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Request in common use of security for student's articles

学生用品的安全通用要求

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Request in common use of security for student's articles

1 Scope

This standard specifies the requirements, test methods, marking of student's articles.

This standard applies to learning articles, which are used by students under the age of 14 (including 14 years old), including watercolor paints, crayons, oil pastels, colored clay, erasers, correction fluids, correction tapes, correction stickers, correction pens, liquid glues, solid glue, paste, watercolor pen, fountain pen, ink ballpoint pen, neutral ink ballpoint pen, water-based ink ballpoint pen, marker pen, whiteboard pen, highlighter, pencil, mechanical pencil, ink, lead core, plotter ruler (straightedge, triangle ruler, scale ruler, protractor, drawing template, excluding T-square), student compasses, schoolwork books, book covers, school bags, pencil bags, stationery scissors, stationery boxes, manual pencil sharpeners, pencil sharpeners, utility knifes, etc.

This standard does not apply to stationery products, which are intended for students over 14 years old AND are used by professionals.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 606 Chemical reagent - General method for the determination of water - Karl Fischer method

GB/T 1033.1 Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method liquid pycnometer method and titration method

GB/T 2793 Test method for nonvolatile content of adhesives

GB 6675.2-2014 Safety of toys - Part 2: Mechanical and physical properties

4.4.2 Decomposable hazardous aromatic amine dyes are prohibited. The content of each hazardous aromatic amine shall not exceed 20 mg/kg. See Appendix A for the list of hazardous aromatic amines.

4.5 Limits of phthalate plasticizers in accessible plastic parts

The total content of three phthalates: dihexyl phthalate (DEHP), dibutyl phthalate (DBP), butyl benzyl phthalate (BBP), in accessible plastic parts, shall not exceed 1000 mg/kg. For a single sample, if the sampling size of a single material is less than 10 mg, it can be exempted.

4.6 The limit of free formic acid in colored clay

The content of free formaldehyde, in the colored clay, shall not exceed 500 mg/kg.

4.7 Brightness (whiteness) of schoolwork books

The brightness (whiteness) of the workbook shall not be greater than 85%.

4.8 Pen sleeve safety

4.8.1 General requirements

The pen sleeve shall meet at least one requirement of 4.8.2 or 4.8.3.

4.8.2 Pen sleeve size

When the pen sleeve enters the ring gauge, which has a diameter of $16^{+0.05}_{0}$ mm AND a thickness of not less than 19 mm, vertically along the axis, under its own weight, the length of the pen sleeve, which does not enter the ring gauge, shall be at least 5 mm.

Note: Pen sleeves, which comply with the requirements of this article, are considered large enough to not pose a risk of inhalation.

4.8.3 Air flow of pen sleeve

When the maximum pressure difference, at room temperature, is 1.33 kPa, the air flow through the pen sleeve shall be at least 8 L/min,

Note 1: When the pen sleeve relies on internal ventilation, a round hole which has a cross-sectional area of about 3.4 mm^2 can meet this requirement, BUT multiple small holes may require a larger total cross-sectional area.

Note 2: Appendix B gives guidelines for pen sleeves relying on external ventilation.

Note 3: Pen sleeves, which comply with the requirements of this article, are considered not to pose a suffocation hazard.

4.9 Edge, tip

4.9.1 The top of stationery scissors and blades shall be arc tops, not sharp points.

4.9.2 For stationery scissors, manual pencil sharpeners, pencil sharpeners, student compasses, plotter rulers, utility knives, etc., if there are functional sharp edges and sharp points, due to indispensable functionality, it shall provide warning instructions. There shall be no other non-functional sharp edges and sharp points.

Note: The writing tip of pencils and similar drawing tools is not considered a dangerous sharp tip.

4.9.3 The accessible edges, corners or parting lines of stationery boxes, etc. shall not have sharp burrs, sharp tips or overflows, OR they shall be protected, so that they cannot be touched.

4.9.4 For the accessible edges of student's articles, including holes and grooves, they shall not have dangerous burrs or beveled edges, OR use them as folded edges, curled edges, or formed of curved edges, OR be protected with permanent protective parts or coatings.

4.9.5 The accessible ends of exposed bolts or threaded rods shall not have exposed sharp edges or burrs, OR their ends shall be covered with smooth nuts, so that sharp edges and burrs cannot be touched.

5 Test method

5.1 Limits of migratable elements

The determination of the content of migratable elements shall be carried out, in accordance with the provisions of GB 6675.4-2014.

5.2 Limits of harmful substances in liquid glue, solid glue, paste

5.2.1 The determination of free formaldehyde content in the adhesive shall be carried out, in accordance with the provisions of GB/T 32606.

