm³, and diluting the solution to 500 cm³.

4.5 Iron, standard solution corresponding to 0,1 g of Fe per cubic decimetre.

Dissolve 0,702 g, weighed to the nearest 0,000 5 g, of ammonium iron(II) sulfate hexahydrate $[(\text{NH}_4)_2\text{Fe}(\text{SO}_4)_2 \cdot 6\text{H}_2\text{O}]$ in water in a 1 000 cm³ one-mark volumetric flask. Add 3 cm³ of concentrated hydrochloric acid, ρ 1,19 g/cm³, and dilute to the mark with water.

This solution will generally remain stable for at least 1 month.

1 cm³ of this standard solution contains 0,1 mg of Fe.

* The term millilitre (ml) is commonly used as a special name for the cubic centimetre (cm³), in accordance with a decision of the Twelfth Conférence Générale des Poids et Mesures. The term millilitre is acceptable, in general, for references in International Standards to capacities of volumetric glassware and to liquid volumes.