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**Phenols (phenol, o-cresol, cresols
and xlenols)**

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by the Japan Aromatic Industry Association (JAIA)/Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently **JIS K 2437**:2006 is replaced with this Standard.

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Phenols (phenol, *o*-cresol, cresols and xlenols)

Introduction

This Japanese Industrial Standard was supplemented and revised in March 2006; however, the technical contents were not reviewed. The revision of this time shall be for the purpose of avoiding the overlap of standards and the like by abolishing the measuring techniques which have not been used due to the progress of measuring techniques after the revision in 1994 and the test items not described in quality items and also by quoting as many Japanese Industrial Standards as possible related to the general-purpose test methods common to chemical products for overall testing methods.

The corresponding International Standard has not been established at this time.

1 Scope

This Standard specifies the phenol, *o*-cresol, cresols and xlenols used for the industrial material and the like.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS B 7525 *Density hydrometers*

JIS K 0050 *General rules for chemical analysis*

JIS K 0061 *Test methods for density and relative density of chemical products*

JIS K 0067 *Test methods for loss and residue of chemical products*

JIS K 0068 *Test methods for water content of chemical products*

JIS K 0114 *General rules for gas chromatographic analysis*

JIS K 0557 *Water used for industrial water and wastewater analysis*

JIS K 2249 *Crude petroleum and petroleum products—Determination of density and petroleum measurement tables based on a reference temperature (15 °C)*

JIS K 2436 *Naphthalene for industrial use*

JIS K 8034 *Acetone (Reagent)*

JIS K 8101 *Ethanol (99.5) (Reagent)*

JIS K 8125 *Calcium chloride (for U-tube) (Reagent)*

JIS K 8155 *Barium chlorine dihydrate (Reagent)*

JIS K 8295 *Glycerol (Reagent)*

JIS K 8322 *Chloroform (Reagent)*

JIS K 8374 *Lead (II) acetate trihydrate (Reagent)*

JIS K 8576 *Sodium hydroxide (Reagent)*

JIS K 8951 *Sulfuric acid (Reagent)*

JIS P 3801 *Filter paper (for chemical analysis)*

JIS Z 8401 *Guide to the rounding of numbers*

3 Terms and definitions

For the purposes of this Standard, the definitions given in **JIS K 0050** and the following definitions apply.

3.1 cresols

the mixture composed of *o*-cresol, *m*-cresol and *p*-cresol as the main components and phenol and xylene as others

3.2 *m*-cresols

the mixture containing not less than 50 % (mass fraction) of *m*-cresol, and containing *p*-cresol and a small amount of *o*-cresol and xylene as other components

3.3 xylenols

the mixture containing each isomer of xylene as the main component and a small amount of ethyl phenols and cresol

4 Classification

The classification shall be as follows.

a) Phenol

- 1) Phenol special grade and phenol Grade 1

b) Cresol and cresols

- 1) *o*-cresol
- 2) *m*-cresols Grade 1
- 3) cresols Grade 1

c) Xylenols

5 Quality

The quality shall be divided by classification and shall conform to table 1 when tested in accordance with clause 6.

Table 1 Classification, grade and quality

Item	Classification						
	Phenol		o-cresol	m-cresols Grade 1	Cresols Grade 1	Xylenols	
	Special grade	Grade 1					
Density (20 °C) (g/cm ³)	—		—	1.031 to 1.041	1.026 to 1.056	1.01 to 1.04	
Moisture % (mass fraction)	—		—	1 max.	1 max.	1 max.	
Freezing point °C	40.5 min.	40.0 min.	30.0 min.	—	—	—	
Phenol % (mass fraction)	99.3 min.	99.0 min.	—	1 max.	—	1 max.	
o-cresol % (mass fraction)	—	—	99.0 min.	—	—	—	
m-cresol % (mass fraction)	—	—	—	50 min.	—	—	
Cresols ^{a)} % (mass fraction)	—	—	—	—	40 min.	—	
Xylenols ^{b)} % (mass fraction)	—	—	—	—		60 min.	
Trimethyl phenols ^{c)} % (mass fraction)	—	—	—	5 max.	5 max.	10 max.	
Neutral oil test	Turbidity No. 2 max.		Turbidity No. 2 max.	Turbidity No. 6 max.	Turbidity No. 10 max.	Turbidity No. 10 max.	
Hydrogen sulfide test	—		—	It shall not be darker as compared with the colour of lead acetate test paper tested by blank test.	It shall not be darker as compared with the colour of lead acetate test paper tested by blank test.	It shall not be darker as compared with the colour of lead acetate test paper tested by blank test.	
Colour	It shall be subjected to the agreement between the parties concerned with delivery.		It shall be subjected to the agreement between the parties concerned with delivery.	It shall be subjected to the agreement between the parties concerned with delivery.	It shall be subjected to the agreement between the parties concerned with delivery.	It shall be subjected to the agreement between the parties concerned with delivery.	
Notes ^{a)} All isomers of C ₇ H ₈ O are included.							
^{b)} All isomers of C ₈ H ₁₀ O are included.							
^{c)} All isomers of C ₉ H ₁₂ O are included.							

