Amphomer® HC polymer

Cost efficiency with performance

INCI: Acrylates/Octylacrylamide Copolymer

Amphomer HC polymer is an acrylic resin that offers high performance coupled with unique on-hair characteristics. It is exceptionally moisture resistant and thus provides high holding power under humid conditions. Films of Amphomer HC polymer are hard, but still provide the flexibility and adhesion to produce desirable on-hair properties.

Amphomer HC polymer is highly compatible with hydrocarbon propellants. It is thus ideally suited for use in formulations using high levels of propellant.

Recommended applications

Aerosol hair sprays that require high levels of hydrocarbon propellant; pump hair sprays.

Features and benefits

- High hydrocarbon propellant tolerance
- Holds styles under humid conditions
- Gives very firm hold sprays
- High performance acrylate polymer
- Very resistant to humidity
- Forms strong films

Suggested use levels, as supplied

Hair sprays	1 to 4%, higher concentrations may be used in non-aerosol hairspray formulation

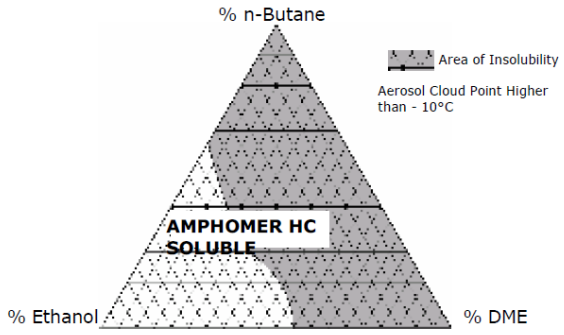
Formulation guidelines

Solubility

Under most conditions, ethanol is preferred as the primary solvent of Amphomer HC polymer in aerosol hair sprays. Isopropanol can also be used; however this can result in some reduction of the hydrocarbon propellant tolerance.

In certain alcohol rich aerosol formulae, a small quantity of water can enhance the solubility of Amphomer HC polymer.

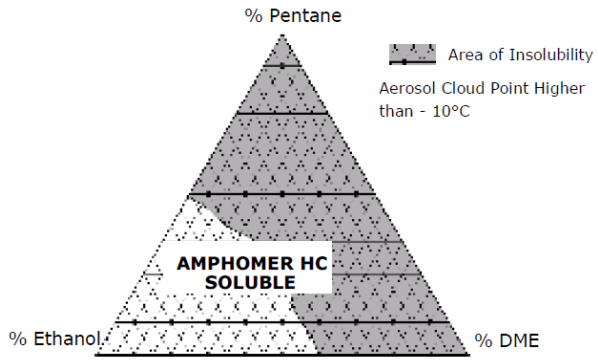
Figure 1: Solubility of Amphomer HC polymer in ethanol-butane-DME systems



Formulation

Amphomer HC	3.00
AMP	0.73
Solvent/Propellant	100.00

Figure 2: Solubility of Amphomer HC in ethanol-pentane-DME system



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Neutralization

Amphomer HC polymer is carboxylated and must be neutralized with a suitable alkaline material for use in hair care formulae. Various neutralizers can be used to achieve a desired effect. The most common neutralizer used is AMP (2-amino-2-methyl-1-propanol). The suggested polymer neutralization level is 90-95%. Under these conditions, Amphomer HC polymer will accept approximately 50% hydrocarbon in an ethanolic system. Alcoholic KOH can be used for neutralization when higher levels of hydrocarbon tolerance are needed. With KOH, attention should be paid to the formulation stability because of the strength of the base and the high pH of the system.

The amount of base required to neutralize the carboxyl groups in Amphomer HC polymer can be determined by the following relationship:

Parts by Weight (g) of Base Required

$$\frac{W \times A \times N \times E}{1000}$$

Where:
W = Parts by weight (grams) of Amphomer HC polymer used
A = Acidity of Amphomer HC polymer
E = Equivalent weight of base
N = % Neutralization required (decimal)

Example:
W = 100g A = 3.0 meq/g
N = 0.90
E = 89.1g/ mol

Grams of AMP 100 =

$$\frac{100 \times 3.0 \times 89.1 \times 0.90}{1000} = 24.1$$

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:

Procedure:

- 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 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 production equipment involved.

Additives

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

Compatibility

Propellants

The hydrocarbon compatibility of Amphomer HC polymer is excellent; the tolerance depends on the neutralizer selected as well as the resin solids and solvent system used. Levels of up to 50% hydrocarbon can be obtained with AMP neutralization, and of up to 65-70% hydrocarbon with potassium hydroxide as the neutralizer.

Storage and handling

Amphomer HC 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 HC 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

Nouryon is a global, specialty chemicals leader. Markets and consumers worldwide rely on our essential solutions to manufacture everyday products, such as personal care, cleaning goods, paints and coatings, agriculture and food, pharmaceuticals, and building products. Furthermore, the dedication of more than 7,900 employees with a shared commitment to our customers, business growth, safety, sustainability and innovation has resulted in a consistently strong financial performance. We operate in over 80 countries around the world with a portfolio of industry-leading brands. Visit our website and follow us @Nouryon and on LinkedIn.

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