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Foreword

This Japanese Industrial Standard has been established by the Minister of Economy, Trade and Industry, through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law.

Attention is drawn to the possibility that some parts of this Standard may conflict with patent rights, applications for a patent after opening to the public or utility model rights. The relevant Minister and the Japanese Industrial Standards Committee are not responsible for identifying any of such patent rights, applications for a patent after opening to the public or utility model rights.

Sensitive measurement method of peroxide in plastics by detecting ultra-weak photon emission

1 Scope

This Japanese Industrial Standard specifies the measurement method for detecting ultra-weak photon emission highly sensitively from the peroxide produced by oxidation reaction of plastics in order to evaluate the deterioration degree of a substance due to the oxidation.

The measurement method in this Standard can also be applied to the measurement of the peroxide contained in organic materials other than plastics. The organic materials refer to, for example, food, oil and medicine as well as polymer materials such as rubber and elastomer.

2 Terms and definitions

For the purpose of this Standard, the following terms and definitions apply.

2.1
chemiluminescence (CL)
phenomenon of light emission observed when electrons are excited to at least one-level higher energy level due to the energy produced by chemical reaction and then are deactivated from the energy levels to the ground state

2.2
dark current value
numeric data measured in a state where the detection element is not irradiated with light

2.3
background
numeric data measured in a state where samples are not placed in a sample container

2.4
oxidation induction time (OIT)
time when the emission intensity rapidly increases due to the disturbance of the equilibrium between the generation rate and the disappearance rate of the peroxide produced in plastics

NOTE The oxidation induction time varies according to the type of antioxidant, additive amount, measurement temperature, etc.

3 Measurement principle

The ultra-weak chemiluminescence (CL) generated when the peroxide with two or more oxygen atoms is decomposed by heat is measured with an apparatus using highly sensitive photodetection elements (e.g. photomultiplier and CCD camera). The temporal