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Acetic acid

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Acetic acid



1 Scope This Japanese Industrial Standard specifies acetic acid for industrial use.

NOTES 1 The acetic acid specified in this Standard is also called glacial acetic acid.

2 The normative references of this Standard are as shown in attached table 1.

2 Quality The quality, when tested in accordance with clause 3, shall satisfy the requirements in table 1.

Table 1 Quality

Item	Quality
Appearance	It shall be a transparent liquid free from foreign matters such as suspended matters or dusts.
Colour (Hazen colour index number)	10 max.
Density (20 °C) g/cm ³	1.049 to 1.056
Purity % mass fraction	99.5 min.
Moisture content % mass fraction	0.5 max.
Evaporation residue % mass fraction	0.005 max.
Potassium permanganate test	The standard red colour shall be maintained for at least 30 min.
Formic acid % mass fraction	0.10 max.
Formaldehyde % mass fraction	0.003 max.
Heavy metal % mass fraction	0.001 max.
Sulfate % mass fraction	0.001 max.
Chloride % mass fraction	0.000 2 max.
Iron % mass fraction	0.000 2 max.

3 Test methods

3.1 General matters The general matters of the test shall be in accordance with JIS K 0050.

3.2 Rounding of numerical values It shall be in accordance with JIS Z 8401.

3.3 Sampling method The representative sample shall be taken from one lot regarded to be uniform in quality, according to the method for the relevant type of container specified in the following.

Moreover, the setting up of lot, and the time and place for sampling may be determined in accordance with the agreement between the parties concerned with delivery.

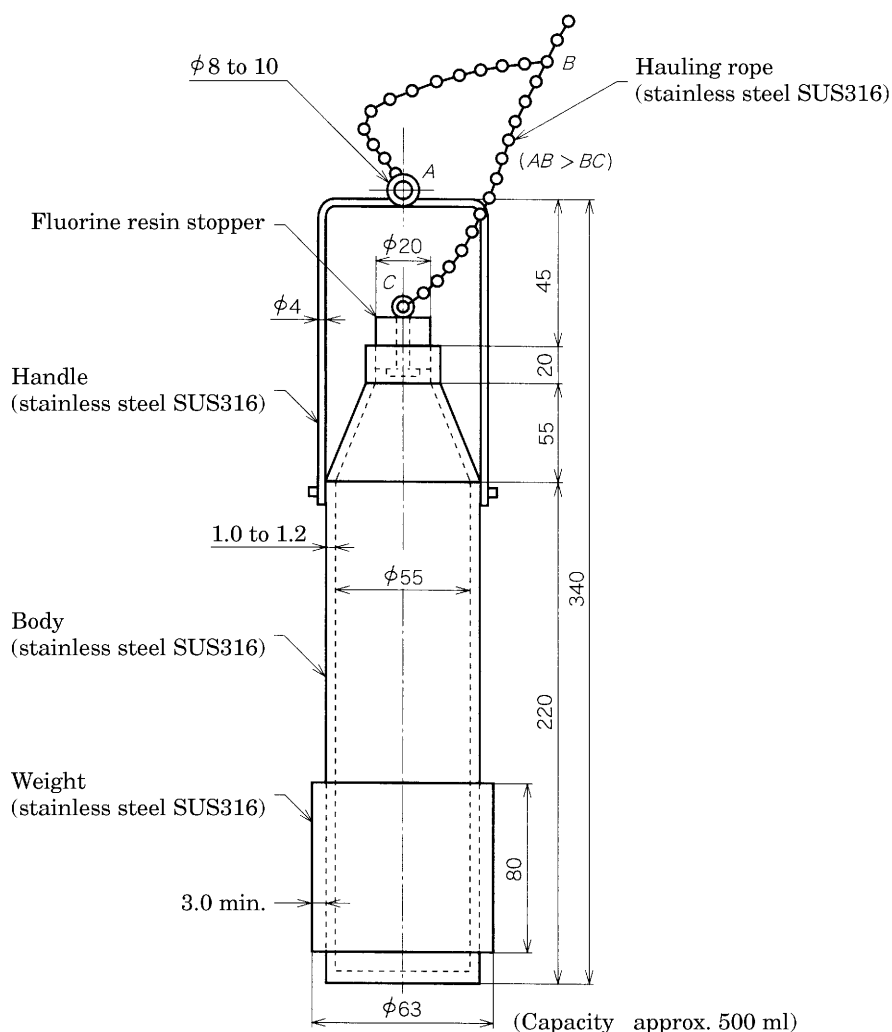
3.3.1 Large-sized containers (tank, tank car, tanker lorry, tanker, etc.)

