degussa.
Röhm Pharma Polymers

Specifications and test methods for EUDRAGIT® RL 12,5 and EUDRAGIT® RL 100 EUDRAGIT® RS 12,5 and EUDRAGIT® RS 100

Standards Sheet

"Ammonio Methacrylate Copolymer, Type A and B" USP/NF
"Aminoalkylmethacrylate Copolymer RS" JPE

1 Commercial form

EUDRAGIT® RL 12,5 / EUDRAGIT® RS 12,5

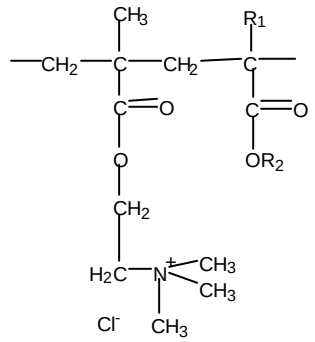
Solutions of EUDRAGIT® RL 100 or EUDRAGIT® RS 100, respectively, with 12.5% (w/w) dry substance in a mixture of 60% (w/w) Isopropyl Alcohol Ph. Eur. / USP and 40% (w/w) Acetone Ph. Eur. / NF.

EUDRAGIT® RL 100 / EUDRAGIT® RS 100

Solid substances EUDRAGIT® RL 100 and EUDRAGIT® RS 100 are described in the monographs quoted above.

2 Chemical structure

EUDRAGIT® RL 100 and RS 100 are copolymers of acrylic and methacrylic acid esters with a low content in quaternary ammonium groups. The ammonium groups are present as salts and make the polymers permeable.



R_1 = H, CH_3
R_2 = CH_3, C_2H_5

The average molecular weight is approx. 150,000.

3 Characters

Description

EUDRAGIT® RL 12,5 / EUDRAGIT® RL 12,5:
Colourless to light yellow liquids of low viscosity, clear to slightly cloudy. The odour is characteristic of the solvents.

EUDRAGIT® RL 100 / EUDRAGIT® RS 100:
Colourless, clear to cloudy granules with a faint amine-like odour.

Solubility

1 g of EUDRAGIT® RL 100 / RS 100 dissolves in 7 g aqueous methanol, ethanol and isopropyl alcohol (containing approx. 3% water), as well as in acetone, ethyl acetate and methylene chloride to give clear to cloudy solutions. EUDRAGIT® RL 12,5 and EUDRAGIT® RS 12,5 are miscible with these solvents in a ratio of 1:1.

EUDRAGIT® RL 100 and EUDRAGIT® RS 100 are practically insoluble in petroleum ether, 1N sodium hydroxide and water. The polymer is precipitated from EUDRAGIT® RL 12,5 / RS 12,5 when mixed with petroleum ether in a ratio of 1:1. When mixed with 1N sodium hydroxide or water, the solution becomes cloudy or precipitates.

4 Tests

Test solution

Either EUDRAGIT® RL 12,5 or EUDRAGIT® RS 12,5 are used for the Test solution, or a corresponding solution of EUDRAGIT® RL 100 / EUDRAGIT® RS 100: 12.5% (w/w) dry substance is dissolved in a mixture of 60% (w/w) isopropyl alcohol and 40% (w/w) acetone.

Film formation

When the Test solution is poured onto a glass plate, a clear film forms upon evaporation of the solvents.

Dry substance / Residue on evaporation

EUDRAGIT® RL 12,5 / EUDRAGIT® RS 12,5: 11.9 - 13.1%

20 g quartz sand are mixed with 1 g of the solution and dried in an oven for 5 hrs at 110 °C, according to Ph. Eur. 2.2.32 d.

EUDRAGIT® RL 100 / EUDRAGIT® RS 100: not less than 97.0%

1 g of granules is dried in an oven for 5 hrs in vacuo at 80 °C.

Loss on drying

EUDRAGIT® RL 100 / EUDRAGIT® RS 100: max. 3.0% according to " Dry substance / Residue on evaporation."

