

JIS

JAPANESE INDUSTRIAL STANDARD

**Test methods for optical
rotation of chemical products**

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Test methods for optical rotation of chemical products K 0063-1992

1. Scope

This Japanese Industrial Standard specifies general methods to measure the optical rotation of chemical products under the condition of solution or liquid.

- Remarks 1. The chemical products mentioned here means all products prepared through chemical reaction, however, when measuring methods other than these methods are prescribed in the standards for other individual product or group of products, the test should conform to the method in the standard.
2. In some chemical products, the safety for the tests can not always be secured when the tests are carried out because of its volatility, explosiveness, or radioactivity. The methods prescribed in this standard are generally applicable, and should be applied to the products of which safety is satisfactorily confirmed.
3. The testing methods mentioned in this standard are carried out by projecting light, accordingly the substance which is unstable to light shall be excluded from this application.
4. In this standard, optical rotation of chemical products is generally measured at 20°C, and expressed as specific rotation.
5. The standards applicable to this standard are shown in Attached Table 1.

2. General matters

2.1 Definition of terms The main terms used in this standard shall be defined as follows except those defined in JIS K 0211, JIS K 0212, and JIS Z 8120.

- (1) linearly polarized light This is the light wave where its vibrating direction of electric vector is contained in the same plane.
- (2) optical rotation This is the phenomenon where the plane of polarization is rotated while linearly polarized light is passing through the medium.
- (3) angle of rotation This is the degree by which optical active material rotates the plane of polarization, and the degree is expressed by angle (α).

When an observer faces to the light source, the case which rotates the polarized plane clockwise is called dextro-rotatory and is expressed with (+); and the case counterclockwise is called levo-rotatory and with (-). The angle of rotation is expressed similarly to this method. The unit of (°) (degree) is used.

- (4) specific rotation This is the angle of rotation converted to the value at 100 mm in the layer length of sample and 100 % in concentration. Because the angle rotated by substance varies depending on the length of sample (travelling distance of light in the sample) and to the temperature and concentration of the sample, specific rotation, which is the value given under specified length of layer and concentration, is defined, and this value is used to express the optical activity of a chemical product.

Specific rotation is expressed as $[\alpha]_t^\lambda = + \text{ (or -) } xx.xxx$ with attaching measuring temperature (t) and measuring wavelength (λ). Generally, light source is sodium lamp, and its D line (589.3 nm) is mainly used for measurement. In this case, D is appended instead of wavelength. The unit of $^{\circ} \cdot \text{cm}^2 \cdot \text{dag}^{-1}$ is used.

- (5) mutarotation The phenomenon where optical active substance varies its specific rotation.

2.2 Matters in common The matters in common to the tests shall be as follows.

2.2.1 Measuring environment and condition of measuring temperature

- (1) Measuring environment Measuring environment shall be $20 \pm 5^{\circ}\text{C}$ in temperature and 80 % or less in humidity.
- (2) Measuring temperature $20 \pm 2^{\circ}\text{C}^{(1)}$

Note ⁽¹⁾ When measuring temperature and the range of temperature is specified, that condition shall be followed. When temperature coefficient is specified, correct the value after measuring in the range of applied temperature.

Remarks: In case of the substance with large temperature coefficient, the measurement in the range of $\pm 0.2^{\circ}\text{C}$ to the specified temperature using a thermostat provides more accurate value of specific rotation.

2.2.2 Sample When a product is solid, dissolve it in a suitable solvent to prepare uniform sample. When a product is liquid, either make it sample as it is, or dissolve it in a suitable solvent to prepare uniform sample. Place this sample in a cell of which the length is known, and carry out the measurement.

2.2.3 Standard substance In order to confirm the accuracy of the equipment, the standard substance, whose purity is certified and whose specific rotation is large, should be used.

Remarks: For instance, sucrose can be used for a standard substance. Preparation method is to dissolve 26 g of sucrose, specified in JIS K 8383, in water to make totally 100 ml.