- (1) **Summary** The contents in container are taken from the specified place by using a large-sized liquid sampler, and transferred into an appropriate sample container in the specified rate and mixed well to be used as the representative sample.
- (2) **Implement**

Large-sized liquid sampler It shall be the large-sized liquid sampler with a stopper made of hot rolled stainless steel (SUS316) specified in **JIS G 4304**, which can be sunk down to the described depth to be filled with the sample by opening the stopper, and then can be taken out as it is. An example is shown in figure 1.

Figure 1 Example of large-sized liquid sampler

Unit: mm



(3) **Operation** The operation shall be as follows.

- (a) **Sampling position** The equal quantity of sample shall be taken from the position corresponding to $\frac{5}{6}$, $\frac{1}{2}$ and $\frac{1}{6}$ of the height of the liquid surface in the case of an upright and cylindrical tank with a uniform section and according to table 2 in the case of a horizontal and cylindrical tank.

When it can be confirmed that the quality of the product is stable, other reasonable sampling method may be used.

Table 2 Sampling position of horizontal and cylindrical tank and mixing ratio

Depth of contents in the container (% to diameter)	Sampling position (Height from container bottom) (% to diameter)			Sample mixing ratio (volume ratio)		
	Upper layer	Middle layer	Lower layer	Upper layer	Middle layer	Lower layer
90	75	50	20	3	4	3
80	70	50	20	2	5	3
70	—	50	20	—	6	4
60	—	50	20	—	5	5
50	—	40	20	—	4	6
40	—	—	20	—	—	10
30	—	—	15	—	—	10
20	—	—	10	—	—	10
10	—	—	5	—	—	10

- (b) **Sampling method** Open the opening of a large-sized container and sink a clean and dry large-sized liquid sampler, as stoppered, down to the specified position.

Pull up the hauling rope at a stretch and unstopper the sampler. Hold the sampler at this position until no bubbles come up to the liquid surface so that the sampler is filled with the sample. Pull up the sampler and transfer the sample into a clean and dry brown glass bottle with grounding stopper and stopper it immediately.

- (c) **Preparation of sample for test** In the case of the upright and cylindrical tank, transfer equal amounts of the samples taken at three positions, and in the case of a horizontal and cylindrical tank, the samples taken according to the mixing ratio specified in table 2 shall be transferred into a clean and dry sample container. Mix well and use 1 L min. of it for a test sample solution.

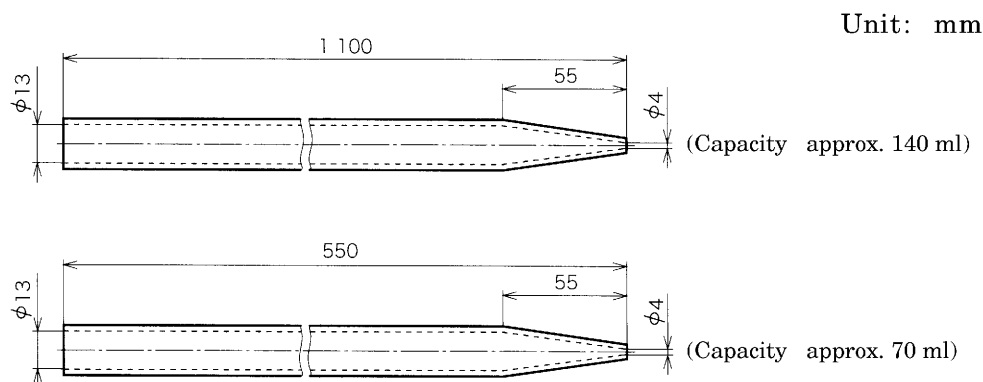
Moreover, when the test is not carried out immediately after the sampling, store the sample in a clean and dry brown glass bottle with a grounding stopper.