Assay

EUDRAGIT® RL 100 / EUDRAGIT® RL 12,5:
8.85 - 11.96% ammonio methacrylate units on dry substance (DS)
Alkali value: 23.9 - 32.3 mg KOH per g DS

EUDRAGIT® RS 100 / EUDRAGIT® RS 12,5:
4.48 - 6.77% ammonio methacrylate units on DS
Alkali value: 12.1 - 18.3 mg KOH per g dry DS

The alkali value (AV) is defined similarly to the acid value. It states how many mg KOH are equivalent to the basic groups contained in 1 g dry substance (DS).

The assay is performed according to Ph. Eur. 2.2.20 "Potentiometric titration" or USP <541>.
1 g EUDRAGIT® RL 100, 2 g EUDRAGIT® RS 100, 8 g EUDRAGIT® RL 12,5 or 16 g EUDRAGIT® RS 12,5 are dissolved in 96 ml glacial acetic acid and 4 ml water. 0.1 N perchloric acid is used as the titrant after adding 5 ml mercury (II) acetate solution (5% solution in glacial acetic acid). 1 ml 0.1N perchloric acid corresponds to 20.772 mg ammonio methacrylate units.

$$\text{Ammonio methacrylate units (\%) on DS} = \frac{\text{ml 0.1 N } HClO_4 \times 207.72}{\text{sample weight (g)} \quad \text{DS (\%)}}$$

AV (mg KOH/g DS) = ammonio methacrylate units (%) · 2.701

EUDRAGIT® RL 100 /
EUDRAGIT® RS 100:
0.27 - 0.80% Nitrogen on dry substance according to JPE.

Viscosity / Apparent viscosity

EUDRAGIT® RL 12,5 / EUDRAGIT® RS 12,5 / EUDRAGIT® RL 100 /
EUDRAGIT® RS 100: max. 15 mPa · s

The viscosity of the Test solution is determined by means of a Brookfield viscometer (UL adapter / 30 rpm / 20 °C).

EUDRAGIT® RL 100 / EUDRAGIT® RS 100:1.0 - 4.0 mm^2/s according to JPE.

Refractive index

n_D^{20}: 1.380 - 1.385
The refractive index of the Test solution is determined according to Ph. Eur. 2.2.6.

Relative density

d_{20}^{20}: 0.816 - 0.836
The relative density of the Test solution is determined according to Ph. Eur. 2.2.5.

5 Purity

Sulphated ash / Residue on ignition

Max. 0.1% according to Ph. Eur. 2.4.14 or USP <281>.

Heavy metals

Max. 20 ppm according to Ph. Eur. 2.4.8 method C or USP <231> method II.

Arsenic

Max. 2 ppm according to USP <211> method II.

1 g EUDRAGIT® RL 12,5 / RS 12,5 or EUDRAGIT® RL 100 / RS 100 is used for the tests.

Monomers

EUDRAGIT® RL 100 / EUDRAGIT® RS 100:
max. 250 ppm ethyl acrylate max. 50 ppm methyl methacrylate

EUDRAGIT® RL12,5 / EUDRAGIT® RS 12,5:
max. 30 ppm ethyl acrylate max. 10 ppm methyl methacrylate

The test is performed according to the USP/NF monograph on 5 g EUDRAGIT® RL 100 / RS 100 or on 10 g EUDRAGIT® RL 12,5 / RS 12,5.

Microbial count

Max. 1,000 CFU/g; Salmonella, E. coli, S. aureus, Ps. aeruginosa not detectable in 10 g.The test is performed according to Ph. Eur. 2.6.12 and 2.6.13.

6 Identity testing

First identification

The material must comply to the tests for "Assay" and "Viscosity / Apparent viscosity."

Second identification

IR spectroscopy on a dry film approx. 15µm thick. To obtain the film, a few drops of the Test solution are placed on a crystal disc (KBr, NaCl) and dried in vacuo for about 2 hours at 70 °C.

The figures on pages 5 and 6 show the characteristic bands of the ester groups at 1,150 - 1,190 and 1,240 - 1,270 cm^{-1}, as well as the C = O ester vibration at 1,730 cm^{-1}. In addition, CH_X vibrations can be discerned at 1,385, 1,450, 1,475 and 2,950 - 3,000 cm^{-1}.

7 Detection in dosage forms

The dosage forms are extracted using the solvents listed under "Solubility," if necessary after crushing. Insoluble substances are isolated by filtration or centrifugation. The clear filtrate is boiled down and the residue identified by IR spectroscopy.

