

Zinc, arsenic-free See zinc for arsenic analysis.

Zinc chloride ZnCl_2 [K8111, Special class]

(5) Measuring Instruments and Appliances

Balances and weights

- (1) Chemical balances Use balances readable to the extent of 0.1 mg.
- (2) Semimicrobalances Use balances readable to the extent of 0.01 mg.
- (3) Microbalances Use balances readable to the extent of 0.001 mg.
- (4) Weights Use calibrated weights.

Filter paper

Use the filter paper conforming to the following specifications. A filter paper without specification means that for qualitative analysis. Store protected from contamination with gas, etc.

Filter paper for qualitative analysis

Use the filter papers conforming to the specifications for filter papers for qualitative analysis (for chemical analysis) provided in P3801 of the JIS.

Filter papers for quantitative analysis

Use the filter papers conforming to the specifications for filter papers for quantitative analysis (for chemical analysis) provided in P3801 of the JIS.

Gas flowmeters for gas chromatography

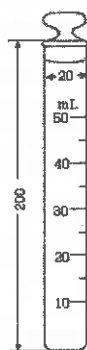
Use the flowmeter provided in K1518 of the JIS.

Micro-syringes for gas chromatography and liquid chromatography

Use commercial micro-syringes for gas chromatography.

Nessler tubes

Use colorless, glass-stoppered cylinders 1.0 to 1.5 mm in thickness, made of hard glass as shown in the figure below. The difference of the height of the graduation line of 50 mL from the bottom among cylinders does not exceed 2 mm.



(The figures are in mm.)

Sieves

Use the sieves provided in Z8801 of the JIS.

Use the sieve number or nominal size (μm) as the designation.

Bulb length (mm)	12-15	12-15	12-15	12-15	12-15	12-15
Distance from bottom of bulb to graduation at the lowest temperature (mm)	75-90	75-90	75-90	75-90	75-90	75-90
Distance from top of thermometer to graduation at the highest temperature (mm)	35-50	35-50	35-50	35-50	35-50	35-50
Distance from bottom of bulb to immersion line(mm)	60	60	60	60	60	60
From of top of thermometer	loop	loop	loop	loop	loop	loop
Maximum scale error at any point	0.2°C	0.2°C	0.2°C	0.2°C	0.2°C	0.2°C

For the No. 1, No. 2 and No. 6 thermometers, the quality of the glass shall be of Jena 16III or higher, and for No. 4, No. 5 and No. 6, Jena 59III or higher.

Thermometers for low pour-point

Use the thermometers provided in B7410 of the JIS.

Thermometers for high pour-point

Use the thermometers provided in B7410 of the JIS.

Volumetric measures for chemical use

Use volumetric flasks, transfer pipets, burettes and measuring cylinders provided in R3505 of the JIS.

<3. Monographs>

Part 1 - Materials

Ionomer Resin

Definition

Ionomer Resin is a copolymer resin, partially cross-linked with sodium hydroxide or zinc oxide, obtained by copolymerizing ethylene and acrylic acid or ethylene and methacrylic acid.

Description

It occurs as translucent powder or granules, and it is practically odorless.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 3440 cm^{-1} , between 3000 cm^{-1} and 2900 cm^{-1} , 1378 cm^{-1} , 1190 cm^{-1} , 1140 cm^{-1} and 720 cm^{-1} .

Specific gravity: 0.93-0.99

Melting point: 80-100°C

Purity

(1) Clarity and color of solution

Dissolve 1 g of this substance in 50 mL of xylene by heating: the solution is colorless and clear.

(2) Heavy metals: Not more than 20 ppm (Method 2)

(3) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 0.1% (5.0 g, Method 1)

Alkyl Acrylate-Vinyl Acetate Copolymer Emulsion (2)

Definition

Alkyl Acrylate-Vinyl Acetate Copolymer Emulsion (2) is a copolymer emulsion mainly consisting of more than one component in alkyl acrylate ($C_1 - C_4$, C_8 and C_{12}) and alkyl methacrylate ($C_1 - C_4$, C_8 and C_{12}), and vinyl acetate.

Description

It is a milky white liquid and it has a faint, characteristic odor.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about between 2940 cm^{-1} and 2900 cm^{-1} , 1730 cm^{-1} (ester), 1450 cm^{-1} , 1240 cm^{-1} , 1020 cm^{-1} and 720 cm^{-1} .

pH: 6.0-8.5

Purity

(1) Heavy metals: Not more than 20 ppm (Method 2)

(2) Arsenic: Not more than 2 ppm (Method 2)

Partial Potassium Salt of Polyacrylic Acid

Definition

Partial Potassium Salt of Polyacrylic Acid is a water-absorbing resin consisting of slightly cross-linked partial

potassium salt of polyacrylic acid as a principal component.

Description

- (1) It occurs as a white powder and it is practically odorless.
- (2) It swells with water but is practically insoluble in water.
- (3) Melting point: Not less than 200°C (with decomposition)

Identification

- (1) To 1.0 g of this substance, add 100 mL of water, stir and allow to stand for 10 minutes: the solution becomes gelatinous.
- (2) To 10 g of the gelatinous substance (1), add 1 mL of calcium chloride TS and shake: a white precipitate is produced.
- (3) To 10 g of the gelatinous substance (1), add 1 mL of magnesium sulfate TS and shake: a white precipitate is produced.
- (4) To 10 g of the gelatinous substance (1), add 1 mL of cobalt chloride solution (1 in 25), add 2 or 3 drops of ammonium chloride TS and shake: a light red precipitate is produced. Dry the precipitate: a purple color develops.
- (5) Ignite this substance to incinerate and perform the test with the residue as directed under Flame Coloration Test: it responds to the Qualitative Test for potassium.

Purity

- (1) Coloring matter

Immerse this substance in ethanol not less than 10 times the mass of this substance, stir for 10 minutes and filter: the filtrate is a colorless clear liquid.

- (2) Acidity or alkalinity

To 1.0 g of this substance, add 500 mL of freshly boiled and cooled water and allow to cool. To 25 mL of this solution, add 3 drops of phenolphthalein TS: no red color develops. Separately, to 25 mL of the solution, add 1 drop of methyl orange TS: a yellow color develops.

- (3) Fluorescence

Irradiate this substance with ultraviolet rays (main wavelength: 365 nm) in a dark place: it shows no marked fluorescence.

- (4) Heavy metals: Not more than 20 ppm (Method 2)

- (5) Acrylic acid

Method 1

To 5.0 g of this substance, add exactly 10 mL of methanol, shake for 4 hours, allow to stand and use the supernatant liquid as the sample solution. Separately, take 0.010 g of the acrylic acid reference standard, dissolve in methanol to make exactly 200 mL and use the solution as the standard solution. Perform the test with 5 µL each of the sample solution and standard solution as directed under Gas Chromatography. Determine the peak heights, H_t and H_s , of acrylic acid of respective solutions: H_t is not higher than H_s .

Method 2

To 1.0 g of this substance, add 250 mL of saline, stir for 2 hours, filter, and use the resultant solution as

the sample solution. Separately, take 0.20 g of acrylic acid reference standard, dissolve in saline to make exactly 100 mL. To 1 mL of the solution, add saline to make exactly 250 mL and use as the standard solution. Perform the test with 20 μ L each of the sample solution and the standard solution as directed under Liquid Chromatography. Determine the peak heights, H_t and H_s , of acrylic acid of respective solutions: H_t is not higher than H_s .

Loss on drying: Not more than 15% (2.0 g, 105°C, 3 hours)

Residue on ignition: Not more than 76% (Method 1)

Absorbency

Take 1.0 g of this substance in a nylon woven fabric (10 cm in width, 20 cm in length, 255 mesh), immerse in 1000 mL of saline for 1 hour, allow to stand for 10 minutes, remove excessive water and determine absorbency: it absorbs not less than 10 times its weight.

Note) Identify acrylic acid according to Method 1 or Method 2.

Partial Sodium Salt of Polyacrylic Acid

Definition

Partial Sodium Salt of Polyacrylic Acid is a water-absorbing resin consisting of slightly cross-linked partial sodium salt of polyacrylic acid as a principal component.

Description

- (1) It occurs as a white powder and it is practically odorless.
- (2) It swells with water but is practically insoluble in water.
- (3) Melting point: Not less than 200°C (with decomposition)

Identification

- (1) To 1.0 g of this substance, add 100 mL of water, stir and allow to stand for 10 minutes: the solution becomes gelatinous.
- (2) To 10 g of the gelatinous substance (1), add 1 mL of calcium chloride TS and shake: a white precipitate is produced.
- (3) To 10 g of the gelatinous substance (1), add 1 mL of magnesium sulfate TS and shake: a white precipitate is produced.
- (4) To 10 g of the gelatinous substance (1), add 1 mL of cobalt chloride solution (1 in 25), add 2 or 3 drops of ammonium chloride TS and shake: a light red precipitate is produced. Dry the precipitate: a purple color develops.
- (5) Ignite this substance to incinerate and perform the test with the residue as directed under the Flame Coloration Test: it responds to the Qualitative Test for sodium.

