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Limit of certain harmful elements of coatings for consumer products contacting with human body

与人体接触的消费产品用涂料中特定有害元素限量

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Standardization Administration of the People's Republic of China.

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Limit of certain harmful elements of coatings for consumer products contacting with human body

1 Scope

This Standard specifies contents such as requirements, test methods and inspection rules for limit of certain harmful elements of coatings for consumer products contacting with human body

This Standard applies to various coatings that are used in consumer product contacting with human body.

2 Normative references

The terms in the following documents become the terms of this Standard by reference to this Standard. For dated references, all subsequent amendments (not including errata content) or revisions do not apply to this standard. However, parties to agreements that are based on this Standard are encouraged to study whether the latest versions of these documents can be used. For undated references, the latest edition applies to this Standard.

GB/T 1250, Representation and determination of limit values

GB/T 3186, Paints, varnishes and raw materials for paints and varnishes - Sampling (GB/T 3186-2006, ISO 15528:2000, IDT)

GB/T 6682, Water for analytical laboratory use - Specification and test methods (GB/T 6682-2008, ISO 3696:1987, MOD)

GB/T 9750, Marks for package of coating products

3 Terms and definitions

The following terms and definitions are applicable to this Standard.

3.1 Consumer product

Articles or parts that are used or enjoyed by consumers in or out of fixed or temporary residences, residential areas, schools, hospitals, sports fields, entertainment venues and other occasions.

3.2 Consumer product contacting with human body

[a] Prepare a mixed sample according to the specified construction ratio of the product (the thinner does not need to be added), and prepare a coating film of appropriate thickness. Under the drying conditions that are specified in the product manual, after the coating is completely dried, determine the dry coating. Determine the powder coating directly.

6 Test method

6.1 Sampling

Product sampling shall be carried out in accordance with GB/T 3186.

6.2 Test method

The determination of soluble elements is carried out in accordance with the provisions of Appendix A of this Standard.

The determination of lead content is carried out in accordance with the provisions of Appendix B of this Standard.

7 Inspection rules

7.1 All requirements that are listed in this Standard are type inspection items.

7.1.1 Under normal production conditions, type inspection shall be carried out at least once a year.

7.1.2 Type inspection shall be carried out in any of the following cases:

-- when a new product is initially finalized;

-- when the product is produced off-site;

-- when there are major changes in production formulas, processes, key raw material sources and product construction ratio;

-- when production is resumed after three months of suspension.

7.2 Determination of the test result

7.2.1 The determination of the test results shall be made according to the rounding comparison method in GB/T 1250. When the test result is 0 after rounding, report the result as a valid digit.

7.2.2 When the inspection results of all items meet the requirements of this Standard, the product meets the requirements of this Standard.

Appendix A

(Normative)

Determination of soluble element content

A.1 Principle

Use 0.07 mol/L hydrochloric acid solution to treat the dried coating; use analytical instrument of appropriate detection-limit to quantitatively determine the content of soluble elements in the test solution.

A.2 Reagent

In the analysis test, only use reagents that are confirmed to be analytical reagents; the used water shall meet the requirements of Grade-3 water in GB/T 6682.

A.2.1 Hydrochloric acid: about 37% (mass fraction); the density is about 1.18 g/mL.

A.2.2 Hydrochloric acid solution: 0.07 mol/L.

A.2.3 Hydrochloric acid solution: about 2 mol/L.

A.2.4 Nitric acid solution: 1:1 (volume ratio).

A.2.5 Antimony, arsenic, barium, cadmium, chromium, lead, mercury and selenium standard stock solutions: the concentration is 100 mg/L or 1 000 mg/L.

A.3 Instruments and apparatuses

General laboratory equipment and some of the following equipment.

A.3.1 Analytical instrument of appropriate detection-limit (see A.6): such as atomic absorption spectrometer, inductively coupled plasma atomic emission spectrometer.

A.3.2 Crushing equipment: crusher, scissors, etc.

A.3.3 Stainless steel metal sieve: pore size of 0.5 mm.

A.3.4 Balance: accuracy of 0.1 mg.

A.3.5 Heating and stirring device: the device shall be able to keep constant temperature at (37 ± 2) °C and continuously and automatically stir. The outer

layer of the stirrer shall be PTFE or glass. An oscillating water bath that can keep constant temperature at (37 ± 2) °C can also be used.

A.3.6 Acidity meter: the accuracy is ±0.2 pH unit.

A.3.7 Filter membrane (applicable to aqueous solution): pore size of 0.45 μm.

A.3.8 Volumetric flask: 25 mL, 50 mL, 100 mL, etc.

A.3.9 Pipette: 1 mL, 2 mL, 5 mL, 10 mL, 25 mL, 50 mL, etc.

A.3.10 Series chemical containers: the total volume is 1.6 ~ 5.0 times the volume of the extractant of the hydrochloric acid solution (A.2.2).

A.3.11 Glass plate or polytetrafluoroethylene plate.

All glassware, sample containers, stirrers, glass plates or polytetrafluoroethylene plates must be soaked in nitric acid solution (A.2.4) for 24 hours before use, then washed with water and dried.

