

# What is the function and principle of polyacrylamide as a flocculant?

**Polyacrylamide has good flocculation, adhesion, resistance reduction, thickening, and other properties and is a linear polymer; its primary function is adsorption bridging and flocculation sedimentation, which is divided into three stages: coagulation, flocculation, and sedimentation.**

## The role and principle of [polyacrylamide](#) as a flocculant

Polyacrylamide has good flocculation, adhesion, resistance reduction, thickening, and other properties and is a linear high molecular polymer.

Most people think that polyacrylamide is used as a flocculant. Its primary function is to absorb bridging and flocculate sedimentation. It is divided into three stages: coagulation, flocculation, and sedimentation. In laboratory tests and computer operations, these three stages can fully indicate whether the selected product is suitable. The following is a detailed report of these three stages:

### 1. Cohesion stage

When PAM liquid medicine is added, the liquid mixture is injected into the coagulation tank, and the raw water is quickly coagulated. Delicate alum flowers are formed in a short time. At this time, the water body will soon become turbid, which requires intense coagulation—water flow. In the experiment using the beaker, stir quickly (250-300 rpm) for 10-30S, generally no more than 2min. The effect at this time is pronounced.

### 2. Flocculation stage

Flocculation is the process of growth and thickening of alum flowers. It requires appropriate turbulent water flow and sufficient residence time (10-15min). In the later stage, many alum flowers can be observed to gather and sink slowly. Clear stratification can be observed on the surface. . In the beaker experiment, first stir at 150 revolutions per minute for about 6 minutes. Then go at 60 revolutions per minute for about 4 minutes until it is in a suspended state. This suit can check the response effect; if the product is not ideal, it needs to be adjusted in time.

### 3. Settlement stage

In the treatment of domestic sewage and organic wastewater, this product exhibits positive electricity in both acidic and alkaline media and effectively flocculates and sediments the negatively charged suspended particles in the sewage. This is the process of floc settlement in the settling tank, requiring slow water flow. If you want to improve efficiency, you can use an inclined tube sedimentation tank, that is, use air flotation to separate flocs. A large amount of alum is blocked by the ready tube wall and deposited on the bottom of the pool. The upper layer is clarified water, and the remaining particles are small in diameter. The alum flowers with low density will slowly drop and continue to collide with each other and combine into clusters.



## **Why does polyacrylamide form agglomerates?**

1. Polyacrylamide is a high-molecular polymer with good flocculation and thickening properties. When it is put into sewage, it will quickly condense pollutants into clusters;
2. If a large amount of polyacrylamide is put into the water at one time, it is not dissolved in the water in advance because the molecular weight is relatively large if it cannot be added to the water evenly and slowly, the part in contact with the water will begin to dissolve and expand, and then the surface area will change. Large, and then wrap the piece that is not in contact with water, so some insoluble floccules are formed. The correct method is first to stir the water and then slowly and uniformly add polyacrylamide to the water, which can reduce the probability of agglomeration.

If our operations are very standardized, and eventually clumping occurs, then we have to consider whether the quality of the product itself is problematic; for example, if the particles are larger or smaller, this will affect the dissolution effect.

## **How to distinguish polyacrylamide anion and cation?**

We know that acrylamide has three types of ions. Is there any easy way to quickly identify anionic, cationic, and non-ionic polyacrylamide?

Anionic acrylamide is usually copolymerized with monomers with negatively charged groups (carboxylic acid groups, sulfonic acid groups) and acrylamide; cationic acrylamide is usually monomers with positively charged groups (tertiary amines, quaternary Amine salt);

Nonionic acrylamide is usually a nonionic monomer (MAM and nitrogen derivatives).

Introduce a relatively simple method to distinguish polyacrylamide anion and cation

If you have a specific cationic agent or an anionic agent around you, dissolve it into a 1%~3% solution. The sample of unknown ion type is also reduced to the same concentration. Mix the two. If it is turbid or precipitated, it is the opposite. Ionic, if it does not react with anionic or cationic agents, it should be non-ionic polyacrylamide.