Purity

- (1) Coloring matter

Immerse this substance in ethanol not less than 10 times the mass of this substance, stir for 10 minutes and filter: the filtrate is a colorless clear liquid.

- (2) Acidity or alkalinity

To 1.0 g of this substance, add 500 mL of freshly boiled and cooled water and allow to cool. To 25 mL of this solution, add 3 drops of phenolphthalein TS: no red color develops. Separately, to 25 mL of the solution, add 1 drop of methyl orange TS: a yellow color develops.

(3) Fluorescence

Irradiate this substance with ultraviolet rays (main wavelength: 365 nm) in a dark place: it shows no marked fluorescence.

(4) Heavy metals: Not more than 20 ppm (Method 2)

(5) Acrylic acid

Method 1

To 5.0 g of this substance, add exactly 10 mL of methanol, shake for 4 hours, allow to stand and use the supernatant liquid as the sample solution. Separately, take 0.010 g of the acrylic acid reference standard, dissolve in methanol to make exactly 200 mL and use the solution as the standard solution. Perform the test with 5 μ L each of the sample solution and standard solution as directed under Gas Chromatography. Determine the peak heights, H_t and H_s , of acrylic acid of respective solutions: H_t is not higher than H_s .

Method 2

To 1.0 g of this substance, add 250 mL of saline, stir for 2 hours, filter, and use the resultant solution as the sample solution. Separately, take 0.20 g of acrylic acid reference standard, dissolve in saline to make exactly 100 mL. To 1 mL of the solution, add saline to make exactly 250 mL and use as the standard solution. Perform the test with 20 μ L each of the sample solution and the standard solution as directed under Liquid Chromatography. Determine the peak heights, H_t and H_s , of acrylic acid of respective solutions: H_t is not higher than H_s .

Loss on drying: Not more than 15% (2.0 g, 105°C, 3 hours)

Residue on ignition: Not more than 76% (Method 1)

Absorbency

Take 1.0 g of this substance in a nylon woven fabric (10 cm in width, 20 cm in length, 255 mesh), immerse in 1000 mL of saline for 1 hour, allow to stand for 10 minutes, remove excessive water and determine absorbency: it absorbs more than 10 times its weight.

Note) Identify acrylic acid according to Method 1 or Method 2.

Acetate Fiber

Definition

Acetate Fiber is a cellulose fiber obtained by partially saponifying acetylated cellulose.

Description

It occurs as colorless to light yellow fibrous substances, and it is odorless.

Identification

- (1) Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 3440 cm^{-1} , 2920 cm^{-1} , 1760 cm^{-1} , 1360 cm^{-1} , 1240 cm^{-1} , 1040 cm^{-1} and 900 cm^{-1} .

- (2) When burned, it softens, shrinks, and burns gradually. Solid and black mass remains, but it can be crushed with a hand easily.

Specific gravity: 1.30-1.32

Melting point: 260°C

Purity

(1) Heavy metals: Not more than 20 ppm (Method 2)

(2) Arsenic: Not more than 2 ppm (Method 2)

Loss on drying: Not more than 8.0% (2.0 g, 105°C, 3 hours)

Residue on ignition: Not more than 2.5% (Method 2)

Alkyl Ketene Dimer Emulsion

Definition

Alkyl Ketene Dimer Emulsion is an emulsion obtained by the emulsification of alkyl ketene dimer.

Description

It is a white liquid, and it is odorless or has a faint, characteristic odor.

Identification

Determine the infrared absorption spectrum of this substance, previously dried at 105°C for 3 hours, as directed in the potassium bromide disk method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about between 3000 cm⁻¹ and 2800 cm⁻¹, 1850 cm⁻¹, 1720 cm⁻¹ and 1470 cm⁻¹.

pH: 3.0-4.5

Purity

(1) Heavy metals: Not more than 10 ppm (Method 2)

(2) Arsenic: Not more than 2 ppm (Method 2)

Alkenyl Succinic Anhydride Solution

Definition

Alkenyl Succinic Anhydride Solution is obtained by the maleinization of alkenyl succinic anhydride and maleic anhydride. It is saponified with potassium hydroxide.

Description

It is a red brown to light red brown liquid, and it has a faint, characteristic odor.

Identification

Determine the infrared absorption spectrum of this substance, previously dried at 105°C for about 2 hours, as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about between 3000 cm⁻¹ and 2800 cm⁻¹, 1570 cm⁻¹, and 1410 cm⁻¹.

pH: 7.0-9.5

Purity

(1) Heavy metals: Not more than 10 ppm (Method 2)

(2) Arsenic: Not more than 2 ppm (Method 2)

Sulfur

Definition

Sulfur, when dried, contains not less than 99.5% of sulfur (S).

Description

It occurs as a light yellow, fine, amorphous or crystalline powder, and it is odorless.

Identification

Ignite this substance: it burns with a blue flame and gives a characteristic odor of sulfur dioxide.

Purity

(1) Acidity or alkalinity

To 2.0 g of this substance, add 10 mL of water, shake and filter: the solution is neutral.

(2) Arsenic

To 0.2 g of this substance, add 10 mL of ammonia TS, stir for 3 hours, filter, evaporate the filtrate on a water bath to dryness, add 1 mL of nitric acid and evaporate the solution to dryness again. To the residue, add 5 mL of water, and perform the test using this solution as the sample solution: not more than 10 ppm.

Loss on drying: Not more than 1.0% (1.0 g, silica gel, 4 hours)

Residue on ignition: Not more than 0.3% (Method 1)

Assay

Weigh accurately about 1 g of this substance, previously dried, add 50 mL of potassium hydroxide-ethanol TS, dissolve by boiling, allow to cool and add water to make 250 mL. To 25 mL of this solution, add 50 mL of hydrogen peroxide TS and heat on a water bath for 1 hour. Acidify with dilute hydrochloric acid, add 200 mL of water and add dropwise hot barium chloride TS while boiling until no more precipitate is produced. Heat the mixture on a water bath for 1 hour, filter the precipitate, and wash thoroughly with water. Ignite the precipitate to constant mass, weigh the residue as barium sulfate (BaSO_4 233.40). Perform a blank determination in the same manner, and make any necessary correction.

$$\text{Amount (mg) of S} = \text{amount (mg) of barium sulfate (BaSO}_4) \times 0.1374$$

Urethane Fiber

Definition

Urethane Fiber is a fiber obtained by the reaction of polytetramethylene ether glycol with diphenylmethane diisocyanate, followed by dilution with dimethylacetamide solvent and polymerization with amine compound.

Description

It occurs as a white elastomer and it is odorless.

Identification

Dissolve this substance in dimethylacetamide (1 in 5), and determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about between 3500 cm^{-1} and 3250 cm^{-1} , between 1750 cm^{-1} and 1690 cm^{-1} , between 1575 cm^{-1} and 1500 cm^{-1} , and 1100 cm^{-1} (ether bond).

Melting point: Not less than 225°C (with decomposition)

Purity

(1) Coloring matter

Immerse 10 g of this substance in 100 mL of ethanol, allow to cool, stir for about 10 minutes and filter. Transfer 50 mL of the filtrate into a Nessler tube and observe downward: the filtrate is colorless and clear.

(2) Acidity or alkalinity

To 1 g of this substance, add 300 mL of freshly boiled and cooled water and allow to cool. To 25 mL of the solution, add 3 drops of phenolphthalein TS: no red color develops. Separately, to 25 mL of the same solution, add 1 drop of methyl orange TS: no red color develops.

(3) Fluorescence

Irradiate this substance with ultraviolet rays (main wavelength: 365 nm) in a dark place: it shows neither marked fluorescence nor fluorescence by contamination.

(4) Residual isocyanate

Weigh accurately 0.3 g of this substance, add 3 mL of methanol, extract at 70°C for 3 hours, and use the extract as the sample solution. Separately, to 0.02 g of diphenylmethane diisocyanate, add methanol to make exactly 100 mL. To 1 mL of this solution, add methanol to make 10 mL, and use this solution as the standard solution. Perform the test with 5 µL each of the sample solution and the standard solution as directed under Liquid Chromatography according to the following conditions: the peak area of the product obtained by the reaction of isocyanate and methanol from the sample solution is not larger than the peak area of the product obtained by the reaction of isocyanate and methanol from the standard solution.

