INTERNATIONAL JOURNAL ON HUMAN COMPUTING STUDIES
https://journals.researchparks.org/index.php/IJHCS e-ISSN: 2615-8159 | p-ISSN: 2615-1898
Volume: 03 Issue: 7 |Sep 2021

Important Properties of Carbomer

Ergashev S. U.

----------***----------

Abstract: The article provides information on the properties of carbomer, areas of application, method of preparation. Carbomer is mainly used in cosmetology and medicine.

Keywords: Carbomer, carbopol, divinyl glycol, polyacrylic acid, neutralization, viscosity, density, sol-gel.

Carbopolar - amorphous white powder, odorless. A product of unique cross-linked acrylic polymers. It is soluble in hydrophilic solvents and slowly swells in an aqueous or aqueous polymer medium. It has the ability to thicken, so it is widely used in pharmacies as a gelling agent in the preparation of MLF. Carbopol-based gels form thin films when distributed on the skin, ensuring a long-lasting effect of the drug and a uniform release of PS. From them are obtained gels used for light dosage forms in the pharmacy under certain conditions and using certain methods. Also called ATM (redkosshitye acrylic polymer) in the course abbreviations. Used in cosmetics as a thickener and gel agent. In the United States and Europe, carbopols are commonly referred to as carbomers.

Carbopol is a very weak acid and is easily converted to salts. Depending on the concentration, carbomer aqueous dispersions have a pH of 2.8 to 3.3. The higher the polymer concentration in the dispersion, the lower the pH due to the increase in carboxyl groups (-COOH) [2].

In cosmetic formulas, it stabilizes emulsions and regulates the density and viscosity of various products. Due to its ability to regulate adhesion and stabilize emulsions, carbomer is widely used in the following cosmetics:

- Lotions;
- Creams and gels;
- Whey;
- Shower gels;
- Washing gels;

Synthetic polymeric substances containing anionic polyelectrolytes containing salt carboxylate and carboxyl groups played a central role in the production of cosmetic gels. Let's talk in more detail about this type of gel, which is most commonly used not only in cosmetic compositions, but also in pharmaceutical systems. These are polymers of acrylic acid (PAA) cross-linked with divine ethyl esters of divinyl glycol or pentaerythritol called INCI carbomers. The difference between the different modifications is the number of cross-links that can be changed to change the properties of the gel. The molecular weight (M) of the PAA fragment is approximately 75–78 Da. The M of the gel formed by the carbomer was theoretically calculated to be 700,000 to 4 million Da. Furthermore, there are no methods to determine the true M. [1,2].

PAA forms a polymer matrix of the gel, which is characterized by high viscosity and compatibility with biologically active substances, drugs and enzymes, and provides long-term effect of these target active substances. The mechanism of PAA gel formation can be represented by the following scheme (Figure 1.1).

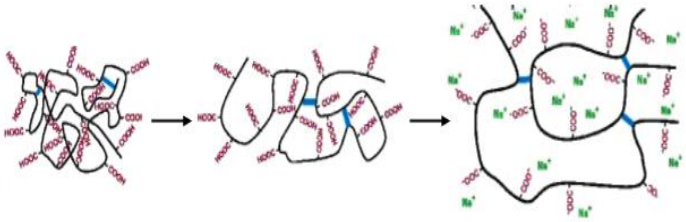


Figure 1.1. Schematic representation of the sol-gel transition of polyacrylic acid (Carbomer).

INTERNATIONAL JOURNAL ON HUMAN COMPUTING STUDIES
https://journals.researchparks.org/index.php/IJHCS e-ISSN: 2615-8159 | p-ISSN: 2615-1898
Volume: 03 Issue: 7 |Sep 2021

Carbomer powder is a globule of tightly bound and interconnected PAA macromolecules. As a result of the dispersion of the gelling agent in water, the macromolecular helix is loosened due to the tendency of the carboxyl groups to hydrate. The final step in the formation of the polymer gel structure is the introduction of a neutralizing substance of alkaline nature (sodium hydroxide (Figure 1.1), triethanolamine, etc.) into the carbomer dispersion, which leads to the conversion of acidic groups of carbomers to high-dissociation salts [3].

Gel preparation:

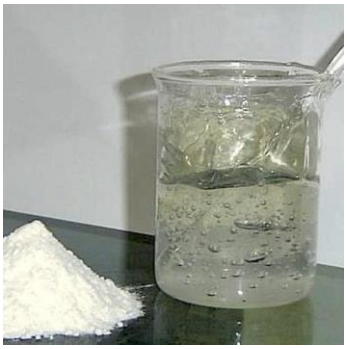
The standard rate of carbomer use is: 0.1% -0.25% (for cream stabilization) or 0.5% -1% (for hard gel), depending on the type of formula (gel / cream) and the desired viscosity. Dense gel is obtained at 1%, medium density gel at 0.5%. Ingredients: 98.25% distilled water 0.5% carbomer 1% triethanolamine solution, 0.25% sodium hydroxide 18% solution (NaOH) or in the worst case, baking soda solution can be used.

Procedure:

1. Measure distilled water.

2. Measure the carbomer powder and add it to the water. Leave the carbomer in water for an hour or two, then mix well by hand. You may see a few pieces, but they will disappear immediately after decontamination.

3. Gradually add the alkaline solution drop by drop and mix well. Check the pH during operation, it should be close to 7. During the process, pay attention to the thickness of the resulting gel. If the gel is still liquid, continue adding the alkali until the desired viscosity level is reached.



4. The best gel structure is obtained at pH = 7. The gel remains at a pH of 5.5 to 8. If the pH changes, more or less of these values will be converted to gel. Strong acidic or alkaline ingredients should not be added after neutralization.

5. Also, you can add oil to the gel, but after adding the oils, the cream gel will become dull

References:

1. Lyapunov N.A., Volovik N.V. Creation of soft medicines on various bases. Communication 2. Investigation of the rheological properties of gels formed by carbomers // Farmakom. - 2001. - No. 2. - P. 52
2. Romanko T.V. Optimization of the rheological properties of the adsorption vaginal gel based on carbomer / T.V. Romanko, G.V. Ayupova, A.A. Fedotova [et al.] // Bashkir Chemical Journal. - 2008. - No. 4. - P. 85 - 89.
3. https://ru.wikipedia.org/wiki/carbopolis