



# SLOVENSKI STANDARD

## SIST EN 1410:1999

01-april-1999

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### Kemikalije, ki se uporabljajo za pripravo pitne vode – Kationski poliakrilamidi

Chemicals used for treatment of water intended for human consumption - Cationic polyacrylamides

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Kationische Polyacrylamide

Produits chimiques utilisés pour le traitement de l'eau destinée à la consommation humaine - Polyacrylamides cationiques

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#### ICS:

13.060.20	Pitna voda	Drinking water
71.100.80	Kemikalije za čiščenje vode	Chemicals for purification of water

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**en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

EN 1410

April 1998

ICS 71.100.80

Descriptors: potable water, water treatment, chemical compounds, description, physical properties, chemical properties, impurities, toxic substances, tests, labelling, storage, information, warning notices

English version

## Chemicals used for treatment of water intended for human consumption - Cationic polyacrylamides

Produits chimiques utilisés pour le traitement de l'eau destinée à la consommation humaine - Polyacrylamides cationiques

Produkte zur Aufbereitung von Wasser für den menschlichen Gebrauch - Kationische Polyacrylamide

This European Standard was approved by CEN on 23 March 1998.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This European Standard has been prepared by Technical Committee CEN/TC 164 "Water supply", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 1998, and conflicting national standards shall be withdrawn at the latest by October 1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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## Introduction

In respect of potential adverse effects on the quality of water intended for human consumption, caused by the product covered by this standard :

- 1) This standard provides no information as to whether the product may be used without restriction in any of the Member States of the EU or EFTA ;
- 2) It should be noted that, while awaiting the adoption of verifiable European criteria, existing national regulations concerning the use and/or the characteristics of this product remain in force.

## 1 Scope

This European Standard is applicable to cationic polyacrylamides used for treatment water intended for human consumption. It describes the characteristics of cationic polyacrylamides and specifies the requirements and the corresponding test methods for cationic polyacrylamides .

Annex A gives some information on origin, use and handling of cationic polyacrylamides.

Annex B lists the bibliography.

## 2 Normative references

This European standard incorporates by dated and undated reference, provisions from other publications. These normative references are cited at the appropriate place in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN ISO 3696	Water for analytical laboratory use - Specification and test methods (ISO 3696:1987)
ISO 3165	Sampling of chemical products for industrial use - Safety in sampling
ISO 6206	Chemical products for industrial use - Sampling - Vocabulary
ISO 8213	Chemical products for industrial use - Sampling techniques - Solid chemical products in the form of particles varying from powders to coarse lumps

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## 3 Description

### 3.1 Identification

#### 3.1.1 Chemical names

Copolymer of acrylamide and amine ester or amide.

### 3.1.2 Synonym or common name

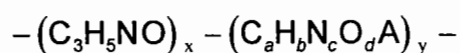
Cationic polyacrylamide.

NOTE : The more general terms : "cationic polymer", "cationic polyelectrolyte" and "cationic flocculant" are used but can also cover other chemicals referred to in other European standards.

### 3.1.3 Relative molecular mass

Typically in the range of 1 to 20 million.

### 3.1.4 Empirical formula



where :

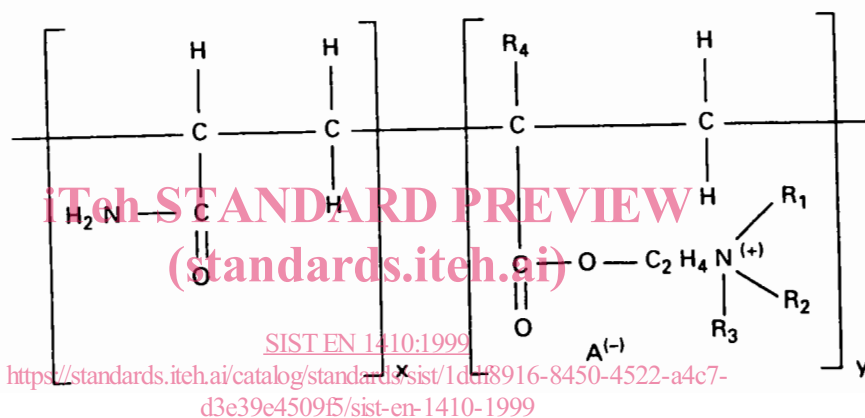
A is a negative ion ;

a,b,c and d are variable depending on the cationic monomer ;

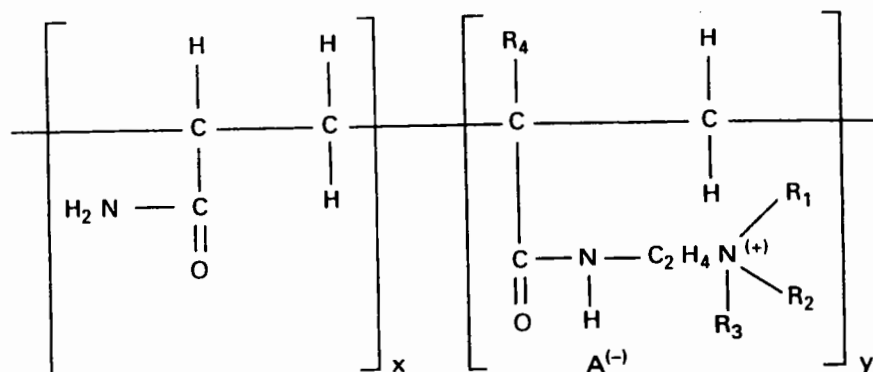
x and y are variable depending on the product.