Operating conditions

Detector: An ultraviolet absorption photometer (wavelength: 246 nm)

Column: A stainless steel column, 4.6 mm in inside diameter and 15 cm in length, packed with octadecylsilanized silica gel for liquid chromatography

Mobile phase: To 50 mL of acetonitrile, add 50 mL of water.

Flow rate: 1.0 mL/min (Adjust it so that the retention time of the product obtained by the reaction of isocyanate and methanol is about 5 minutes)

(5) Heavy metals: Not more than 20 ppm (Method 2)

Residue on ignition: Not more than 5% (Method 3)

Urethane Film

Definition

Urethane Film is a film obtained by the extrusion molding of molten polyurethane.

Description

It occurs as a translucent elastomer and it is practically odorless.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared

Spectrophotometry: it exhibits absorption at the wave numbers of about between 3400 cm^{-1} and 3300 cm^{-1} , 1740 cm^{-1} , 1530 cm^{-1} , and between 1170 cm^{-1} and 1070 cm^{-1} .

Purity

(1) Coloring matter

Immerse 10 g of this substance in 100 mL of freshly boiled and cooled water, stir and filter. Transfer 50 mL of the filtrate into a Nessler tube and observe downward: the filtrate is almost colorless.

(2) Acidity or alkalinity

Transfer 25 mL of the filtrate (1) into a test tube 15 mm in inside diameter and add 3 drops of phenolphthalein TS: no red color develops. Separately, to 25 mL of the same solution, add 1 drop of methyl orange TS: no red color develops.

(3) Fluorescence

Irradiate this substance with ultraviolet rays (main wavelength: 365 nm) in a dark place: it shows neither marked fluorescence nor fluorescence by contamination.

(4) Heavy metals: Not more than 20 ppm (Method 2)

Urethane Foam

Definition

Urethane Foam is a soft polyester polyol urethane foam.

Description

It occurs as a white porous elastomer and it is odorless.

Identification

(1) Confirmation of urethane bond

Take about 0.2 g of this substance in a test tube and stopper loosely with absorbent cotton. Decompose this substance by heating the test tube over a low flame, immerse the absorbent cotton in a solution of p-dimethylaminobenzaldehyde in methanol (1 in 100) and acidify with 1 drop of dilute hydrochloric acid: a bright yellow color develops.

(2) Confirmation of ester bond

Take about 0.05 g of this substance in a test tube, add several drops of a solution of potassium hydroxide in methanol (11.2 in 100) and several drops of a saturated solution of hydroxylamine hydrochloride in methanol. Add several drops of phenolphthalein TS and confirm this mixture is alkaline. Heat the mixture on a water bath for 20-40 seconds, allow to cool about 1 minute and acidify with 1 mol/L hydrochloric acid TS. To this solution, add ferric chloride solution (2 in 100): a purple color develops.

pH

To 1.0 g of this substance, add 100 mL of freshly boiled and cooled water, press out and determine the pH as directed under pH Determination: it is between 6.0 and 7.5.

Melting point: 225-240°C (Method 1, with decomposition)

Purity

(1) Heavy metals: Not more than 20 ppm (Method 2)

(2) Unreacted monomer

To 1.0 g of this substance, previously dried, add benzene solution of dibenzylamine (1 in 100,000) to make exactly 100 mL, and heat on a hot bath for 1 hour. After cooling, press to collect the extract.

Immerse the extract in 50 mL of benzene, and press to collect the extract, and repeat this three more times.

Evaporate the extract to dryness under reduced pressure, add 1 mL of methanol, and use this solution as the sample solution. Separately, to 0.020 g of isophorone diisocyanate, add benzene to make exactly 100 mL. To 1 mL of the solution, add benzene solution of dibenzylamine (1 in 100,000) to make exactly 100 mL, and heat on a hot bath for 1 hour. After cooling, evaporate it to dryness under reduced pressure, add 1 mL of methanol, and use this solution as the standard solution. Perform the test with 20 μ L each of the sample solution and standard solution as directed under Liquid Chromatography according to the following conditions. Determine the peak heights, H_t and H_s , of isophorone diisocyanate of respective solutions: H_t is not higher than H_s .

Operating conditions

Detector: An ultraviolet absorption photometer (wavelength: 265 nm)

Column: A stainless steel column, 4.6 mm in inside diameter and 150 mm in length, packed with 6- μ m silica gel chemically bounded with an octadecyl group

Mobile phase: To 85 mL of methanol, add 15 mL of water.

Flow rate: 0.7 mL/min (Adjust the flow rate so that the retention time of the product obtained by the reaction of isophorone diisocyanate and dibenzylamine is about 10 minutes)

Detection sensitivity: Adjust it so that the peak height of isophorone diisocyanate obtained from 20 μ L of the standard solution is 5 to 10 mm.

Residue on ignition: 0.2% (Method 1)

Ester Gum

Definition

Ester Gum is an ester compound of the derivatives of rosin or its polymer.

Description

It occurs as a light yellow to light brown glass mass or clear viscous liquid, and it is odorless or has a faint, characteristic odor.

Identification

- (1) To 0.1 g of this substance, add 10 mL of acetic anhydride, dissolve by heating in a water bath, allow to cool and add 1 drop of sulfuric acid: a purple-red color develops.
- (2) To 1 g of this substance, add 5 mL of sodium hydroxide solution (1 in 25) and 5 mL of water and shake vigorously: a white to light yellow turbidity and a lasting foam is produced.

Purity

- (1) Clarity of solution

Dissolve 10 g of this substance in 10 mL of toluene at 70-75°C, filter while warming and allow the

solution to stand for 24 hours: the solution is clear.

- (2) Acid value: Not more than 18.0 (Method 1)

Weigh accurately about 3 g of this substance, dissolve in 50 mL of a mixture of benzene and ethanol (2:1), and perform the test with this solution as the sample solution.

- (3) Heavy metals: Not more than 40 ppm (0.50 g, Method 2, Standard Lead Solution 2.0 mL)

- (4) Arsenic: Not more than 4 ppm (0.25 g, Method 2)

Residue on ignition: Not more than 0.1% (2.0 g, Method 1)

Ethylene-Ethyl Acrylate Copolymer (EEA)

Definition

Ethylene-Ethyl Acrylate Copolymer (EEA) is an ethylene-ethyl acrylate copolymer resin obtained by copolymerizing of ethylene and ethyl acrylate.

Description

It occurs as translucent powder or granules, and it is practically odorless.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about between 3000 cm^{-1} and 2900 cm^{-1} , 1740 cm^{-1} , 1460 cm^{-1} , 1378 cm^{-1} , 1160 cm^{-1} , 1140 cm^{-1} , 730 cm^{-1} , and 720 cm^{-1} .

Specific gravity: 0.91-0.98

Melting point: 60-100°C

Purity

- (1) Clarity and color of solution

Dissolve 1 g of this substance in 50 mL of xylene by heating: the solution is colorless and clear.

- (2) Heavy metals: Not more than 20 ppm (Method 2)

- (3) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 0.1% (5.0 g, Method 1)

Ethylene-Acrylic Acid Copolymer (EAA)

Definition

Ethylene-Acrylic Acid Copolymer (EAA) is an ethylene-acrylic acid copolymer resin obtained by copolymerizing ethylene and acrylic acid.

Description

It occurs as translucent powder or granules, and it is practically odorless.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 2960 cm^{-1} , 2870 cm^{-1} , 1379 cm^{-1} , 730 cm^{-1} , 722 cm^{-1} and 720 cm^{-1} .

Specific gravity: 0.94-0.98

Melting point: 80-100°C

Purity

(1) Clarity and color of solution

Dissolve 1 g of this substance in 50 mL of xylene by heating: the solution is colorless and clear.

(2) Heavy metals: Not more than 20 ppm (Method 2)

(3) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 0.1% (5.0 g, Method 1)

Ethylene-Octene-1 Copolymer

Definition

Ethylene-Octene-1 Copolymer is an ethylene-octene-1 copolymer resin obtained by copolymerizing ethylene and octene-1.

Description

It occurs as translucent powder or granules, and it is practically odorless.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 2960 cm^{-1} , 2870 cm^{-1} , 1460 cm^{-1} , 1378 cm^{-1} , 899 cm^{-1} , 730 cm^{-1} and 720 cm^{-1} .

Specific gravity: 0.85-0.94

Melting point: 115-130°C

Purity

(1) Clarity and color of solution

Dissolve 1 g of this substance in 50 mL of xylene by heating: the solution is colorless and clear.

