

## HAIR SPRAYS

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They are quick-drying liquids on the hair to keep it in place. They contain ingredients that stick to the hair and hold it in place for a short period of time. The safety of hair sprays is established by selection of ingredients that are safe and suitable for this purpose. Besides Hair sprays are assessed for their potential to cause scalp and eye irritation.

Hair sprays are generally alcohol solutions of film forming resins and a propellant. When sprayed on hair they form droplets of resin which when dry, imparts support and stiffening properties to hair fibres. PVP (Polyvinylpyrrolidone) is the most common film former or resin used. It is available in various grades of viscosity/molecular weight and is soluble in both aqueous and organic solvents. This resin can also be used with vinyl acetate as copolymer. The PVP resin is hydrophilic and so tends to take up moisture and becoming dull and tacky. The hydrophobic properties can be imparted by addition of Shellac, ethyl Cellulose and certain other synthetic resins. It is also sometimes useful to include a coupling agent such as benzyl alcohol but if added too much it leads to tacky film and too little amount gives an opaque whiteness.

Hair spray is an aerosol cosmetic product which is a mixture of various components like Concentrate, plasticizers, propellants, luster agents, solvents and fragrances.

Concentrate or holding agent :- Hairspray are a blend of polymers that provide structural support to hair. These frequently include co-polymers of polyvinyl pyrrolidone (PVP) and Poly vinyl Acetate (PVAc). Vinylacetate-Crotonic acid Co-polymers give harder films. The desired properties of hair spray can be achieved by making changes in the Co-polymer mixture. The physical properties strength, foaming, etc, can be adjusted using plasticizers such as aminomethyl propanol, surfactants such as benzalkonium chloride and other agents like dimethicone.

### Propellants

Hydrocarbons are the most common propellant used after the phase-out of CFCs as global warming chemicals. These include propane, butane, isobutane and related volatile hydrocarbons as well as their mixtures. Such hydrocarbons are poor solvents for the active ingredients such as polymers and for this reason dimethylether is often added to act as a propellant and a solvent.

Solvents :- Water is a popular solvent due to its lower cost. It has certain disadvantages as formulations that contain water take longer to dry, is less soluble in many propellant systems and has corrosion problem inside the metallic can. Ethanol, although somewhat more expensive, is another popular solvent. However, ethanol belongs to the class of volatile organic compounds (VOCs) whose use in aerosols have been restricted because they contribute to air pollution. ②

Other Components :-

Plasticizers used in hair spray include esters of citric acid and adipic acid. Silicones and polyglycols are also used. Fragrances are most of the time few drops of essential oil.

The following parameter must be considered for the designing of good hair spray.

- \* The polymer must deposit a film which is substantive on the hair and should be easily washed away.
- \* It must hold hair with flexibility so the hair can move without breaking the film.
- \* It must be transparent so it does not reduce the hair's natural gloss.
- \* It should not flake when the hair is brushed; and it must not absorb moisture from the atmosphere and become sticky.

\* The ingredients used in hairsprays are in contact with the skin for an extended period of time, they must be designed to be non-irritating, non-sensitizing and non-hazardous. (3)

## Non-Aerosol hair spray

### Formula 1

S.No	Ingredients	%(W/W)	Purpose
1	Water	42.70	Solvent
2	PVP K-30	2.00	Hair styling polymer
3	Ethanol	55.00	Solvent
4	Panthenol	0.20	Conditioner
5	Glycerin	0.10	Humectant
6	Perfume	QS	fragrance

### Method of Preparation

In a suitable formulation vessel, at room temperature add and mix all ingredients from S.No 1-5 until a homogenous clear solution is obtained. If necessary the solution may be filtered to remove undissolved particulate matter. Add a few drops of fragrance of your choice and mix it thoroughly. Keep the prepared hair spray in a suitable bottle.

The following are the commonly used formulae for Aerosol hair sprays.

### Formula 1

S.No	Ingredients	%(W/W)
1	Propellants -12/-11/Vinyl Chloride (20:45:35)	60
2	Hair Spray Concentrates	40

### Formula 2

S.No	Ingredients	%(W/W)
1	Propellants 12/11, 50:50	60.0
2	Below Hair spray Concentrates	40.0
3	Ethyl Alcohol anhydrous	95.3
4	PVP, K-30	4.0
5	Shellac, Denard	0.5
6	Perfume	0.2