### 3.1.5 Chemical formulae

Copolymer of acrylamide and amine ester



## Copolymer of acrylamide and amine amide



where :

- R<sub>1</sub> is H or an alkyl group ;
- R<sub>2</sub> and R<sub>3</sub> are alkyl groups ;
- R<sub>4</sub> is H or CH<sub>3</sub> ;
- A is a negative ion ;
- x and y are variable depending on the product.

### 3.1.6 CAS Registry Numbers <sup>1)</sup>

The following is a list of CAS Registry Numbers for typical cationic polyacrylamide polymers.

69418-26-4  
26006-22-4  
35429-19-7  
25568-39-2  
60162-07-4  
51410-72-1  
52285-95-7  
68227-15-6  
55216-72-3  
26796-75-8  
45021-77-0

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### 3.1.7 EINECS reference <sup>2)</sup>

The conformity of polymers to EINECS is assessed on the basis of the monomers of which they are composed. Thus, EINECS reference numbers do not exist for polymers.

<sup>1)</sup> Chemical Abstracts Service Registry Number.

<sup>2)</sup> European Inventory of Existing Commercial Chemical Substances.



### 3.2 Commercial form

Cationic polyacrylamide as specified in this standard is available as a solid containing a small amount of residual moisture.

### 3.3 Physical properties

#### 3.3.1 Appearance

The product is a white or off-white solid in the form of granule, flake or powder.

#### 3.3.2 Density

The bulk density of the product is typically in the range 0,5 g/cm<sup>3</sup> to 0,8 g/cm<sup>3</sup>.

#### 3.3.3 Solubility

The product is soluble in cold water. Its solubility is limited only by viscosity, with a gel being formed at concentrations of approximately 20 g/l and above.

#### 3.3.4 Vapour pressure

Not applicable.

#### 3.3.5 Boiling point at 100 kPa

Not applicable.

#### 3.3.6 Melting point

The product decomposes at approximately 200 °C.

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#### 3.3.7 Specific heat

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Not applicable.

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#### 3.3.8 Viscosity, dynamic

Not applicable.

#### 3.3.9 Critical temperature

Not applicable.

### 3.3.10 Critical pressure

Not applicable.

### 3.3.11 Physical hardness

Not applicable.

## 3.4 Chemical properties

Cationic polyacrylamide is a non hazardous material and not intrinsically reactive. However, in common with many other organic compounds, a strong exothermic reaction will occur if it is brought into contact in the dry state with a strong acid or oxidizing agent.

NOTE : In dilute solution, there can be a reaction with, or destruction by, some of the disinfection and oxidizing agents used in water treatment.

## 4 Purity criteria

Limits have been given for impurities and toxic substances where these are likely to be present in significant quantities from the current production process and raw materials. If a change in the production process or raw materials leads to significant quantities of other impurities or by-products being present, this shall be notified to the user.

### 4.1 Composition of commercial product

The following requirement shall apply to cationic polyacrylamide.

The cationic polyacrylamide shall be free of any visible extraneous matter.

NOTE : Various parameters can be checked as part of assessment of product quality (see 5.2.2).

### 4.2 Impurities and main by-products

The product shall contain no more than 250 mg of acrylamide monomer per kilogram of product (as derived from a reference dose of 0,4 mg/l).

Based on the raw materials and manufacturing process (see A.1), there are no significant concentrations of additional reactants or by-products which are relevant to the application of these products in drinking water treatment.

### 4.3 Toxic substances

NOTE : For the purpose of this standard, "toxic substances" are those defined in the EU Directive 80/778/EEC of 15 July 1980 (see B.1).

Toxic substances as defined above are not relevant at a reference dose of 0,4 mg/l.

## 5 Test methods

### 5.1 Sampling

Sampling shall be in accordance with ISO 8213 and the recommendations given in ISO 3165 and ISO 6206 shall be followed.

A representative sample of the solid product, of sufficient mass, shall be obtained immediately after manufacture or from a newly opened package(s). The sample shall be clearly labelled with product name/code, batch number, type of container(s) sampled and date sampled. Reference samples shall be retained for the storage life of the product as claimed by the manufacturer/supplier.

### 5.2 Analyses

#### 5.2.1 General

Unless otherwise specified, all reagents shall be of recognized analytical grade. The water used shall conform to grade 2 specified in EN ISO 3696.

#### 5.2.2 Main product

If additional requirements are agreed between the customer and the manufacturer/supplier, the latter shall provide the necessary test methods, if requested, so that the customer can carry out his own quality checks.

A certificate of analysis shall be provided by the manufacturer/supplier, if requested.

NOTE : A number of physical/chemical measurements can be used by manufacturers to ensure the consistent quality of products delivered to customers. For example, solution viscosity is commonly measured, this being done under strictly controlled conditions. The viscosity value obtained provides a reliable indication of relative molecular mass when comparing batches of a particular product, but has no significance in absolute terms, since it is highly dependent on the composition of the product, the solution preparation procedure, the measuring device and test conditions used. Other tests which can be carried out include determination of ionic charge, solubility, particle size and infra-red spectroscopic analysis, depending on the product and manufacturer/supplier.

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#### 5.2.3 Impurity : residual acrylamide monomer content

##### 5.2.3.1 Principle

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Acrylamide monomer is extracted from the cationic polyacrylamide sample into a mixture of water and acetone which softens the polymer but does not dissolve it. The extract is analysed by high-performance liquid chromatography (HPLC) using ultraviolet detection. Identification is made by comparison with an external standard and concentration determined by peak area measurements and ratio.