3.3.2 In the case of small-sized container (20 L polyethylene can, stainless steel drum, etc.)

- (1) **Summary** An equal quantity of sample is taken from several small-sized containers by using a small-sized liquid sampler and transferred together into an appropriate sample container. After sufficient mixing, not less than 1 L of it is used for the test.
- (2) **Implement**

Small sized liquid sampler It shall be a glass tube, which is capable of being inserted into a small sized container with its mouth open, and after letting the sample flow into it, being taken out with its mouth stoppered. An example is shown in figure 2.

Figure 2 Example of small-sized liquid sampler



- (3) **Operation** The operation shall be as follows.
 - (a) **Sampling number of small-sized containers** In the case of sampling several small-sized containers from one lot, sample at random the number of pieces as shown in table 3.

If it can be confirmed that the quality of product is stable, the number of containers sampled may be altered.

Table 3 Number of small containers to be sampled

Number of small-sized containers	Sampling number	Number of small-sized containers	Sampling number
1 to 4	All	76 to 100	10
5 to 10	5	101 to 125	11
11 to 20	6	126 to 150	12
21 to 30	7	151 to 200	13
31 to 50	8	201 to 250	14
51 to 75	9	251 min.	14 + $\alpha^{(1)}$

Note ⁽¹⁾ α is calculated according to the following formula and the figures below the decimal point are raised to be an integer.

$$\alpha = \frac{n - 250}{50}$$

where, n : number of small-sized containers

- (b) **Sampling method** Open the mouth of the small-sized container and put a clean and dry small-sized liquid sampler in the small-sized container with its mouth open until its tip reaches the bottom. Pull out the sampler after closing its mouth.
- (c) **Preparation of the test sample** Transfer the equal quantity of each sample into a clean and dry suitable sample container and mix it well. Take not less than 1 L of this solution as the sample for test.

When the test is not carried out immediately after the preparation of sample, the sample shall be stored in a clean and dry brown glass bottle with a grounding stopper which is hermetically sealed.

3.4 Appearance

- (1) **Summary** The appearance of sample is visually examined.
- (2) **Implement**

Colorimetric tube The colourless transparent flat-bottomed glass tube with grounding stopper, of approximately 23 mm inside diameter and approximately 400 mm height, on which the marked line of 100 ml is given at the height of 200 mm to 300 mm from the bottom.

- (3) **Operation** Pour the sample into a colorimetric tube in liquid state up to the marked line. See through it against white and black backgrounds from the upper and the side directions to examine the transparency and to check for the presence of foreign matters such as suspended matters or dusts.

3.5 Colour The colour is measured by the visual colorimetric method and the colorimetric method using such as spectrophotometer or photoelectric colorimeter, and Hazen colour index number is obtained.

3.5.1 Visual colorimetric method

- (1) **Summary** Hazen colour index number is obtained by comparing visually the transmitted colour of sample with Hazen standard colorimetric solution.
- (2) **Apparatus and implement** The apparatus and implement shall be as follows.
 - (a) **Colorimetric apparatus** It consists of a supporting stand for standing two colorimetric tubes, a white and flat bottom plate, a black screen shutting off the scattered light from side surface and a reflecting mirror introducing rays through the bottom plate and is capable of comparing the colour of two tubes by seeing through from the upper direction of colorimetric tube under the scattering daylight specified in **JIS C 7601**.
 - (b) **Colorimetric tube** The same one in quality and shape as that specified in **3.4 (2)**.
- (3) **Reagent** The reagents shall be as follows.
 - (a) **Standard colorimetric stock solution** Dissolve 1.245 g of potassium hexachloroplatinate (IV) specified in **JIS K 8163** and 1.000 g of cobalt (II)

chloride hexahydrate specified in **JIS K 8129** in 100 ml of hydrochloric acid specified in **JIS K 8180** so that the resultant solution contains 0.500 g of platinum and 0.250 g of cobalt, respectively. Add water to make up to 1 000 ml.