(2) Heavy metals: Not more than 20 ppm (Method 2)

(3) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 0.1% (5.0 g, Method 1)

Ethylene-Vinyl Acetate Copolymer (EVA) (1)

Definition

Ethylene-Vinyl Acetate Copolymer (EVA) (1) is an ethylene-vinyl acetate copolymer obtained by heating and polymerizing ethylene and vinyl acetate under high pressure using organic peroxide as a reaction initiator.

Description

(1) It occurs as a milky white pelleted or powdered solid.

(2) It is soluble in toluene and xylene, and practically insoluble in water.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 1740 cm^{-1} and 1470 cm^{-1} .

Purity

- (1) Clarity of solution

Dissolve 1 g of this substance in 100 mL of hot xylene: the solution is clear.

- (2) Heavy metals: Not more than 10 ppm (Method 2)

Loss on drying: Not more than 0.5% (1.0 g, 80°C, 4 hours)

Residue on ignition: Not more than 0.5% (30 g, 900°C, 90 minutes)

Ethylene-Vinyl Acetate Copolymer (EVA) (2)

Definition

Ethylene-Vinyl Acetate Copolymer (EVA) (2) is a copolymer resin obtained by radical reaction of ethylene and vinyl acetate (3% to 40%).

Description

It occurs as translucent powder or granules, and it is practically odorless.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 2920 cm^{-1} , 2850 cm^{-1} , 1735 cm^{-1} , 1470 cm^{-1} , 1370 cm^{-1} , 1235 cm^{-1} , 1020 cm^{-1} and 720 cm^{-1} .

Specific gravity: 0.91-0.98

Melting point: 60-100°C

Purity

- (1) Clarity and color of solution

Dissolve 1 g of this substance in 50 mL of xylene by heating: the solution is colorless and clear.

- (2) Heavy metals: Not more than 20 ppm (Method 2)

- (3) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 0.1% (5.0 g, Method 1)

Ethylene-Vinyl Acetate Copolymer Emulsion

Definition

Ethylene-Vinyl Acetate Copolymer Emulsion is a copolymer emulsion obtained by the emulsion polymerization of ethylene and vinyl acetate under medium pressure.

Description

It is a milky white liquid, and it is odorless or has a faint, characteristic odor.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about between 2900 cm^{-1} and 2850 cm^{-1} , 1740 cm^{-1} , 1240 cm^{-1} , and 610 cm^{-1} .

pH: 4.0-7.0

Purity

- (1) Heavy metals: Not more than 10 ppm (Method 2)

(2) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 0.4% (Method 1)

Ethylene-Vinyl Acetate/Polypropylene Bicomponent Fiber

Definition

Ethylene-Vinyl Acetate/Polypropylene Bicomponent Fiber is a polypropylene-core/ethylene-vinyl acetate copolymer-sheath or side-by-side bicomponent fiber.

Description

It occurs as colorless to white fibrous substances, and it is odorless.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared

Spectrophotometry: it exhibits absorption at the wave numbers of about 2880 cm^{-1} , 2820 cm^{-1} , 1740 cm^{-1} , 1450 cm^{-1} , 1360 cm^{-1} , 1240 cm^{-1} , 1010 cm^{-1} , 720 cm^{-1} and 600 cm^{-1} .

Specific gravity: 0.93-0.98

Melting point: 90-110°C

Purity

(1) Heavy metals: Not more than 20 ppm (Method 2)

(2) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 2.5% (Method 2)

Ethylene-Butene Copolymer (EBR)

Definition

Ethylene-Butene Copolymer (EBR) is an ethylene-butene copolymer resin obtained by copolymerizing ethylene and butene.

Description

It occurs as translucent powder or granules, and it is practically odorless.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared

Spectrophotometry: it exhibits absorption at the wave numbers of about 2960 cm^{-1} , 2870 cm^{-1} , 1379 cm^{-1} , 772 cm^{-1} , 730 cm^{-1} and 720 cm^{-1} .

Specific gravity: 0.85-0.90

Melting point: 120-130°C

Purity

(1) Clarity and color of solution

Dissolve 1 g of this substance in 50 mL of xylene by heating: the solution is colorless and clear.

(2) Heavy metals: Not more than 20 ppm (Method 2)

(3) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 0.1% (5.0 g, Method 1)

Ethylene-Propylene Copolymer (EPR)

Definition

Ethylene-Propylene Copolymer (EPR) is an ethylene-propylene copolymer resin obtained by copolymerizing ethylene and propylene.

Description

It occurs as translucent powder or granules, and it is practically odorless.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 2960 cm^{-1} , 2870 cm^{-1} , 1735 cm^{-1} , 1460 cm^{-1} , 1377 cm^{-1} , 1150 cm^{-1} , 937 cm^{-1} , 730 cm^{-1} and 720 cm^{-1} .

Specific gravity: 0.85-0.88

Melting point: 120-130°C

Purity

(1) Clarity and color of solution

Dissolve 1 g of this substance in 50 mL of xylene by heating: the solution is colorless and clear.

(2) Heavy metals: Not more than 20 ppm (Method 2)

(3) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 0.1% (5.0 g, Method 1)

Ethylene-Pentene-1 Copolymer

Definition

Ethylene-Pentene-1 Copolymer is an ethylene-pentene-1 copolymer resin obtained by copolymerizing ethylene and pentene-1.

Description

It occurs as translucent powder or granules, and it is practically odorless.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 2960 cm^{-1} , 2870 cm^{-1} , 1460 cm^{-1} , 1378 cm^{-1} , 894 cm^{-1} , 730 cm^{-1} and 720 cm^{-1} .

Specific gravity: 0.85-0.94

Melting point: 120-130°C

Purity

(1) Clarity and color of solution

Dissolve 1 g of this substance in 50 mL of xylene by heating: the solution is colorless and clear.

(2) Heavy metals: Not more than 20 ppm (Method 2)

(3) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 0.1% (5.0 g, Method 1)

Ethylene-Methacrylic Acid Copolymer (EMAA)

Definition

Ethylene-Methacrylic Acid Copolymer (EMAA) is an ethylene-methacrylic acid copolymer resin obtained by copolymerizing ethylene and methacrylic acid.

Description

It occurs as translucent powder or granules, and it is practically odorless.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 2960 cm^{-1} , 2870 cm^{-1} , 1710 cm^{-1} , 1460 cm^{-1} , 730 cm^{-1} and 720 cm^{-1} .

Specific gravity: 0.92-0.98

Melting point: 80-105°C

Purity

(1) Clarity and color of solution

Dissolve 1 g of this substance in 50 mL of xylene by heating: the solution is colorless and clear.

(2) Heavy metals: Not more than 20 ppm (Method 2)

(3) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 0.1% (5.0 g, Method 1)

Ethylene-Methyl Methacrylate Copolymer (EMMA)

Definition

Ethylene-Methyl Methacrylate Copolymer (EMMA) is an ethylene-methyl methacrylate copolymer resin obtained by copolymerizing ethylene and methyl methacrylate.

Description

It occurs as translucent powder or granules, and is practically odorless.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 3440 cm^{-1} , between 3000 cm^{-1} and 2900 cm^{-1} , 1378 cm^{-1} , 1190 cm^{-1} , 1140 cm^{-1} and 720 cm^{-1} .

Specific gravity: 0.92-0.95

Melting point: 60-110°C

Purity

(1) Clarity and color of solution

Dissolve 1 g of this substance in 50 mL of xylene by heating: the solution is colorless and clear.

(2) Heavy metals: Not more than 20 ppm (Method 2)

(3) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 0.1% (5.0 g, Method 1)

Ethylene-4-Methylpentene-1 Copolymer

Definition

Ethylene-4-Methylpentene-1 Copolymer is an ethylene-4-methylpentene-1 copolymer resin obtained by copolymerizing ethylene and 4-methylpentene-1.

Description

It occurs as translucent powder or granules, and is practically odorless.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 2960 cm^{-1} , 2870 cm^{-1} , 1460 cm^{-1} , 1384 cm^{-1} , 1366 cm^{-1} , 1169 cm^{-1} , 920 cm^{-1} , 730 cm^{-1} and 720 cm^{-1} .

Specific gravity: 0.85-0.94

Melting point: 120-130°C

Purity

- (1) Clarity and color of solution

Dissolve 1 g of this substance in 50 mL of xylene by heating: the solution is colorless and clear.

- (2) Heavy metals: Not more than 20 ppm (Method 2)

- (3) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 0.1% (5.0 g, Method 1)

Chemical Pulp

Definition

Chemical Pulp is obtained by the chemical treatment of fiber to separate the fibers.

Description

It is white in color, practically odorless, and contains no foreign matter.

Purity

- (1) Lignin

Dissolve 0.1 g of phloroglucin in 15 mL of hydrochloric acid, add water to make 20 mL and drop onto this substance: no marked pink or red color develops.

