

ISO

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO RECOMMENDATION R 619

METHODS OF CHEMICAL ANALYSIS OF MANGANESE ORES
DETERMINATION OF CHROMIUM CONTENT

1st EDITION

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BRIEF HISTORY

The ISO Recommendation R 619, *Methods of Chemical Analysis of Manganese Ores — Determination of Chromium Content*, was drawn up by Technical Committee ISO/TC 65, *Manganese Ores*, the Secretariat of which is held by Komitet Standartov Mer i Izmeritel'nyh Priborov pri Sovete Ministrov S.S.S.R. (GOST).

Work on this question by the Technical Committee began in 1954 and led, in 1964, to the adoption of a Draft ISO Recommendation.

In April 1965, this Draft ISO Recommendation (No. 778) was circulated to all the ISO Member Bodies for enquiry. It was approved, subject to a few modifications of an editorial nature, by the following Member Bodies:

Argentina	Hungary	Spain
Austria	India	Switzerland
Chile	Italy	Turkey
Czechoslovakia	Korea, Rep. of	U.A.R.
France	Netherlands	United Kingdom
Germany	Poland	U.S.S.R.
Greece	Romania	Yugoslavia

No Member Body opposed the approval of the Draft.

The Draft ISO Recommendation was then submitted by correspondence to the ISO Council, which decided, in September 1967, to accept it as an ISO RECOMMENDATION.

METHODS OF CHEMICAL ANALYSIS OF MANGANESE ORES

DETERMINATION OF CHROMIUM CONTENT

(Atomic mass Cr: 52.01; molecular mass Cr_2O_3 : 152.02)

This ISO Recommendation contains three parts:

- I. Introduction section 1
- II. Photometric method of determination of chromium content by using diphenylcarbazide sections 2 to 5
- III. Volumetric method of determination of chromium content by using silver persulphate sections 6 to 9

I. INTRODUCTION

1. GENERAL INSTRUCTIONS

- 1.1 In the following analysis use a sample for chemical analysis of air-dried manganese ore, sampled and prepared in accordance with ISO Recommendation R 309, *Methods of Sampling Manganese Ores*.

Simultaneously with the collection of test samples for the determination of chromium, take three more test samples for the determination of hygroscopic moisture.

Calculate the content of chromium in ore on the dry basis by multiplying the numerical results of the determination of chromium by the conversion factor K , as found from the following formula:

$$K = \frac{100}{100 - A}$$

where

A is the percentage hygroscopic moisture content.

- 1.2 The determination of chromium in manganese ore should be carried out by analysing three parallel-weighed test samples of the ore together with two blank tests to allow the necessary corrections to be made to the results of the determination.

Simultaneously and under the same conditions, carry out a check analysis of a standard sample of manganese ore for the determination of its chromium content. The standard sample for analysis should be taken from the same type of ore as that from which the analysed sample was taken.

The arithmetical mean of the three results should be accepted as the final result.

The following conditions should be observed:

The difference between the highest and the lowest results should not exceed double the absolute value of the permissible tolerance for the corresponding interval of chromium content shown in the Tables under clauses 5.2 and 10.2, "Accuracy of method".

The average result of the simultaneous check analysis of the standard sample of manganese ore for chromium content should not differ from the result shown in the certificate by more than the $\pm$ value of the permissible tolerance for the corresponding interval of chromium content shown in the tables under clauses 5.2 and 10.2, "Accuracy of method".

1.3 The test samples should be weighed to an accuracy of ± 0.0002 g.

1.4 Double distilled or de-ionized water should be used during the procedure and for preparation of the solutions.

1.5 Meanings of particular expressions:

hot water (or solution)	implies a temperature of the liquid of 60 to 70 °C;
warm water (or solution)	implies a temperature of the liquid of 40 to 50 °C;
diluted 1:1, 1:2, 1:5, etc.	the first figure gives the number of parts by volume of concentrated acid or some other solution; the second figure gives the number of parts by volume of water.

1.6 Indications as to the concentrations of solutions show the quantity of solute, in grammes, in the corresponding volume of the solvent.

1.7 The following abbreviations and symbols are used:

CP	chemically pure
<i>d</i>	relative density
g	gramme
g/l	grammes per litre
l	litre
ml	millilitre
nm	nanometre
N	standard solution of normal concentration
PFA	pure for analysis.

II. PHOTOMETRIC METHOD OF DETERMINATION OF CHROMIUM CONTENT BY USING DIPHENYLCARBAZIDE

(For chromium content below 0.1 %)

2. PRINCIPLE OF METHOD

A test sample of ore is fused with sodium carbonate and sodium peroxide and the fused mass is extracted in water.*

Chromium is determined in the solution by the photometric method based on the oxidation of diphenylcarbazide with chromate ions with the formation of a compound of red-violet colour.

* If the vanadium content exceeds 0.1 %, its effect can be eliminated by extraction of 8-hydroxyquinolate of vanadium with chloroform (see the Note under clause 4.4).