COSMETIC FORMULATORS

www.CosmeticFormulators.com

Formulating Hair Conditioners: Understanding Ingredients and Types

Washing hair with shampoos containing anionic surfactants often leaves hair dry and difficult to comb after drying. Conditioners are used to make hairs manageable and give them a smooth and silky look (1). Aftercare of hair treatments like straightening, coloring, or waving that includes the use of chemicals also require conditioners to increase the shine of hair, adding volume and making your hair manageable (2).

What is Hair Conditioner?

A hair care product that helps to improve the appearance, feel, volume, or shine of the hair is a hair conditioner. In general, conditioners make hair more manageable by reducing friction between hair strands and ease the process of combing the hair. It also strengthens the hair, reduces frizz, and makes them anti-static (3,4).

How do hair conditioners work?

At a neutral pH, the surface of hairs has a negative charge. Conditioners, just like shampoos, also contain surfactants that are positively charged. The positively charged molecules of the conditioners are attracted to the negatively charged surface of the hair. This attraction results in conditioner to deposit on the hair, especially on weathering parts (1,5).

After getting deposits on the surface, conditioners help reduce the static charge, which develops due to interaction between the anionic surfactants of shampoo and the negatively charged surface of the hair. Reduces the friction between hair by closing the cuticle scales. This results in a smooth feeling to the hair and makes combing hair easier both in wet and dry conditions. Conditioner also helps to improve color, seals the split ends of hair temporarily, and gives shine to the hair by increasing the light reflectance (5–7).

What are the components of a Hair Conditioner?

Conditioners mainly contain cationic surfactants and a number of other ingredients that work together to achieve a conditioning effect specifically designed for a specific hair type. Conditioners are formulated as dispersions instead of as solutions (8).

1. Water: It is often mentioned on the product labeled as "aqua." Water makes almost 80% of the formulation in which all the other ingredients are dispersed (9).

2. Cationic Surfactants or Conditioning agents: The active ingredients and backbone of the conditioner are cationic surfactants, such as Stearamidopropyl dimethylamine, Behentrimonium or propyltrimonium, or cetyltrimethylammonium chloride. The positively charged molecules of conditioning agents become "adsorb" on the hair's surface instead of getting absorbed.

A cationic polymer, such as polypeptides derived from collagen, polyvinylpyrrolidone (PVP), or poly and monopeptides-like hydrolyzed proteins (amino acids), are added to achieve additional conditioning effects. These cations are attracted by the negatively charged surface of the hair shaft and make a film over the hair shaft making hair fibers smooth (9,10). Conditioning agents make 1 to 4% of the formulation (11).

3. Humectants or Moisturizers: These are the ingredients that attract and bind the water molecules from the surrounding environment to hair and provide a moisturizing effect to the hair. They are present in a quantity of 0 to 2% in the formulation.

However, while formulating a conditioner and adding humectant, the type of hair for which conditioner is formulated needs to be kept in mind. For example, people with frizzy hair do not require much moisturizing; therefore, the amount of humectant needs less conditioner for frizzy hairs. Glycerin is a commonly used humectant (9,11,12).

4. Emollients: These are the ingredients that make the hair soft and lubricated and usually from 0 to 2% of the formulation. They also replenish the lipids lost from the hair shaft. Oils, fats, and butter are the common types of emollients used in conditioners. Again, the type of hair for which the conditioner is being formulated needs to be considered while using the emollients as well, such as hair that are fine require lighter emollients; otherwise, heavy emollients make them weighed down and lank (9,11).

Natural oils such as olive oil, jojoba oil, or grape seed oil, synthetic oils like silicones (Cyclomethicone, amodimethicone, dimethiconol, and dimethicone) are used commonly in conditioners to give luster and shine to your hair strands (5).

5. Other ingredients: Conditioners also contain thickening agents, preservatives, fragrances, and pH stabilizers in addition to all the above (10).

Types of Conditioners:

Several conditioners are available in the market, but it is essential to have an understanding of different types of ingredients used for various purposes while planning to formulate one.

1. Rinse-out Conditioner: These are the most common type and also known as "instant conditioner." These are meant to be used daily, applied for a shorter time after shampoo, and treats hair cuticle from outside, making your hair smooth. All types of hair, from dry to normal to oily, can use it (13).

2. Deep Conditioner: These conditioners are designed specifically for dry and damaged hair and are more dense than regular conditioners. These conditioners do not produce significant effects on normal to oily hairs and can make them look oily and can weigh hairs down. Deep conditioners contain a significant quantity of fatty acids, oils, esters as well as proteins and amino acids. Deep conditioners are left in the hair for 30 minutes and then rinsed off and can be used once every week for best results (14).