5.2.2 The determination of the benzene content in the adhesive is carried out, in accordance with Appendix C.

5.2.3 The determination of toluene and xylene content in the adhesive is carried out, in accordance with Appendix D.

Appendix C

(Normative)

Determination of benzene content in adhesives and correction products - Gas chromatography

C.1 Overview

This Appendix specifies the determination method of benzene content, in adhesives and correction products for students.

C.2 Principle

After the specimen is diluted with an appropriate solvent, use a micro-syringe, to directly inject the diluted specimen solution into the sampling device. Use the carrier gas to bring it into the chromatographic column, where it is separated into the corresponding components. Use the hydrogen flame ionization detector, to detect and record the chromatogram. Use the external standard method, to calculate the benzene content in the specimen solution.

C.3 Reagents

C3.1 Benzene: Chromatographically pure.

C3.2 Ethyl acetate: Analytically pure.

C.4 Instruments

C.4.1 Injector: Micro-syringe.

C.4.2 Chromatograph: Equipped with hydrogen flame ionization detector.

C.4.3 Chromatographic column: Capillary column; the stationary liquid is dimethyl polysiloxane.

Note: Where there are other components that are difficult to separate from the peaks of the tested component, switch to a column, which has a different polarity, to perform the test, under appropriate conditions.

C.4.4 Recording device: Integrator or chromatography workstation.

C.4.5 The measurement conditions are as follows:

- Vaporization chamber's temperature: 200 °C;

- Testing chamber's temperature: 250 °C;

Appendix D

(Normative)

Determination of toluene and xylene content in adhesives - Gas chromatography

D.1 Overview

This Appendix specifies the determination method of toluene and xylene content, in adhesives for students.

D.2 Principle

After the specimen is diluted with an appropriate solvent, directly inject the diluted specimen solution into the sampling device, by the use of a micro syringe. Use the carrier gas to bring it into the chromatographic column, where it is separated into the corresponding components. Use the hydrogen flame ionization detector, to detect and record the chromatogram. Use the external standard method, to calculate the content of toluene and xylene, in the specimen solution.

D.3 Reagents

D.3.1 Toluene: Chromatographically pure.

D.3.2 m-xylene and p-xylene: Chromatographically pure.

D.3.3 o-xylene: Chromatographically pure.

D.3.4 Ethyl acetate: Analytically pure.

D.4 Instruments

D.4.1 Sample injection device: Micro-syringe.

D.4.2 Chromatograph: Equipped with hydrogen flame ionization detector.

D.4.3 Chromatographic column: It shall be able to sufficiently separate the measured compounds. For example: Polydimethylsiloxane capillary column or similar models.

Note: When there are other components, which are difficult to separate from the peaks of the tested component, switch to a column, which has a different polarity, to perform the test under appropriate conditions.

D.4.4 Recording device: Integrator or chromatographic workstation.

D.4.5 The measurement conditions are as follows:

- Vaporization chamber's temperature: 200 °C;
- Testing chamber's temperature: 250 °C;
- Nitrogen: Purity greater than 99.99%;
- Hydrogen: Purity greater than 99.99%;
- Air: Silica gel to remove water;
- Program heating: Initial temperature 35 °C; holding time 25 min; heating rate 8 °C/min; ending temperature 150 °C; holding time 10 mm.

Note: Other measurement conditions, which achieve the separation effect, can be selected.

D.5 Analytical procedures

Weigh 0.5 g ~ 1.0 g (accurate to 0.1 mg) of the specimen. Place it in a 25 mL volumetric flask. Use ethyl acetate to dissolve and dilute it to the mark. Shake it well. Use a micro-syringe, to take 1 μL of injected sample. Measure its peak area. If the peak area of the specimen solution is greater than the peak area of the maximum concentration in Table D.1, use a pipette to accurately pipette V volume of the specimen solution, into a 50 mL volumetric flask. Use ethyl acetate to dilute it to the mark. Shake well before measurement.

D.6 Preparation of standard solution

D.6.1 Preparation of benzene series solution

Toluene, meta-xylene, p-xylene, o-xylene standard solutions: 1.0 mg/mL, 1.0 mg/mL, 1.0 mg/mL.

Respectively, weigh 0.1000 g of toluene, 0.1000 g of m-xylene and p-xylene, 0.1 g of (accurate to 0.1 mg) o-xylene. Place them in a 100 mL volumetric flask. Use ethyl acetate, to dilute it to the mark. Shake well.

D.6.2 Preparation of series of standard solutions

Add the volume of the standard solution (D.6.1), which is listed in Table D.1, into six 25 mL volumetric flasks. Use ethyl acetate to dilute it to the mark. Shake well.

