
International Standard



6353/1

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Reagents for chemical analysis — Part 1 : General test methods

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

International Standard ISO 6353/1 was developed by Technical Committee ISO/TC 47, *Chemistry*, and was circulated to the member bodies in May 1980.

It has been approved by the member bodies of the following countries :

Belgium	Hungary	Poland
Brazil	India	Romania
China	Italy	South Africa, Rep. of
Czechoslovakia	Korea, Rep. of	Switzerland
Egypt, Arab Rep. of	Mexico	United Kingdom
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The member bodies of the following countries expressed disapproval of the document on technical grounds :

Australia
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Reagents for chemical analysis — Part 1 : General test methods

1 Scope and field of application

This part of ISO 6353 specifies general test methods for verifying the compliance of reagents for chemical analysis with the specifications given in other parts of this International Standard.

2 References

ISO 31, *Quantities, units and symbols*.

ISO 758, *Liquid chemical products for industrial use — Determination of density at 20 °C*.

ISO 759, *Volatile organic liquids for industrial use — Determination of dry residue after evaporation on a water bath — General method*.

ISO 760, *Determination of water — Karl Fischer method (General method)*.

ISO 918, *Volatile organic liquids for industrial use — Determination of distillation characteristics — General method*.¹⁾

ISO 1392, *Determination of crystallizing point — General method*.

ISO 2211, *Liquid chemical products — Measurement of colour in Hazen units (platinum-cobalt scale)*.

ISO 2718, *Standard layout for a method of chemical analysis by gas chromatography*.

ISO 6685, *Chemical products for industrial use — General method for determination of iron content — 1,10-Phenanthroline spectrophotometric method*.²⁾

3 General information

3.1 The nomenclature for chemical compounds used in this International Standard in general conforms to the rules published by the International Union of Pure and Applied Chemistry (IUPAC).

3.2 In all reactions or operations described, use only distilled or deionized water. Carbon dioxide-free water, if required, may be prepared by boiling water of the above grade for about 10 min and protecting from the atmosphere during cooling and storing.

3.3 Unless otherwise stated, solutions are aqueous and, dilutions shall be made with water.

3.4 The symbol “%” indicates percentage by mass (*m/m*), unless otherwise stated.

3.5 The reference number of a general test method, abbreviated GM, as given in the individual tests, refers to the number of the method in clause 5.

3.6 The reagents used shall conform to the specifications in ISO 6353. In the absence of such a specification, reagents of suitable analytical grade shall be used.

NOTE — Reagents specified in this International Standard are identified R .., e. g. sodium chloride is R 31.

3.7 Unless otherwise stated, values for density refer to the density at 20 °C.

3.8 Temperatures are expressed in degrees Celsius (°C).

1) At present at the stage of draft. (Revision of ISO/R 918.)

2) At present at the stage of draft.

3.9 The following additional abbreviations are used in this International Standard :

AgDDTC	silver diethyldithiocarbamate
APDC	ammonium pyrrolidine-1-carbodithioate
EDTA	ethylenediaminetetraacetic acid, disodium salt
AAS	atomic absorption spectroscopy
FES	flame emission spectroscopy
GC	gas chromatography
SS	standard solution
IS	indicator solution
RS	reagent solution
GM	general test method
R	reagent
MAS	molecular absorption spectrophotometry

3.10 Warning

The physical and chemical properties of the chemicals being handled, in particular those relating to physiological effects, combustibility and explosive tendencies, may be such as to present significant health and safety hazards. Although the degree of risk is extremely variable, it should be assumed, in the absence of specific information to the contrary, that the handling of any chemical will involve hazards of this kind.

The provision of exhaustive details in respect of hazards and associated safety procedures is not considered to fall within the scope of this International Standard as most manufactures of chemicals are very willing to advise prospective users on the handling of their products. In addition, national regulations on the packaging and labelling of hazardous chemicals should ensure that adequate information is given on the hazards associated with the use of chemicals.

4 Solutions for use in test methods

4.1 Standard solutions

Prepare stock standard solutions (4.1.1) and dilute standard solutions (4.1.2) as follows.

4.1.1 Stock standard solutions

Dissolve the constituents indicated in column 2 of table 1, dilute to the mark in a 1 000 ml one-mark volumetric flask and mix.

It is recommended that all stock standard solutions of inorganic compounds be stored in bottles of suitable plastic material, unless otherwise stated.

4.1.2 Dilute standard solutions

Prepare dilute standard solutions I, II and III at the time of use by diluting the stock standard solutions (4.1.1) in one-mark volumetric flasks of appropriate capacity and in the precise volume ratios 1/10, 1/100, 1/1 000, respectively.

4.2 Reagent solutions

Prepare the reagent solutions as follows.

4.2.1 Ammonium metavanadate (RS)

Dissolve 2,5 g of ammonium metavanadate in 500 ml of boiling water, cool, add 20 ml of nitric acid solution (R 19), cool and dilute to 1 000 ml. Store in a polyethylene bottle.

4.2.2 Borate standard buffer (RS)

Using the carbon dioxide-free water (see 3.2), dissolve 3,81 g of sodium tetraborate decahydrate and dilute to 1 000 ml. Store protected from atmospheric carbon dioxide.

4.2.3 Calcium hydroxide standard buffer (RS)

Prepare a saturated solution at 25 °C. Determine the calcium hydroxide concentration by titration with standard volumetric hydrochloric acid solution, $c(\text{HCl}) = 0,1 \text{ mol/l}$, using phenol red (IS 4.3.10) as indicator. The concentration $c[1/2 \text{ Ca}(\text{OH})_2]$ shall be between 0,040 0 and 0,041 2 mol/l. Store protected from atmospheric carbon dioxide and reject the solution as soon any turbidity appears.

4.2.4 Chromic acid (RS)

Dissolve 100 g of chromium trioxide in sulphuric acid solution (35 %) and dilute to 1 000 ml with the same acid.

4.2.5 Cobalt(II) chloride (RS)

4.2.5.1 Preparation

Dissolve 60 g of cobalt(II) chloride hexahydrate in about 900 ml of a mixture of 25 ml of hydrochloric acid solution (R 13) and 975 ml of water and dilute to 1 000 ml with the same mixture. Determine the concentration by the method specified in 4.2.5.2 and adjust it to 59,5 mg of $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ per millilitre using a calculated quantity of diluted hydrochloric acid solution.

4.2.5.2 Titration

Place 5,0 ml of the solution (4.2.5.1), 5 ml of hydrogen peroxide solution (3 %) and 10 ml of sodium hydroxide solution (27 %) in a 200 ml conical flask fitted with a ground glass stopper. With the stopper removed, boil gently for 10 min, allow to cool, add 60 ml of sulphuric acid (10 %) and 2 g of potassium iodide (R 25). Stopper the flask and dissolve the precipitate by shaking gently. Titrate the liberated iodine with standard volumetric sodium thiosulphate solution, $c(\text{Na}_2\text{S}_2\text{O}_3) = 0,1 \text{ mol/l}$, adding 10 drops of the starch solution (IS 4.3.11) towards the end of the titration.

The end-point is reached when the blue colour has just been discharged.

1 ml of sodium thiosulphate solution, $c(\text{Na}_2\text{S}_2\text{O}_3) = 0,1 \text{ mol/l}$, corresponds to 23,79 mg of $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$.