- (2) Coloring matter

Immerse 10 g of this substance in 100 mL of freshly boiled and cooled water, stir and filter. Transfer 50 mL of the filtrate into a Nessler tube and observe downward: the filtrate is almost colorless.

- (3) Acidity or alkalinity

Transfer 10 mL of the filtrate (2) into a test tube 15 mm in inside diameter and add 2 drops of phenolphthalein TS: no red color develops. Separately, to 10 mL of the same solution, add 1 drop of methyl orange TS: no red color develops.

- (4) Fluorescence

Irradiate this substance with ultraviolet rays (main wavelength: 365 nm) in a dark place: it shows neither

marked fluorescence nor fluorescence by contamination.

Total ash: Not more than 0.65% (5.0 g)

Active Carbon

Definition

Active Carbon is obtained by activating carbon substance such as plant-based fibers treated with oxidizing gas or chemicals at high temperature.

Description

It occurs as black powder, granules or fibrous substances, and it is odorless.

Identification

- (1) If this substance is a powder, use it as it is. If it is in a granular or fibrous state, pulverize well to powder. Take about 0.1 g of this substance in a powder state, add 10 mL of dilute methylene blue TS and 2 drops of hydrochloric acid (1 in 4), shake well and filter with a dry filter paper for quantitative analysis (5C): the filtrate is colorless.
- (2) Take about 0.5 g of this substance in a powder state in a test tube and heat over a direct flame while supplying air: it burns without any flame. Pass the evolved gas through calcium hydroxide TS: a white turbidity is produced.

Purity

- (1) Color and acidity or alkalinity of solution
To 3.0 g of this substance, add 60 mL of water, boil for 5 minutes, cool, add water to make 60 mL and filter: the filtrate is colorless and neutral.
- (2) Heavy metals: Not more than 50 ppm (0.50 g, Method 2, Standard Lead Solution 2.5 mL)
- (3) Arsenic: Not more than 2 ppm (Method 2)

Flocculent Sodium Carboxymethylcellulose

Definition

Flocculent Sodium Carboxymethylcellulose is flocculent fiber made from the sodium salt of carboxymethylether of parts of fiber structure of plant-based fibers.

Description

- (1) It is white in color, odorless, and contains no foreign matter.
- (2) It does not remarkably contain broken pieces of pericarp and seed, or nep.

Identification

It becomes slightly viscous when water is added.

Purity

- (1) Coloring matter
Immerse 10 g of this substance in 100 mL of ethanol, press out, transfer 50 mL of the extract into a Nessler tube and observe downward: a yellow color may develop but neither blue nor green color develops.
- (2) Acidity or alkalinity

To 10 g of this substance, add 100 mL of freshly boiled and cooled water and allow to cool. To 25 mL of the solution, add 3 drops of phenolphthalein TS: no red color develops. Separately, to 25 mL of the same solution, add 1 drop of methyl orange TS: no red color develops.

(3) Fluorescence

Irradiate this substance with ultraviolet rays (main wavelength: 365 nm) in a dark place: it shows neither marked fluorescence nor fluorescence by contamination.

(4) Sedimentation velocity

Prepare a test basket, weighing about 3 g from copper wire 0.4 mm in diameter (No. 26) in the form of a cylinder 50 mm in diameter and 80 mm in depth, with 20-mm intervals between the wires. Place 5.0 g of this substance in the test basket, drop the basket on its side gently into the water about 200 mm in depth at ordinary temperature from the height of about 10 mm above the water surface: the basket sinks in water within 8 seconds.

Total ash: Not more than 5.6% (5.0 g)

Absorbent Paper

Definition

Absorbent Paper is a paper made of chemical pulp.

Description

- (1) It is white in color, odorless, and contains no foreign matter.
- (2) It does not remarkably contain undissociated fibers.

Purity

(1) Lignin

Dissolve 0.1 g of phloroglucin in 15 mL of hydrochloric acid, add water to make 20 mL and drop onto this substance: no marked pink or red color develops.

(2) Coloring matter

Immerse 10 g of this substance in 100 mL of ethanol, press out, transfer 50 mL of the extract into a Nessler tube and observe downward: a yellow color may develop but neither blue nor green color develops.

(3) Acidity or alkalinity

To 10 g of this substance, add 100 mL of freshly boiled and cooled water and allow to cool. To 25 mL of the solution, add 3 drops of phenolphthalein TS: no red color develops. Separately, to 25 mL of the same solution, add 1 drop of methyl orange TS: no red color develops.

(4) Fluorescence

Irradiate this substance with ultraviolet rays (main wavelength: 365 nm) in a dark place: it shows neither marked fluorescence nor fluorescence by contamination.

(5) Sedimentation velocity

Prepare a test basket, weighing about 3 g from copper wire 0.4 mm in diameter (No. 26) in the form of a cylinder 50 mm in diameter and 80 mm in depth, with 20-mm intervals between the wires. Place 5.0 g of

this substance in the test basket, drop the basket on its side gently into the water about 200 mm in depth at ordinary temperature from the height of about 10 mm above the water surface: the basket sinks in water within 8 seconds.

Total ash: Not more than 0.65% (5.0 g)

High-density Polyethylene (HDPE)

Definition

High-density Polyethylene (HDPE) is a straight-chain high-density polyethylene resin obtained by the polymerization of ethylene.

Description

It occurs as translucent powder or granules, and it is practically odorless.

Identification

Determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 2960 cm^{-1} , 2870 cm^{-1} , 1460 cm^{-1} , 730 cm^{-1} and 720 cm^{-1} .

Specific gravity: 0.85-1.00

Melting point: 115-140°C

Purity

(1) Clarity and color of solution

Dissolve 1 g of this substance in 50 mL of xylene by heating: the solution is colorless and clear.

(2) Heavy metals: Not more than 20 ppm (Method 2)

(3) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 0.1% (5.0 g, Method 1)

Cycloaliphatic Saturated Hydrocarbon Resin

Definition

Cycloaliphatic Saturated Hydrocarbon Resin is a hydrogenated C_9 -group petroleum resin. The mean molecular weight is 550 to 900.

Description

It occurs as an almost colorless clear glass mass, and it is odorless or has a faint, characteristic odor.

Specific gravity: 0.98-1.03

Identification

Dissolve about 1.0 g of this substance in 5 mL of chloroform and determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 2930 cm^{-1} , 1450 cm^{-1} , 1380 cm^{-1} and 760 cm^{-1} .

Heavy metals: Not more than 10 ppm (Method 2)

Loss on drying: Not more than 1.0% (2.0 g, 105°C, 2 hours)

Residue on ignition: Not more than 0.01% (50 g, 800°C, 3 hours)

Cycloparaffin

Definition

Cycloparaffin is a mixture of liquid hydrocarbons obtained from petroleum.

Description

It is a colorless to light yellow liquid, and it is odorless or has a faint, characteristic odor.

Specific gravity: d_4^{15} 0.81-0.94

Purity

(1) Acidity or alkalinity

To 10 mL of this substance, add 10 mL of hot water and 1 drop of phenolphthalein TS, and shake vigorously: no red color develops. Separately, to 10 mL of this substance, add 10 mL of hot water and 1 drop of methyl orange TS: no red color develops.

(2) Sulfur compounds

To 4 mL of this substance, add 2 mL of ethanol (99.5) and 2 drops of a transparent sodium hydroxide solution (1 in 5) saturated with lead monoxide, heat at 70°C for 10 minutes with occasional shaking, and allow to cool: no dark brown color develops.

(3) Polynuclear aromatic hydrocarbons

Transfer 25 mL of this substance into a 100-mL separator using a 25-mL measuring cylinder, wash the measuring cylinder with 25 mL of n-hexane for ultraviolet-visible spectrophotometry, combine the washings with the liquid in the separator, and shake well. Shake this solution vigorously with 5.0 mL of dimethylsulfoxide for ultraviolet-visible spectrophotometry for 2 minutes, and allow to stand for 15 minutes. Transfer the lower layer into a 50-mL separator, add 2 mL of n-hexane for ultraviolet-visible spectrophotometry, shake vigorously for 2 minutes and allow to stand for 2 minutes. Transfer the lower layer into a glass-stoppered 10-mL centrifuge tube, centrifuge at the rate between 2500 and 3000 rpm for about 10 minutes. Transfer the clear solution so obtained into a cell, stopper tightly, and use this solution as the sample solution. Separately, transfer 25 mL of n-hexane for ultraviolet-visible spectrophotometry into another 50-mL separator, shake vigorously with 5.0 mL of dimethylsulfoxide for ultraviolet-visible spectrophotometry for 2 minutes, and allow to stand for 2 minutes. Transfer the lower layer into a glass-stoppered 10-mL centrifuge tube, centrifuge at the rate between 2500 and 3000 rpm for about 10 minutes. Transfer the clear solution so obtained into a cell, and stopper tightly. Immediately determine the absorbance of the sample solution using this solution as the blank: it is not more than 4.0 at the wavelength between 260 and 350 nm.