3. Leave-in Conditioners: These conditioners are formulated for thin, oily, or curly hairs and are very light, thin, and less viscous. These can be sprayed after washing hair and makes a thin layer over hair, and assist in detangling the hair strands and making hairs smooth (13).

Choosing Hair Conditioner According to Hair Type:

1. Fine and Flat Hair: Volumizing conditioner is required, especially when hairs are straight, frizz-free, and silky. Volumizing conditioners have ingredients that provide a lift to the hair, such as polymers containing oil-controlling components such as starch and talc (15).

2. Wavy Hairs: These are the trickiest hairs to manage as wavy hairs become frizzy in humid weather and dry in cold weather. Light-weight conditioners such as leave-in conditioners are best for wavy hairs (14,16).

3. Curly Hairs: The more the hair is curly, the more they are dry. Curly and dry hairs require deep conditioners to add moisture to strands. Using leave-in conditioners also helps in making curly hair more manageable (14).

The Bottom Line:

The use of conditioners after washing hairs has become a part of personal grooming every day. While formulating a conditioner, one should keep in mind the type of hair for which the conditioner is being formulated and how different ingredients perform their functions. It is best to take the help of a cosmetic chemist.

References

1. Tadros TF. Formulation of hair conditioners in shampoos. In: Formulations: In Cosmetic and Personal Care [Internet]. Berlin, Boston: De Gruyter; 2016 [cited 2021 May 15]. p. 217–30. Available from: https://www.degruyter.com/document/doi/10.1515/9783110452389-012/html

2. Swift JA, Brown AC. The critical determination of fine change in the surface architecture of human hair due to cosmetic treatment. J Soc Cosmet Chem. 1972;23:675–702.

3. Draelos ZK. Hair Cosmetics. Dermatologic Clinics. 1991 Jan 1;9(1):19–27.

4. Shipp JJ. Hair-care Products. In: Williams DF, Schmitt WH, editors. Chemistry and Technology of the cosmetic and Toiletries Industry. London: Blackie Academic and Professional; 1992. p. 32–54.

5. Bhushan B. Biophysics of Human Hair: Structural, Nanomechanical, and Nanotribological Studies. Springer Science & Business Media; 2010. 192 p.

6. Drovetskaya TV, Diantonio EF, Kreeger RL, Amos JL, Frank DP. New high-charge density hydrophobically modified cationic HEC polymers for improved co-deposition of benefit agents and serious conditioning for problem hair. J Cosmet Sci. 2007 Aug;58(4):421–34.

7. Ruetsch SB, Kamath YK, Kintrup L, Schwark H-J. Effects of conditioners on surface hardness of hair fibers: an investigation using atomic force microscopy. J Cosmet Sci. 2003 Dec;54(6):579–88.

8. Gray J. Hair care and hair care products. Clin Dermatol. 2001 Apr;19(2):227–36.

9. 9 Key Ingredients for an Amazing Natural Conditioner [Internet]. School of Natural Skincare. 2019 [cited 2021 May 15]. Available from: https://www.schoolofnaturalskincare.com/9-key-ingredients-for-natural-conditioner/

10. D'Souza P, Rathi SK. Shampoo and Conditioners: What a Dermatologist Should Know? Indian Journal of Dermatology. 2015 Jun;60(3):248.

11. Deckner G. What makes an effective hair conditioner formulation? [Internet]. Prospector Knowledge Center. 2018 [cited 2021 May 15]. Available from: https://knowledge.ulprospector.com/8959/pcc-hair-conditioner-formulations/

12. Leah. The Ingredients Of A Healthy Hair Conditioner [Internet]. [cited 2021 May 15]. Available from: https://www.arelaxedgal.com/2014/10/healthy-ingredients-of-a-good-hair-conditioners.html

13. What's the difference between 3 Major Types Of Conditioners? [Internet]. Best Dry Shampoo. 2014 [cited 2021 May 15]. Available from: https://thebestdryshampoo.com/whats-the-difference-between-3-major-types-of-conditioners/

14. 4 Types of Conditioners [Internet]. Headcurve.com. [cited 2021 May 15]. Available from: https://www.headcurve.com/hair/types-of-conditioners/#Deep_Conditioners

15. Gould H. The Science of Beauty: How Do Volumizing Hair Products Work? [Internet]. Byrdie. [cited 2021 May 15]. Available from: https://www.byrdie.com/how-do-volumizing-hair-products-work

16. The 7 Types of Conditioner: What's the Difference? | Keeps [Internet]. [cited 2021 May 15]. Available from: https://www.keeps.com/learn/types-of-conditioner