6 Test method

6.1 General matters

General matters common to test shall be in accordance with **JIS K 0050**.

6.2 Sampling and preparation of sample

6.2.1 Sampling

The sampling shall be carried out in accordance with Annex A of **JIS K 2436** and this shall be taken as the representative sample. In the case of taking from a storage tank and the like, when the contents have sufficiently become uniform, the sample taken once from any one of taps may be taken as the representative sample.

6.2.2 Preparation of sample

Use approximately 1 L of representative sample, which is sufficiently mixed up without dehydration, for the test.

Fuse the frozen sample by using warm water beforehand.

6.2.3 Preparation of dehydrated sample

Take approximately 300 ml of sample in a 500-ml interchangeable ground Erlenmeyer flask, heat it approximately to 50 °C, add approximately 100 g of calcium chloride specified in **JIS K 8125** and stopper it.

Next, agitate it sufficiently for 5 min or longer by keeping it approximately at 50 °C, then stand it still for 30 min, furthermore repeat twice the same operation, then take the supernatant solution and take it as the dehydrated sample.

6.3 Density

The measurement of density of *m*-cresol, cresols and xylenols shall be in accordance with any one of the following methods. General matters related to this measurement shall be in accordance with clause 3 of **JIS K 0061**.

- a) **Hydrometer method** The measurement by hydrometer method shall be in accordance with 7.1 of **JIS K 0061**.

For the hydrometer, No. 9 (1.000 to 1.050) or No. 10 (1.050 to 1.100) of I shape-A (15 °C density-scale) specified in **JIS K 2249**, or No. 6 (1.000 to 1.060) or No. 7 (1.060 to 1.120) of a large-size 19-piece set (15 °C/4 °C specific gravity-scale) specified in **JIS B 7525** shall be used¹⁾.

Note ¹⁾ The sample may be measured at 10 °C to 20 °C, provided that it shall be corrected according to the formula (1).

$$D = D_t + 0.000\,73(t - 15) \dots\dots\dots (1)$$

where,

D : the density (20 °C) (g/cm³)

D_t : the density at measured temperature (g/cm³)

t : the measured temperature (°C)

0.000 73 : the specific gravity-temperature correction factor (1/°C)²⁾

The density at 20 °C, when No. 6 (1.000 to 1.060) or No. 7 (1.060 to 1.120) of a large size 19-piece set (15 °C/4 °C specific gravity-scale) specified in **JIS B 7525** is used, shall be calculated according to the formula (2).

$$D = (d - 5 \times 0.000\,73) \times 0.999\,97 \dots\dots\dots (2)$$

where, D : the density (20 °C) (g/cm³)
 d : the specific gravity (15 °C/4 °C)
 0.000 73 : the specific gravity–temperature correction factor (1/°C)²⁾
 0.999 97 : the density of water at 4 °C (g/cm³)

Note ²⁾ The temperature correction of hydrometer itself is not included in the value of 0.000 73.

The temperature corrected value of hydrometer is given by $0.000\,025 \times 4 \times (15 - t)$; however, this corrected value is considerably small, therefore it is allowed to be neglected.

- b) **Pycnometer method** The measurement by pycnometer method shall be in accordance with **7.2** of **JIS K 0061**. The conversion from specific gravity to density shall be according to the formula (2).
- c) **Vibration type density meter method** The measurement by vibration type density meter method shall be in accordance with **7.3** of **JIS K 0061**.

6.4 Moisture

The measurement of moisture shall be in accordance with clause **6** of **JIS K 0068**. When measuring the moisture of not less than 0.5 % (mass traction), it is allowed to use the method of clause **8** of **JIS K 0068**.

6.5 Freezing point

6.5.1 Summary

The sample is taken in a test tube, cooled gradually on the water bath kept at a definite temperature to obtain the freezing point of preliminary test, then the operation is similarly carried out on the water bath of lower temperature than the freezing point of preliminary test and the freezing point shall obtained for the regular test.

6.5.2 Apparatus and implements

The apparatus and implements shall be as follows.

6.5.2.1 Freezing point measuring apparatus The apparatus assembled as figure 1 or figure 2 by using the following implements.

6.5.2.2 Test tube The shape and dimensions shall be in accordance with figure 1 for phenol and be in accordance with figure 2 for *o*-cresol.

6.5.2.3 Thermometer A thermometer of enclosed scale with immersion line with the indicator surface of a milk-white plate and in accordance with table 2.