(4) Heavy metals: Not more than 10 ppm (2.0 g, Method 3, Standard Lead Solution 2.0 mL)

(5) Arsenic: Not more than 2 ppm (Method 2)

Dibenzothiazyl Disulfide

Definition

Dibenzothiazyl Disulfide is di(benzothiazolyl-2)disulfide ($C_{14}H_8N_2S_4$ 332.49) obtained by the reaction of an

aqueous solution of the alkali salt of 2-mercaptobenzothiazole with oxidants such as bromine.

Description

It occurs as a white to light yellow powder, and it is not soluble in water and ethanol, but soluble in toluene and chloroform.

Identification

Take 0.1 g of this substance in a volumetric flask and dissolve in chloroform to make 100 mL. Perform the test with 5 μL of this solution as directed under Liquid Chromatography: a peak is observed at the retention time of about 22.6 minutes.

Operating conditions

Detector: An ultraviolet absorption photometer (wavelength: 254 nm)

Column: A stainless steel column, 4.6 mm in inside diameter and 25 cm in length, packed with octadecylsilanized silica gel

Flow rate: 0.8 mL/min

Melting point: 165-175°C

Purity

- (1) Heavy metals: Not more than 20 ppm (Method 2)
- (2) Arsenic: Not more than 2 ppm (Method 2)

Residue on ignition: Not more than 0.5% (Method 1)

Aliphatic Hydrocarbon Resin

Definition

Aliphatic Hydrocarbon Resin is a C_5 -group petroleum hydrocarbon resin. The mean molecular weight is 500 to 2000.

Description

- (1) It occurs as a white to light yellowish brown easily-breakable solid, and it is odorless or has a faint, characteristic odor.
- (2) It is freely soluble in toluene, and practically insoluble in water and ethanol.

Specific gravity: 1.03-1.06

Identification

Mix this substance, previously pulverized, with potassium bromide powder, solidify to plate-like shape, and determine the infrared absorption spectrum of this substance as directed in the potassium bromide disk method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about between 2970 cm^{-1} and 2950 cm^{-1} and 1300 cm^{-1} .

Heavy metals: Not more than 10 ppm (Method 2)

Loss on drying: Not more than 1.0% (2.0 g, 105°C, 2 hours)

Residue on ignition: Not more than 0.01% (1.0 g, 450-550°C)

Aliphatic and Aromatic Copolymer Resin

(Aromatic and Denatured Aliphatic Hydrocarbon Resin)

Definition

Aliphatic and Aromatic Copolymer Resin (Aromatic and Denatured Aliphatic Hydrocarbon Resin) is obtained by the copolymerization of a C₅-group resin and an aromatic resin. The mean molecular weight is 400 to 1500.

Description

- (1) It occurs as a light yellow solid or viscous liquid, and it is practically odorless.
- (2) It is practically insoluble in water and ethanol, but freely soluble in tetrahydrofuran and diethyl ether.

Identification

Dissolve 1 g of this substance in 10 mL of toluene, apply onto a potassium bromide disk, evaporate the toluene to obtain a film and determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about between 2970 cm⁻¹ and 2950 cm⁻¹, 1600 cm⁻¹, 1460 cm⁻¹, 1370 cm⁻¹ and 700 cm⁻¹.

Purity

- (1) Clarity of solution

Dissolve 150 g of this substance in 400 mL of tetrahydrofuran: the solution is clear.

- (2) Heavy metals: Not more than 10 ppm (Method 2)

Loss on drying: Not more than 3% (5.0 g, 105°C, 4 hours)

Residue on ignition: Not more than 0.01% (30 g, 600°C)

Aliphatic Saturated Hydrocarbon Resin

Definition

Aliphatic Saturated Hydrocarbon Resin is a hydrogenated C₅-group petroleum resin. The mean molecular weight is 300 to 600.

Description

It is an almost colorless clear viscous liquid, and it is odorless or has a faint, characteristic odor.

Specific gravity: d_4^{15} 0.90-0.95

Identification

Dissolve about 1 g of this substance in 5 mL of chloroform and determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 2930 cm⁻¹, 1450 cm⁻¹, 1380 cm⁻¹ and 760 cm⁻¹.

Heavy metals: Not more than 10 ppm (Method 2)

Loss on drying: Not more than 1.0% (2.0 g, 105°C, 2 hours)

Residue on ignition: Not more than 0.1% (50 g, 800°C, 3 hours)

Hydrogenated Aliphatic and Aromatic Copolymer Resin

Definition

Hydrogenated Aliphatic and Aromatic Copolymer Resin is obtained by the copolymerization and hydrogenation of a C₅-group resin and an aromatic resin. The mean molecular weight is 500 to 1000.

Description

It occurs as a colorless clear pellet or flake solid, and it is odorless or has a faint, characteristic odor. It is freely soluble in toluene, xylene and diethyl ether, but practically insoluble in water and ethanol.

Identification

Mix completely 1 mg of this substance and 100 to 200 mg of dried potassium bromide for infrared spectrophotometry, and determine the infrared absorption spectrum of this substance as directed in the potassium bromide disk method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 3650 cm^{-1} , 2930 cm^{-1} , 2850 cm^{-1} , 2790 cm^{-1} , 2670 cm^{-1} , 2600 cm^{-1} , 1746 cm^{-1} , 1449 cm^{-1} , 1375 cm^{-1} , 890 cm^{-1} , 843 cm^{-1} , 757 cm^{-1} and 700 cm^{-1} .

Heavy metals: Not more than 10 ppm (Method 2)

Loss on drying: Not more than 1.0% (2.0 g, 105°C , 2 hours)

Residue on ignition: Not more than 0.02% (5.0 g, 850°C , 30 minutes)

Hydrogenated Dicyclopentadiene-group Hydrocarbon Resin

Definition

Hydrogenated Dicyclopentadiene-group Hydrocarbon Resin is a solid resin obtained by the hydrogenation of a dicyclopentadiene-based polymer. The mean molecular weight is 300 to 700.

Description

It occurs as a colorless, clear, easily-breakable solid, and it is odorless.

It is freely soluble in tetrahydrofuran and toluene, but practically insoluble in water and ethanol.

Acid value: Not more than 0.1 (Method 1)

Weigh accurately 2 g of this substance and dissolve it in a 40-mL mixture of toluene and isopropyl alcohol (2:1), and perform the test with this solution.

Specific gravity: 1.05-1.08

Identification

Mix this substance, previously pulverized, with potassium bromide powder, solidify to plate-like shape, and determine the infrared absorption spectrum of this substance as directed in the potassium bromide disk method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about between 2970 cm^{-1} and 2950 cm^{-1} , 1463 cm^{-1} and 1373 cm^{-1} .

Purity

(1) Clarity of solution

Dissolve 150 g of this substance in 400 mL of tetrahydrofuran: the solution is clear.

(2) Heavy metals: Not more than 10 ppm (Method 2)

Loss on drying: Not more than 1% (5.0 g, 105°C , 4 hours)

Residue on ignition: Not more than 0.01% (30 g, 600°C)

Styrene-Isoprene-Styrene Block Copolymer

Definition

Styrene-Isoprene-Styrene Block Copolymer is a ternary block copolymer of polystyrene, polyisoprene and polystyrene. The mean molecular weight is 80000 to 200000.

Description

It occurs as a white to light yellow elastic pellet, crumb or powder solid, and it is odorless or has a faint, characteristic odor.

It is freely soluble in tetrahydrofuran, diethyl ether, and toluene, but practically insoluble in water and ethanol.

Identification

Dissolve 1 g of this substance in 10 mL of toluene, apply 1 drop of this solution onto a potassium bromide disk, evaporate the solvent to obtain a film and determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 2960 cm^{-1} , 2850 cm^{-1} , 1600 cm^{-1} , 1452 cm^{-1} , 1375 cm^{-1} , and 837 cm^{-1} .

Viscosity

Dissolve 50.0 g of this substance in 150 g of toluene, use the solution as the sample solution, and measure viscosity twice: the mean viscosity is 100 - 1700 mPa·s. (Brookfield type viscometer, No. 3, 10-60 rotations, $30\pm 1^\circ\text{C}$, 1 minute)

Purity

(1) Clarity and color of solution

Dissolve 1.0 g of this substance in 100 mL of toluene: the solution is colorless and clear.