8 Storage

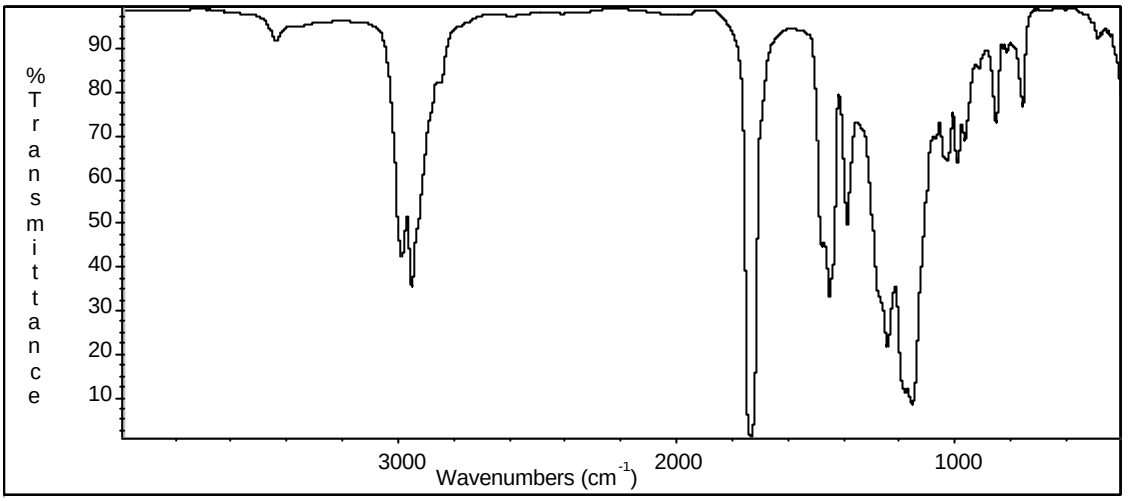
Protect from warm temperatures. Keep solutions in tightly closed containers and protect solid substances from moisture.

EUDRAGIT® RL 100 and EUDRAGIT® RS 100 tend to form lumps at warm temperatures. This has no influence on the quality. The lumps are easily broken up again.

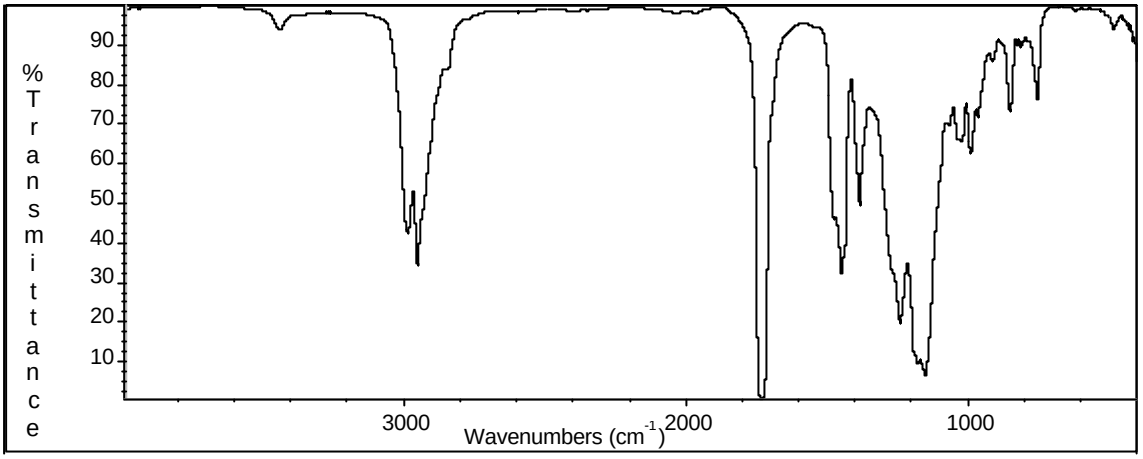
9 Stability

Minimum stability dates are given on the product labels and batch-related Certificates of Analysis. Storage Stability data are available upon request.

EUDRAGIT® RL 100 / EUDRAGIT® RL 12,5



EUDRAGIT® RS 100 / EUDRAGIT® RS 12,5



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