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**Plastics — Epoxy resins — Determination  
of chlorine content —**

**Part 3:  
Total chlorine**

*Plastiques — Résines époxydes — Détermination de la teneur en chlore —  
Partie 3: Chlore total*



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Case postale 56 • CH-1211 Geneva 20  
Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
E-mail [copyright@iso.ch](mailto:copyright@iso.ch)  
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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 3.

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 part of ISO 21627 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 21627-3 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 12, *Thermosetting materials*.

This first edition cancels and replaces ISO 13651:1996, of which it constitutes a technical revision.

ISO 21627 consists of the following parts, under the general title *Plastics — Epoxy resins — Determination of chlorine content*:

- *Part 1: Inorganic chlorine*
- *Part 2: Easily saponifiable chlorine*
- *Part 3: Total chlorine*

## Introduction

In producing epoxy resins based on epichlorohydrin, impurities containing chlorine may be formed. These are shown below. Since these impurities could lower the final properties of the cured resins, it is necessary to control their formation. Their chemical activities differ significantly, so different analytical procedures are needed for their analysis.

ISO 21627 specifies methods for the determination of these organic and inorganic chlorides which occur as impurities in epoxy resins derived from epichlorohydrin.

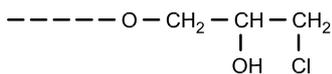
- Part 1: Inorganic chlorine (also called ionic chlorine).
- Part 2: Easily saponifiable chlorine consisting mainly of chlorine, which is present as 1,2-chlorohydrin as the result of incomplete dehydrohalogenation.
- Part 3: Total chlorine consisting mainly of all saponifiable organic chlorine, e.g. 1,2-chlorohydrin, 1,3-chlorohydrin and 1-chloro-2-glycidylether (chloromethyl derivative) which are the result of incomplete dehydrohalogenation, along with inorganic chlorine present in the test portion of epoxy resin.

Since the purposes of parts 1 to 3 of ISO 21627 differ, one of these methods should be selected depending on the impurities to be measured.

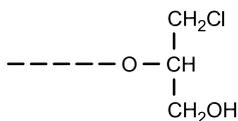
For analytical methods for impurities other than those shown below, see ISO 4615.

$\text{Cl}^-$

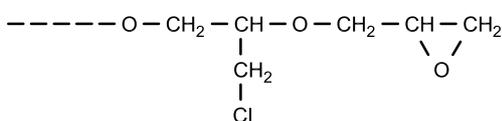
Inorganic chlorine (or ionic chlorine)



1,2-chlorohydrin



1,3-chlorohydrin



1-chloro-2-glycidylether  
(chloromethyl derivative)

Typical impurity types of inorganic and organic chlorine.



# Plastics — Epoxy resins — Determination of chlorine content —

## Part 3: Total chlorine

**WARNING** — Persons using this part of ISO 21627 should be familiar with normal laboratory practice. This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

### 1 Scope

This part of ISO 21627 specifies a method for the determination of the total chlorine contained in epoxy resins.

The amount of chlorine measured by this method, referred to as total chlorine, includes saponifiable organic chlorine and inorganic chlorine.

### 2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 21627. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 21627 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 3696:1987, *Water for analytical laboratory use — Specification and test methods*

ISO 5725-2:1994, *Accuracy (trueness and precision) of measurement methods and results — Part 2: Basic method for the determination of repeatability and reproducibility of a standard measurement method*

### 3 Term and definition

For the purposes of this part of ISO 21627, the following term and definition apply.

#### 3.1

##### **total chlorine**

amount of chlorine measurable by this method

**NOTE** It consists mainly of all saponifiable organic chlorine, e.g. 1,2-chlorohydrin, 1,3-chlorohydrin and 1-chloro-2-glycidylether which are the result of incomplete dehydrohalogenation along with inorganic chlorine present in the test portion of epoxy resin.

### 4 Principle

A test portion is dissolved in diethylene glycol monobutyl ether and the solution saponified with an alcoholic solution of potassium hydroxide by heating under reflux. The total chlorine content is then determined by potentiometric titration of the solution with silver nitrate solution.