Measure the absorbance of this solution at respective wavelengths in table 4 by taking water as the reference solution using a 10 mm absorption cell in spectrophotometer. As a result, those confirmed to be within the respective absorbance ranges in the right column shall be the standard colorimetric stock solutions, taken as Hazen No. 500.

Table 4 Tolerance of absorbance for standard colorimetric stock solution

Wavelength nm	Absorbance
430	0.110 to 0.120
455	0.130 to 0.145
480	0.105 to 0.120
510	0.055 to 0.065

- (b) **Hazen standard colorimetric solution** The preparation methods for various Hazen standard colorimetric solution shall be in accordance with table 5.

Table 5 Hazen standard colorimetric solution

Number of standard colorimetric solution	Colorimetric stock solution ml	Water ml
5	1	99
10	2	98
15	3	97
20	4	96
25	5	95
30	6	94

The standard colorimetric stock solution and the standard colorimetric solution shall be stored in a hermetic coloured glass bottle. The preservation period shall be in principle within one year for standard colorimetric stock solutions of Hazen No. 500 and within one month for standard colorimetric solutions of Hazen No. 500 or less after preparation.

- (4) **Operation** Pour the sample in the colorimetric tube up to the 100 ml marked line. Pour the Hazen standard colorimetric solution in other colorimetric tube up to the 100 ml marked line. Stand both tubes next to each other in a colorimetric apparatus, and compare the colours of the solutions by seeing through both tubes from above and obtain the Hazen colour index number.

When it is in the middle, adopt the number of the darker one of the two.

3.5.2 Colorimetric method by spectrophotometer or photoelectric colorimeter

- (1) **Summary** The transmitted colours of the sample and Hazen standard colorimetric solution are compared by spectrophotometer or photoelectric colorimeter, and Hazen colour index number is obtained.
- (2) **Apparatus** The spectrophotometer or photoelectric colorimeter specified in clause 5 or 6 of JIS Z 8722 shall be used.
- (3) **Operation** It shall be in accordance with 5.4 or 6.3 of JIS Z 8722.
 - (a) Measure the yellowing factor (ΔYI) of Hazen standard colorimetric solution by spectrophotometer or photoelectric colorimeter, and prepare the working curve beforehand.
 - (b) Read out the Hazen colour index number from the yellowing factor (ΔYI) of sample measured by spectrophotometer or photoelectric colorimeter by using the working curve.

3.6 Density The density shall be obtained by vibrating type densimeter method or hydrometer method.

3.6.1 Vibrating type densimeter method

- (1) **Summary** The density is obtained according to 7.3 of JIS K 0061.
- (2) **Apparatus**
Vibrating type densimeter It shall be in accordance with 7.3.2 of JIS K 0061.
- (3) **Operation** It shall be carried out according to 7.3 of JIS K 0061.
- (4) **Calculation** The density shall be calculated according to the following formula.

$$D = D_{w2} + K_t(T_{st}^2 - T_{wt}^2)$$

where, D : density of sample (20 °C) (g/cm³)
 D_{w2} : density of water (20 °C) (0.998 20 g/cm³)
 K_t : cell constant of sample (20 °C)
 T_{st} : oscillation period of sample (20 °C)
 T_{wt} : oscillation period of water (20 °C)

Moreover, when specific gravity is obtained from density, it shall be obtained by converting according to the following two formulas.

$$G_1 = \frac{D}{D_{w1}}$$

$$G_2 = G_1 \times \frac{D_{w1}}{D_{w2}}$$

where, G_1 : specific gravity of sample (20/4 °C)