NATIONAL STANDARD OF THE

PEOPLE'S REPUBLIC OF CHINA

GB 5009.1-2025

Replacing GB/T 5009.1-2003

National food safety standard - Physical and chemical testing - General principles

食品安全国家标准 理化检验 总则

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1 Scope

This standard lays down the basic principles and requirements for physical and chemical testing under the national food safety standards.

This standard applies to physical and chemical testing under the national food safety standards.

2 Terms and definitions

2.1 Method validation. The experimental activity of providing objective and valid evidence that a particular analytical method meets the stated requirements.

2.2 Reference standard. A substance, or a solution of it, having a defined property or value and possessing homogeneity, stability and traceability.

2.3 Sample. One product, or a group of products, taken from the same batch and able to give information about that batch.

2.4 Test portion. A sample that has been prepared so that it can be used for one or several tests.

2.5 Sample reduction. The operation of reducing a sample by a specified method while keeping it representative.

3 General requirements for physical and chemical testing

3.1.1 Testing staff shall have received the corresponding education or training in physical and chemical testing, shall have the corresponding ability, and shall be able to understand and correctly carry out the test.

3.1.2 They shall have a command of laboratory chemical safety practice and shall observe the relevant safety measures and rules during testing, so that their own safety is assured.

3.1.3 Staff who carry out tests involving the sense of smell shall not have an olfactory impairment, and staff who carry out tests involving colour discrimination shall not have a colour vision impairment.

3.2.1 The working area, the general layout, the facilities and equipment and the environmental controls of the laboratory shall meet the needs of the testing work.

3.2.2 The laboratory area shall be physically separated from the office area, and the sample preparation area should be effectively separated from the instrument area.

3.2.3 The temperature, humidity, ventilation, cleanliness, illumination, noise and vibration of the laboratory shall meet the working requirements and shall not affect the accuracy of the test results.

3.2.4 An emergency shower, an eyewash unit and similar emergency facilities shall be placed in a conspicuous position in the laboratory, and a first-aid kit shall be provided as needed.

3.3.1.1 A suitable method shall be chosen according to the scope of application and the performance characteristics of the test method standard and the relevant provisions.

3.3.1.2 Where two or more test methods with the same scope of application meet the requirements, the laboratory may choose which to use according to the actual situation.

3.3.2.1 Before a test method is used, the laboratory shall validate the method it intends to use against the intended purpose.

3.3.2.2 Where the procedure of the test method is the same for all the sample matrices to which it applies, validation shall be carried out on at least one representative sample matrix; where the test method has optional steps, the steps that are to be used shall be validated.

3.3.2.3 For a qualitative method, the detection limit and the specificity shall in principle be validated.

3.3.2.4 For a quantitative method, the detection limit, the limit of quantification, the trueness and the repeatability shall in principle be validated.

3.3.2.5 The validation of the method performance parameters is carried out with reference to GB 5009.295, GB 31604.59 or similar standards.

3.3.2.6 The performance characteristics of the test method after validation by the laboratory shall not be poorer than those laid down in the test method standard, or shall meet the

requirements of the intended purpose.

3.4.1.1 The water and the reagents used in the test shall meet the requirements of the test method standard. Chemical reagents of different grades shall be chosen according to the test method and the accuracy required of the result. Key reagents that affect the result shall meet the relevant requirements.

3.4.1.2 Where the test method does not state a concentration, sulfuric acid, nitric acid, hydrochloric acid and ammonia solution mean the commercially available reagent grade concentrations (see Annex A).

3.4.1.3 Reagent storage containers are generally reagent bottles of hard glass; strong alkaline solutions and solutions of inorganic elements should be kept in polyethylene reagent bottles, and light-sensitive reagents shall be kept in brown or black reagent bottles.

3.4.1.4 Ways of expressing solution concentration: a) the mixing ratio by mass of several solid reagents, or by volume of liquid reagents, may be written as (1+1), (4+2+1) and so on; b) the concentration of a solution may be expressed as a mass fraction or a volume fraction, for example a mass (or volume) fraction of 0.75 or a mass (or volume) fraction of 75 per cent; mass fraction and volume fraction may also be expressed as micrograms per gram and as millilitres per cubic metre respectively; c) the concentration may also be expressed as a mass concentration, in grams per litre or a suitable submultiple such as milligrams per millilitre; d) where a solution is prepared by diluting another particular solution, the following convention shall be used: 1) diluted V1 to V2 means that a volume V1 of the particular solution is diluted in some way so that the total volume of the final mixture is V2; 2) diluted V1 plus V2 means that a volume V1 of the particular solution is added to a volume V2 of solution.

3.4.2.1 The reference standard chosen shall meet the requirements of the test method standard as to purity or grade. A product with a certificate of reference material should be chosen, the certificate carrying information on metrological traceability, the assigned value and the uncertainty.

3.4.2.2 Where there is no reference standard for the target analyte, a high-purity chemical with clearly stated purity may be used.

3.4.2.3 The preparation and dilution of standard solutions shall be recorded so that traceability is assured; the record shall state the name of the reference standard, its mass or volume, the solvent, the volume made up or the dilution volume, the storage conditions and the expiry date.

3.4.2.4 The expiry date of a standard solution shall be adequately supported and, where necessary, stability testing shall be carried out in accordance with GB 5009.295, GB 31604.59 or similar standards.

3.4.2.5 Intermediate standard solutions and standard working solutions shall be prepared

by stepwise dilution, and a single dilution step should not exceed a factor of 100.

3.4.2.6 As a rule the mass of reference standard to be weighed out shall be calculated from the actual purity.

3.4.3.1 The performance of the test materials shall meet the provisions of the test method standard.

3.4.3.2 Test materials shall be treated and their performance checked as required by the test method standard.

3.5.1 Before instruments and equipment are used it shall be confirmed that their performance parameters meet the technical requirements of the test method standard.

3.5.2 Instruments and equipment shall be kept under suitable environmental conditions and shall be cleaned, maintained and serviced periodically, so that their working performance and safe operation are assured.

3.5.3 Measuring ware, temperature-controlled equipment and detection instruments that affect the accuracy of the result shall all meet the requirements for metrological traceability management.

3.5.4 The accuracy of the volume delivered by the measuring ware used in the test, such as burettes, one-mark pipettes, graduated pipettes, volumetric flasks, micropipettes and colorimetric tubes, shall meet the national standard accuracy requirements for that item of volumetric glassware.

3.5.5 Measuring ware and vessels shall be thoroughly cleaned before use; the preparation and use of the common washing solutions are given in Annex B.

4 Requirements for samples and test portions

4.1.1 Sampling shall follow the principles of representativeness and randomness.

4.1.2 Sampling shall take account of the date of production, the shelf life and the batch number or batch of the product.

4.1.3 The amount sampled shall be enough for testing, for re-testing and for retention.

4.1.4 Sampling equipment shall be of inert material and shall not contaminate the sample or otherwise affect it adversely.

4.1.5 During sampling and transport, adverse effects of ambient temperature, humidity and light on the sample and on the target analyte shall be avoided, for example spoilage, uptake of moisture, loss of water, breakage and cross-contamination.

4.1.6 Where the test method has particular requirements for sampling and transport, those requirements govern.