A.4 Test steps

A.4.1 Preparation of coating film

Stir the to-be-tested sample evenly. Prepare a mixed sample according to the specified construction ratio of the product (the thinner does not need to be added); stir evenly; then, prepare a coating film of appropriate thickness on the glass plate or polytetrafluoroethylene plate (A.3.11). Under the drying conditions that are specified in the product manual, after the coating film is completely dry (if the self-drying paint is dried, the temperature cannot exceed (60 ± 2) °C), remove the coating film; use the crushing equipment (A.3.2) to crush it at room temperature; use a stainless steel metal sieve (A.3.3) to sieve it before processing.

Note 1: For coating films that cannot be crushed (such as elastic or plastic coating films), use clean scissors (A.3.2) to cut the coating film as much as possible; directly perform sample processing without sieving.

Note 2: For powdered samples, perform sample processing directly.

A.4.2 Sample processing

Perform two parallel tests on the prepared samples.

Use a suitable chemical container (A.3.10); use a suitable pipette (A.3.9) to combine the hydrochloric acid solution (A.2.2) that is equivalent to 50 times the mass of the test sample and of a temperature of (37 ± 2) °C with the test sample. After stirring for 1 min on the stirring device (A.3.5), use an acidity meter (A.3.6)

Appendix B

(Normative)

Determination of lead content

B.1 Principle

For the dried coating film, use a suitable method to remove all organic substances; then, use a suitable analytical instrument to determine the lead content in the test solution.

B.2 Reagent

In the analysis test, only use reagents that are confirmed to be analytical reagents; the used water shall meet the requirements of Grade-3 water in GB/T 6682.

B.2.1 Nitric acid: about 65% (mass fraction); the density is about 1.40 g/mL; nitric acid that has turned yellow shall not be used.

B.2.2 Hydrogen peroxide: about 30% (mass fraction); the density is about 1.10 g/mL.

B.2.3 Magnesium carbonate.

B.2.4 Nitric acid solution: 1:1 (volume ratio).

B.2.5 Nitric acid solution: 2:98 (volume ratio).

B.2.6 Lead standard stock solution: the concentration is 100 mg/L or 1 000 mg/L.

B.3 Instruments and apparatuses

General laboratory equipment and some of the following equipment.

B.3.1 Appropriate analytical instruments: such as flame atomic absorption spectrometer, inductively coupled plasma atomic emission spectrometer.

B.3.2 Crushing equipment: crusher, scissors or other suitable crushing equipment.

B.3.3 Electric heating plate: temperature controllable.

B.3.4 Muffle furnace: the temperature can be controlled at (475 ± 25) °C.

B.3.5 Microwave digestion system.

the fume hood; gradually increase the temperature of the electric heating plate (not exceeding 475 °C) until the sample is digested into a coke mass, and the volatile digestion products have been fully discharged; only leave a dry carbonaceous residue. Then, put the crucible into the muffle furnace (B.3.4) at (475 ± 25) °C; keep it warm until it is completely ashed.

Enough air shall be supplied for oxidation during the ashing; but the material in the crucible is not allowed to burn at any stage.

After the crucible that contains the ash is cooled to room temperature, add 5 mL of nitric acid (B.2.1); then, use a filter membrane (B.3.9) to filter the solution in the crucible, and transfer it to a 50 mL volumetric flask (B.3.10); use water to rinse the crucible and the filter membrane; collect all the obtained solutions in the same volumetric flask; then, use water to dilute to the mark. Do a reagent blank test at the same time.

Note: This method is not applicable to fluorocarbon coatings.

B.4.2.2 Wet acid digestion method

Weigh about 0.1 g ~ 0.3 g (accurate to 0.1 mg) of the crushed sample into a 50 mL beaker (B.3.8); add 7 mL of nitric acid (B.2.1); cover the mouth of the beaker with a watch glass; heat on the electric heating plate (B.3.3) to keep the solution slightly boiling for about 15 minutes; continue to heat until white smoke is produced. Remove the beaker from the electric heating plate; cool it for about 5 minutes; slowly add 1 mL ~ 2 mL of hydrogen peroxide (B.2.2) 3 times. After each addition, wait for the reaction to calm down before adding. Place the beaker on the electric heating plate again and heat until the sample is completely digested. If the sample is not fully digested, remove it and cool it slightly; then, add an appropriate amount of concentrated nitric acid (B.2.1) and hydrogen peroxide (B.2.2) one or two times; continue to heat to complete the digestion of the sample. When the remaining solution is about 1 mL, remove the beaker and cool to room temperature. Use about 10 mL of water to dilute; then, use a filter membrane (B.3.10) to filter the solution and transfer to a 50 mL volumetric flask (B.3.10). Use water to rinse the beaker and the filter membrane; collect all the obtained solutions in the same volumetric flask; then, use water to dilute to the mark. Do a reagent blank test at the same time.

B.4.2.3 Microwave digestion method

Weigh about 0.1 g ~ 0.2 g (accurate to 0.1 mg) of the crushed sample into a microwave digestion tank; respectively add 5 mL of nitric acid (B.2.1) and 2 mL of hydrogen peroxide (B.2.2); then, close the digestion tank. Perform digestion according to the following temperature program: rise to (180 ± 5) °C within about 10 min; maintain the temperature for 30 min; then, cool down. After the digestion tank is cooled to room temperature, open the digestion tank; use a filter

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