(2) Extractable substances

To 5.0 g of this substance, add 80 mL of water, and boil under a reflux condenser for 30 minutes. After cooling, filter the extract, and add water to the filtrate to make **exactly** 100 mL. Use this solution as the sample solution for the following tests.

1) pH: 6.0-9.0

2) Chloride

Perform the test with 10 mL of the sample solution as directed under Chloride Limit Test: not more than 0.085%. Prepare the control solution with 1.2 mL of 0.01 mol/L hydrochloric acid

3) Heavy metals: Not more than 20 ppm (20 mL of the sample solution, Method 1, Standard Lead Solution 2 mL)

4) Potassium permanganate-reducing substances

Transfer 25 mL of the sample solution into a glass-stoppered, Erlenmyer flask, add 10.0 mL of 0.002 mol/L potassium permanganate VS and 5 mL of dilute sulfuric acid, and boil for 3 minutes. After cooling, add 0.10 g of potassium iodide, stopper tightly, shake, and allow to stand for 10 minutes. Titrate the solution with 0.01 mol/L sodium thiosulfate VS (indicator: 5 drops of starch TS). Perform the test in the same manner, using 25 mL of the blank solution, and obtain the difference of the consumption of 0.002 mol/L potassium permanganate VS between these solutions: not more than 2.0 mL.

(3) Styrene

Weigh exactly 5.0 g of this substance, and dissolve in 50 mL of tetrahydrofuran. Add methanol to make

exactly 100 mL, shake vigorously for 10 minutes, centrifuge and use the supernatant liquid as the sample solution. Separately, weigh exactly 0.10 g of styrene, and add methanol to make exactly 100 mL. Measure exactly 5 mL of the solution, and add methanol to make exactly 100 mL. Measure exactly 1 mL of the solution, add 50 mL of tetrahydrofuran, mix well, add methanol to make exactly 100 mL, and use this solution as the standard solution. Perform the test with 100 μ L each of the sample solution and standard solution as directed under Liquid Chromatography according to the following conditions. Determine each peak area from these solutions by the automatic integration method: the peak area of styrene from the sample solution is not larger than the peak area of styrene from the standard solution.

Operating conditions

Detector: An ultraviolet absorption photometer (wavelength: 268 nm)

Column: A stainless steel column, about 4 mm in inside diameter and about 15 cm in length, packed with 10- μ m octadecylsilanized silica gel for liquid chromatography

Column temperature: A constant temperature of about 25°C

Mobile phase: A mixture of water and tetrahydrofuran (1:1)

Flow rate: Adjust the flow rate so that the retention time of styrene is about 5 minutes.

Detection sensitivity: Adjust it so that the peak height of styrene obtained from 100 μ L of the standard solution is not less than 5 mm.

(4) Lithium

Take 1.0 g of this substance in a crucible, and ignite at 450°C to 500°C to incinerate. After cooling, dissolve the residue in 2 mL of 0.1 mol/L hydrochloric acid TS, add 10 mL of water, and filter through a glass filter (G4). To this filtrate, add water to make exactly 200 mL, and use this solution as the sample solution. Separately, measure exactly 1.0 mL of Standard Lithium Solution for Atomic Absorption Spectrophotometry, and add water to make exactly 100 mL. Measure exactly 10 mL of this solution, add 2 mL of 0.1 mol/L hydrochloric acid TS, add water to make exactly 100 mL, and use this solution as the standard solution. Perform the test with the sample solution and the standard solution as directed under Atomic Absorption Spectrophotometry according to the following conditions: the absorbance of the sample solution is not more than that of the standard solution.

Gas: Combustible gas-Acetylene

Supporting gas-Air

Lamp: Lithium hollow-cathode lamp

Wavelength: 670.8nm

Loss on drying: Not more than 1.0% (0.1 g, 105°C, 4 hours)

Residue on ignition: Not more than 2.0% (1 g)

Styrene-Ethylene-Butylene-Styrene Block Copolymer

Definition

Styrene-Ethylene-Butylene-Styrene Block Copolymer is a block copolymer of polystyrene-polyethylene butylene-polystyrene, obtained by the hydrogenation of a copolymer consisting of a

polystyrene-polybutadiene-polystyrene block. The mean molecular weight is 30000 to 300000.

Description

It occurs as a white to light yellow elastic pellet, crumb or powder solid, and it is odorless or has a faint, characteristic odor.

It is freely soluble in tetrahydrofuran, diethyl ether, and toluene, but practically insoluble in water and ethanol.

Identification

Dissolve 1 g of this substance in 10 mL of toluene, apply 1 drop of this solution onto a potassium bromide disk, evaporate the solvent to obtain a film and determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 2920 cm^{-1} , 2850 cm^{-1} , 1601 cm^{-1} , 1380 cm^{-1} , 760 cm^{-1} and 700 cm^{-1} .

Viscosity

Dissolve 50.0 g of this substance in 150 g of toluene, remove air bubbles, use the solution as the sample solution, and measure viscosity twice: the mean viscosity is 100 - 10000 mPa·s. (Brookfield type viscometer, No. 3, 10-60 rotations, $25\pm 1^\circ\text{C}$, 1 minute)

Purity

(1) Clarity and color of solution

Dissolve 1.0 g of this substance in 100 mL of toluene: the solution is colorless and clear.

(2) Extractable substances

To 5.0 g of this substance, add 80 mL of water, and boil under a reflux condenser for 30 minutes. After cooling, filter the extract, and add water to the filtrate to make exactly 100 mL. Use this solution as the sample solution for the following tests.

1) pH: 5.0-9.0

2) Chloride

Perform the test with 10 mL of the sample solution as directed under Chloride Limit Test: not more than 0.085%. Prepare the control solution with 1.2 mL of 0.01 mol/L hydrochloric acid

3) Heavy metals: Not more than 20 ppm (20 mL of the sample solution, Method 1, Standard Lead Solution 2 mL)

4) Potassium permanganate-reducing substances

Transfer 25 mL of the sample solution into a glass-stoppered, Erlenmeyer flask, add 10.0 mL of 0.002 mol/L potassium permanganate VS and 5 mL of dilute sulfuric acid, and boil for 3 minutes. After cooling, add 0.10 g of potassium iodide, stopper tightly, shake and allow to stand for 10 minutes. Titrate the solution with 0.01 mol/L sodium thiosulfate VS (indicator: 5 drops of starch TS). Perform the test in the same manner, using 25 mL of the blank solution, and obtain the difference of the consumption of 0.002 mol/L potassium permanganate VS between these solutions: not more than 2.0 mL.

(3) Styrene

Weigh exactly 5.0 g of this substance, and dissolve in 50 mL of tetrahydrofuran. Add methanol to make exactly 100 mL, shake vigorously for 10 minutes, centrifuge and use the supernatant liquid as the sample

solution. Separately, weigh exactly 0.10 g of styrene, and add methanol to make exactly 100 mL. Measure exactly 5 mL of the solution, and add methanol to make exactly 100 mL. Measure exactly 1 mL of the solution, add 50 mL of tetrahydrofuran, mix well, add methanol to make exactly 100 mL, and use this solution as the standard solution. Perform the test with 100 μ L each of the sample solution and standard solution as directed under Liquid Chromatography according to the following conditions. Determine each peak area from these solutions by the automatic integration method: the peak area of styrene from the sample solution is not larger than the peak area of styrene from the standard solution.

Operating conditions

Detector: An ultraviolet absorption photometer (wavelength: 268 nm)

Column: A stainless steel column, about 4 mm in inside diameter and about 15 cm in length, packed with 10- μ m octadecylsilanized silica gel for liquid chromatography

Column temperature: A constant temperature of about 25°C

Mobile phase: A mixture of water and tetrahydrofuran (1:1)

Flow rate: Adjust the flow rate so that the retention time of styrene is about 5 minutes.

Detection sensitivity: Adjust it so that the peak height of styrene obtained from 100 μ L of the standard solution is not less than 5 mm.

(4) Lithium

Take 1.0 g of this substance in a crucible, and ignite at 450°C to 500°C to incinerate. After cooling, dissolve it in 2 mL of 0.1 mol/L hydrochloric acid TS, add 10 mL of water, and filter through a glass filter (G4). To this filtrate add water to make exactly 200 mL, and use this solution as the sample solution. Separately, measure exactly 1.0 mL of Standard Lithium Solution for Atomic Absorption Spectrophotometry, and add water to make exactly 100 mL. Measure exactly 10 mL of this solution, add 2 mL of 0.1 mol/L hydrochloric acid TS, add water to make exactly 100 mL, and use this solution as the standard solution. Perform the test with the sample solution and the standard solution as directed under Atomic Absorption Spectrophotometry according to the following conditions: the absorbance of the sample solution is not more than that of the standard solution.