Appendix E

(Normative)

Determination of total volatile organic compounds in adhesives

E.1 Overview

This Appendix is suitable for the determination of total volatile organic compounds in adhesives for students.

E2 Principle

Put an appropriate amount of adhesive, in a blast drying oven, at a constant temperature. Determine the total volatile content of the adhesive, within a specified time. Use Karl Fischer method or gas chromatography, to determine the water content. The total volatile content of the adhesive is deducted by the amount of water in it, to calculate the total volatile organic content in the adhesive.

E.3 Reagents

E.3.1 Unless otherwise specified, only use reagents confirmed to be analytically pure AND distilled water or deionized water or water of equivalent purity in the analysis.

E.3.2 Karl Fischer reagent.

E.4 Instruments

E.4.1 Blast drying oven: The temperature is controlled at 105 °C ± 1 °C.

E.4.2 Karl Fischer titrator.

E.4.3 Gas chromatograph: Equipped with thermal conductivity detector.

E.5 Analytical procedures

E.5.1 Determination of total volatile content

Make determination, according to the method specified in GB/T 2793.

E.5.2 Determination of moisture content in adhesive

E.5.2.1 Karl Fischer method

Make determination, according to the method specified in GB/T 606.

E.5.2.2 Gas chromatography

E.5.2.2.1 Reagents

E.5.2.2.1.1 Distilled water.

E.5.2.2.1.2 Anhydrous N,N-dimethylformamide (DMF), analytically pure.

E.5.2.2.1.3 Anhydrous isopropanol, analytically pure.

E.5.2.2.2 Instruments

E.5.2.2.2.1 Gas chromatograph: Equipped with thermal conductivity detector.

E.5.2.2.2.2 Chromatographic column: The column length is 1 m; the outer diameter is 3.2 mm; the stainless steel column is packed with polymer porous microspheres of 177 μm ~ 250 μm. (For program heating, the initial column temperature is 80 °C; the holding time is 5 min; the heating rate is 30 °C/min; the end temperature is 170 °C; the holding time is 5 min. For the constant temperature, the column temperature is 140 °C. After the isopropanol is completely extracted, adjust the column temperature to 170 °C. Wait for the DMF peak to come out. If the test continues, lower the column temperature to 140 °C.

E.5.2.2.2.3 Recorder.

E.5.2.2.2.4 Micro-syringe.

E.5.2.2.2.5 Glass bottle with stopper: 10 mL,

E.5.2.2.3 Test procedure

E.5.2.2.3.1 Determination of water response factor R

Weigh about 0.2 g of distilled water AND about 0.2 g of isopropanol (accurate to 0.1 mg). Put it in the same glass bottle with a stopper. Add 2 mL of N, N-dimethylformamide. Mix well. Use a micro-syringe to inject 1 μL of standard mixture. Record its chromatogram.

Calculate the water response factor R, according to formula (E.1):

$$R = \frac{m_i A_{H_2O}}{m_{H_2O} A_i} \qquad \cdots\cdots (E.1)$$

Where:

R - Response factor of water;

m_i - The mass of isopropanol, in grams (g);

Appendix F

(Normative)

Air flow test

F.1 Principle

Fully insert the pen sleeve under test into an elastic hose, which has an appropriate diameter. When air flows through the hose, measure the pressure difference in two directions, respectively.

F.2 Equipment

F.2.1 Air source: the frequency is not limited; the air supply is at least 25 L/min, within the pressure range of 4 kPa ~ 50 kPa.

F.2.2 The flow regulator: it can control the flow, which has an accuracy of ± 0.1 L/min.

F.2.3 Flow meter: it is capable of measuring flow in the range of 5 L/min ~ 10 L/min, which has an accuracy of ±0.2 L/min.

F.2.4 Pressure gauge, capable of measuring at least 4.00 kPa pressure, with an accuracy of ± 0.01 kPa.

F.2.5 Connections and hoses: according to Figure F.1, connect the above equipment into a test device.

F.2.6 Flexible hose: measure the widest part of the pen sleeve under test; select the hose, whose inner diameter is 80% ~ 85% of the circumscribed circle diameter of the pen sleeve under test; its wall thickness is (0.75 ± 0.25) mm; the Shore hardness A is (55 ± 10).

Note: A hose, which has a diameter suitable for the pen sleeve, may be difficult to obtain. If necessary, the hose can be manufactured by dip molding technology.

F.3 Procedure

F.3.1 Cut an elastic hose, which has an appropriate length (see F.2.6), so that when the pen sleeve is inserted and connected to the test device, there is a loose space at both ends of the pen sleeve. Coat the inner wall of the hose, with soapy water or other suitable low-viscosity lubricant. The pen sleeve shall be inserted into the middle of the hose; try to keep it parallel to the axis of the hose.

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