



Amphomer® LV-71 polymer

For hard holding hair fixative formulations

INCI: Octylacrylamide/Acrylates/Butylamineethyl Methacrylate Copolymer

Amphomer LV-71 polymer is a hard holding, amphoteric, acrylic hair fixative polymer, developed primarily for alcoholic or hydroalcoholic hair spray formulas. The composition is inherently stiff and moisture resistant. Moreover, on film formation, cationic groups align with anionic to produce a three dimensional matrix effect. This produces yet a further enhancement of stiffness, holding and moisture resistance. The molecular weight distribution of Amphomer LV-71 polymer is such that very fine atomization can be achieved even at high solids levels or in low VOC hair spray systems. Amphomer LV-71 polymer provides excellent combability, high degree of gloss and pronounced ease of removability, even with heavy deposition on damaged hair.

Recommended applications

Amphomer LV-71 polymer can be used in a broad variety of hair fixative formulations, such as traditional or low VOC hair sprays, spritzes, gels and spray gels, fixative mousses, styling creams, and setting lotions.

Features and benefits

- Low viscosity
- Amphoteric
- Forms hard, clear, moisture resistant films
- Fine, misty atomization
- Propellant compatible
- Excellent holding and subjective properties on hair
- Excellent humidity resistance
- Ease of shampoo removability

Suggested use levels, as supplied

Hair sprays	2.0% to 7.0% for aerosol formulas; higher concentrations in non-aerosol hair spray formulations
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Formulation guidelines

Solubility

Amphomer LV-71 polymer as supplied is soluble in ethanol and isopropanol, but insoluble in water. The polymer can be made water soluble through complete neutralization of its carboxyl groups with a suitable alkaline material. The most commonly used neutralizer is AMP (2 amino-2-methyl-1-propanol). Organic neutralizers such as sodium hydroxide, potassium hydroxide and ammonium hydroxide are sometimes used to modify the characteristics of the formulation.

Neutralization

The carboxyl groups of Amphomer LV-71 polymer must be at least partially neutralized so as to develop the optimum properties of the polymer. For initial evaluation, 90% neutralization of the polymer with either AMP or AMP-95 (or AMP-Ultra™ PC grades) is suggested. The final formulation pH of an AMPHOMER LV-71 containing hair spray should fall within a pH range of 8.0-9.0. Quantities of either AMP or AMP-95 needed to neutralize 100 grams of Amphomer LV-71 polymer from 70% to 100% are outlined below.

% Neutralization	Per 100 grams AMPHOMER LV-71 w	
	grams AMP	grams AMP-95
70%	15.29	16.09
80%	17.47	18.39
90%	19.66	20.69
100%	21.84	22.99

The level of neutralization can also alter the film properties, where higher neutralization provides a softer, more flexible feel, while lower neutralization imparts a harder, stiffer feel.

The amount of base needed to neutralize the carboxyl groups in Amphomer LV-71 polymer can be determined by the following relationships:

$$B = \frac{W * A * N * E}{1000}$$

Example:

To neutralize 100 grams of Amphomer LV-71 polymer 90% with AMP

W = 100 grams

A = 2.40 (average acidity)

N = 0.90

E = 89

$$19.2 = \frac{100 * 2.40 * 0.90 * 89}{1000}$$

Organic amines and amino alcohols, when used as neutralizers for carboxylated polymers, will produce a plasticizing effect on the polymer. The degree of softening will be a function of molecular weight and structure of the neutralizer, as well as degree of neutralization required. Neutralization with inorganics provides an excellent way to bring out the inherent stiffness of Amphomer LV-71 polymer.

Note:

Depending upon the polymer used, it may be necessary in quality control to consider the alkalinity of the polymer in titrations to determine percent neutralization. Contact Nouryon Personal Care for further information and procedures.



Preparation of hair spray concentrates

The preparation of the aerosol concentrates should be carried out according to the procedure outlined in the following example:

- Charge the mixing vessel with the required amount of alcohol
- Start agitation
- Add resin slowly – so that no accumulation of resin occurs on the surface
- After all the resin is added, slowly add the neutralizing agent (If KOH, add as 10% solution in alcohol)*
- Continue mixing until all the resin is in solution
- Add the rest of the ingredients in the formulation
- Filter the concentrate down through 5-10 micron cartridge filters before filling the aerosol containers.

Note: Alcohol temperature dramatically affects solution rate. It is generally suggested that alcohol temperature be 15-20 degrees Centigrade. Concentrates of up to 20% neutralized resin in alcohol may be prepared. Care should be taken that the viscosity of the concentrate is suited to the aerosol packing machinery involved.

Compatibility

Alcoholic solutions of neutralized Amphomer LV-71 polymer are compatible with hydrocarbon, dimethylether, and hydrofluorocarbon propellants. Small quantities of water (i.e., 1-15% of the aerosol) can be used to further enhance solubility of the resin. Further, certain long chain amines, such as dimethyl stearamine, can be used as neutralizers to produce enhanced hydrocarbon compatibility of the polymer.

For VOC compliant formulas, Amphomer LV-71 polymer can also be used with Hydrofluorocarbon 152A (1, 1 difluoroethane) or carbon dioxide propellants.

Additives

Amphomer LV-71 polymer is compatible with a wide variety of additives such as ester type plasticizers, ethoxylates, silicones and a variety of protein derivatives. When formulating Amphomer LV-71 polymer with high proportions of hydrocarbon or hydrofluorocarbon propellant, it is essential that the hydrocarbon compatibility of the additives themselves be confirmed.

Storage and handling

Amphomer LV-71 polymer can be stored under ambient conditions without undergoing decomposition or degradation. This product is supplied in fiber containers. When not in use, the container should be kept covered to prevent dirt, dust, and moisture pick-up. Store in a cool, dry area.

Health and safety

Information on Amphomer LV-71 polymer relating to the EU Cosmetics Directive 76/768/EEC is available on request.



Contact us directly for detailed product
information and sample request
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Nouryon

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