Gas: Combustible gas-Acetylene

Supporting gas-Air

Lamp: Lithium hollow-cathode lamp

Wavelength: 670.8nm

Loss on drying: Not more than 1.0% (1.0 g, 105°C, 4 hours)

Residue on ignition: Not more than 2.0% (Method 1)

Styrene-Ethylene-Propylene-Styrene Block Copolymer

Definition

Styrene-Ethylene-Propylene-Styrene Block Copolymer is a block copolymer of polystyrene-polyethylene propylene-polystyrene, obtained by the hydrogenation of a copolymer consisting of a polystyrene-polyisoprene-polystyrene block or styrene-poly(isoprene/butadiene)-polystyrene. The mean

molecular weight is 30000 to 300000.

Description

It occurs as a white to light yellow elastic pellet, crumb or powder solid, and it is odorless or has a faint, characteristic odor.

It is freely soluble in tetrahydrofuran, diethyl ether, and toluene, but practically insoluble in water and ethanol.

Identification

Dissolve 1 g of this substance in 10 mL of toluene, apply 1 drop of this solution onto a potassium bromide disk, evaporate the solvent to obtain a film and determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 2920 cm^{-1} , 2850 cm^{-1} , 1601 cm^{-1} , 1380 cm^{-1} , 760 cm^{-1} and 700 cm^{-1} .

Viscosity

Dissolve 50.0 g of this substance in 150 g of toluene, remove air bubbles, use the solution as the sample solution, and measure viscosity twice: the mean viscosity is 150 - 20000 mPa·s. (Brookfield type viscometer, No. 3, 10-60 rotations, $25\pm 1^\circ\text{C}$, 1 minute)

Purity

(1) Clarity and color of solution

Dissolve 1.0 g of this substance in 100 mL of toluene: the solution is colorless and clear.

(2) Extractable substances

To 5.0 g of this substance, add 80 mL of water, and boil under a reflux condenser for 30 minutes. After cooling, filter the extract, and add water to the filtrate to make exactly 100 mL. Use this solution as the sample solution for the following tests.

1) pH: 5.0-9.0

2) Chloride

Perform the test with 10 mL of the sample solution as directed under Chloride Limit Test: not more than 0.085%. Prepare the control solution with 1.2 mL of 0.01 mol/L hydrochloric acid

3) Heavy metals: Not more than 20 ppm (20 mL of the sample solution, Method 1, Standard Lead Solution 2 mL)

4) Potassium permanganate-reducing substances

Transfer 25 mL of the sample solution into a glass-stoppered, Erlenmeyer flask, add 10.0 mL of 0.002 mol/L potassium permanganate VS and 5 mL of dilute sulfuric acid, and boil for 3 minutes. After cooling, add 0.10 g of potassium iodide, stopper tightly, shake and allow to stand for 10 minutes. Titrate the solution with 0.01 mol/L sodium thiosulfate VS (indicator: 5 drops of starch TS). Perform the test in the same manner, using 25 mL of the blank solution, and obtain the difference of the consumption of 0.002 mol/L potassium permanganate VS between these solutions: not more than 2.0 mL.

(3) Styrene

Weigh exactly 5.0 g of this substance, and dissolve in 50 mL of tetrahydrofuran. Add methanol to make exactly 100 mL, shake vigorously for 10 minutes, centrifuge and use the supernatant liquid as the sample

solution. Separately, weigh exactly 0.10 g of styrene, and add methanol to make exactly 100 mL. Measure exactly 5 mL of the solution, and add methanol to make exactly 100 mL. Measure exactly 1 mL of the solution, add 50 mL of tetrahydrofuran, mix well, add methanol to make exactly 100 mL, and use this solution as the standard solution. Perform the test with 100 μ L each of the sample solution and standard solution as directed under Liquid Chromatography according to the following conditions. Determine each peak area from these solutions by the automatic integration method: the peak area of styrene from the sample solution is not larger than the peak area of styrene from the standard solution.

Operating conditions

Detector: An ultraviolet absorption photometer (wavelength: 268 nm)

Column: A stainless steel column, about 4 mm in inside diameter and about 15 cm in length, packed with 10- μ m octadecylsilanized silica gel for liquid chromatography

Column temperature: A constant temperature of about 25°C

Mobile phase: A mixture of water and tetrahydrofuran (1:1)

Flow rate: Adjust the flow rate so that the retention time of styrene is about 5 minutes.

Detection sensitivity: Adjust it so that the peak height of styrene obtained from 100 μ L of the standard solution is not less than 5 mm.

(4) Lithium

Take 1.0 g of this substance in a crucible, and ignite at 450°C to 500°C to incinerate. After cooling, dissolve it in 2 mL of 0.1 mol/L hydrochloric acid TS, add 10 mL of water, and filter through a glass filter (G4). To this filtrate add water to make exactly 200 mL, and use this solution as the sample solution.

Separately, measure exactly 1.0 mL of Standard Lithium Solution for Atomic Absorption

Spectrophotometry, and add water to make exactly 100 mL. Measure exactly 10 mL of this solution, add 2 mL of 0.1 mol/L hydrochloric acid TS, add water to make exactly 100 mL, and use this solution as the standard solution. Perform the test with the sample solution and the standard solution as directed under

Atomic Absorption Spectrophotometry according to the following conditions: the absorbance of the sample solution is not more than that of the standard solution.

Gas: Combustible gas-Acetylene

Supporting gas-Air

Lamp: Lithium hollow-cathode lamp

Wavelength: 670.8nm

Loss on drying: Not more than 1.0% (1.0 g, 105°C, 4 hours)

Residue on ignition: Not more than 2.0% (Method 1)

Styrene-Butadiene-Styrene Block Copolymer

Definition

Styrene-Butadiene-Styrene Block Copolymer is a block copolymer of polystyrene and polybutadiene. The mean molecular weight is 30000 to 300000.

Description

It occurs as a white to light yellow elastic pellet, crumb or powder solid, and it is odorless or has a faint, characteristic odor.

It is freely soluble in tetrahydrofuran and toluene, but practically insoluble in water and ethanol.

Identification

Dissolve 1 g of this substance in 10 mL of toluene, apply 1 drop of this solution onto a potassium bromide disk, evaporate the solvent to obtain a film and determine the infrared absorption spectrum of this substance as directed in the film method under Infrared Spectrophotometry: it exhibits absorption at the wave numbers of about 2960 cm^{-1} , 2850 cm^{-1} , 1600 cm^{-1} , 1452 cm^{-1} , 965 cm^{-1} , 910 cm^{-1} , and 700 cm^{-1} .

Viscosity

Dissolve 50.0 g of this substance in 150 g of toluene, use the solution as the sample solution, and measure viscosity twice: the mean viscosity is 200 - 20000 mPa·s. (Brookfield type viscometer, No. 3, 10-60 rotations, $25\pm 1^\circ\text{C}$, 1 minute)

Purity

(1) Clarity and color of solution

Dissolve 1.0 g of this substance in 100 mL of toluene: the solution is colorless and clear.

(2) Extractable substances

To 5.0 g of this substance, add 80 mL of water, and boil under a reflux condenser for 30 minutes. After cooling, filter the extract, and add water to the filtrate to make exactly 100 mL. Use this solution as the sample solution for the following tests.

1) pH: 5.0-9.0

2) Chloride

Perform the test with 10 mL of the sample solution as directed under Chloride Limit Test: not more than 0.085%. Prepare the control solution with 1.2 mL of 0.01 mol/L hydrochloric acid

3) Heavy metals: Not more than 20 ppm (20 mL of the sample solution, Method 1, Standard Lead Solution 2 mL)

4) Potassium permanganate-reducing substances

Transfer 25 mL of the sample solution into a glass-stoppered, Erlenmyer flask, add 10.0 mL of 0.002 mol/L potassium permanganate VS and 5 mL of dilute sulfuric acid, and boil for 3 minutes.

After cooling, add 0.10 g of potassium iodide, stopper tightly, shake and allow to stand for 10 minutes. Titrate the solution with 0.01 mol/L sodium thiosulfate VS (indicator: 5 drops of starch TS). Perform the test in the same manner, using 25 mL of the blank solution, and obtain the difference of the consumption of 0.002 mol/L potassium permanganate VS between these solutions: not more than 2.0 mL.

(3) Styrene

Weigh exactly 5.0 g of this substance, and dissolve in 50 mL of tetrahydrofuran. Add methanol to make exactly 100 mL, shake vigorously for 10 minutes, centrifuge and use the supernatant liquid as the sample solution. Separately, weigh exactly 0.10 g of styrene, and add methanol to make exactly 100 mL. Measure exactly 5 mL of the solution, and add methanol to make exactly 100 mL. Measure exactly 1 mL of the