**polyacrylamide**

1. **What is polyacrylamide PAM?**  
   [**Polyacrylamide**](http://www.njgaokechem.com/Polyacrylamide.htm) is a polymer (-CH2CHCONH2-) formed from acrylamide subunits, it is long-chain polymer (same molecule repeating itself many times) designed to attract either positively charged particles (organic materials, such as carbon or human waste) or negatively charged particles (inert materials, such as sand or clay). The abbreviation of polyacrylamide is PAM, it is a chemical which purchased in dry, emulsion, liquid and tablet form.  
   Polyacrylamide can be carbonated into black powder at 210οC without oxygen. Polyacrylamide could be made to four series,e.g., non-ion polyacrylamide,zwitterionic polyacrylamide,[**cationic polyacrylamide**](http://www.njgaokechem.com/Cationic-polyacrylamide-CPAM.htm) [**CPAM**](http://www.njgaokechem.com/Cationic-polyacrylamide-CPAM.htm), and [**anionic polyacrylamide**](http://www.njgaokechem.com/Anionic-polyacrylamide-APAM.htm) [**APAM**](http://www.njgaokechem.com/Anionic-polyacrylamide-APAM.htm).  
   Polymers may be purchased in dry, emulsion, liquid and tablet form. These chemical compounds are used to flocculate and coagulate suspended solids in water, wastewater, and soil. They assist in management of the Earth’s soil and water. In the straight-chain form, it is also used as a thickener and suspending agent.
2. **How many types of polyacrylamide? What is the difference between them?**  
   There are three types of polyacrylamide: [**APAM**](http://www.njgaokechem.com/Anionic-polyacrylamide-APAM.htm), [**CPAM**](http://www.njgaokechem.com/Cationic-polyacrylamide-CPAM.htm), and NPAM.We also provide acrylamide.   
   [**Anionic polyacrylamide APAM**](http://www.njgaokechem.com/Anionic-polyacrylamide-APAM.htm):  
   This type of polymer has molecules that carry negative charge. [Anionic polyacrylamide](http://www.njgaokechem.com/Anionic-polyacrylamide-APAM.htm)can pick up positively charged particles (clay, sand), much like a magnet picks up nails and other metal objects. There are over 100 varieties of this type of polymer. Anionic polyacrylamide has no aquatic toxicity. It is recommended for use in furrow irrigation, dust control, crop dusting, treating wholesale nursery & stormwater runoff, hydroseeding, animal waste treatment, construction projects, sports fields, landscaping, turf & sod, drilling mud, mining, and water & soil conservation.  
   [**Cationic polyacrylamide**](http://www.njgaokechem.com/Cationic-polyacrylamide-CPAM.htm) [**CPAM**](http://www.njgaokechem.com/Cationic-polyacrylamide-CPAM.htm):  
   This type of polymer has molecules that carry positive charge. Cationic PAM can pick up negatively charged particles (organic materials like carbon or human waste). There are over 1000 varieties of this type of polymer. It is recommended for use in wastewater plants, animal waste treatment, water clarification, drinking water, and many industrial applications, such as mining and paper processing. Many hours of testing are often required in these applications to determine the correct polymer choice.  
   [**Non-ionic polyacrylamide**](http://www.njgaokechem.com/Non-ion-Polyacrylamide.htm):  
   This type of polymer has molecules with no charge. [**Non-ionic polyacrylamide**](http://www.njgaokechem.com/Non-ion-Polyacrylamide.htm) are used in very rare instances and special circumstances only. This polymer is used mostly in mining.
3. **What are the uses of polyacrylamide?**  
   Flocculate or coagulate solids in a liquid may be one of the largest uses for [**polyacrylamide**](http://www.njgaokechem.com/Polyacrylamide.htm). This process applies to wastewater treatment, and processes like paper making. Most polyacrylamide is supplied in a liquid form. The liquid is subcategorized as solution and emulsion polymer. Even though these products are often called 'polyacrylamide', many are actually copolymers of **acrylamide** and one or more other chemical species, such as an acrylic acid or a salt thereof. The main consequence of this is to give the 'modified' polymer a particular ionic character.  
   Another common use of polyacrylamide and its derivatives is in subsurface applications such as Enhanced Oil Recovery. High viscosity aqueous solutions can be generated with low concentrations of polyacrylamide polymers, and these can be injected to improve the economics of conventional waterflooding.  
   It has also been used for horticultural and agricultural use under trade names such as Broadleaf P4, Swell-Gel and so on. The anionic form of cross-linked **polyacrylamide** is frequently used as a soil conditioner on farm land and construction sites for erosion control, in order to protect the water quality of nearby rivers and streams.
4. **How is polyacrylamide applied?**  
   Three most common forms of polyacrylamide are dry granules, solid blocks (cubes), and emulsified liquids. The application method of polyacrylamide chosen depends on the form of polyacrylamide selected.   
   The use of dry granular polyacrylamide into irrigation water is facilitated by the use of an augured metering system and excellent mixing and thorough dissolving before the polyacrylamide reaches the irrigated furrows. In order for the polyacrylamide to dissolve properly in the irrigation ditch it must have proper agitation.  Unlike sugar or salt which dissolve fairly quickly in water, granular polyacrylamide needs to be agitated thoroughly in order for it to dissolve.   
   Polyacrylamide blocks (or cubes) are usually placed in wire baskets that need to be secured to the edge of the ditch to avoid washing of the blocks down the ditch. In a concrete ditch, tins or boards will provide sufficient turbulence.   
   Liquid polyacrylamide can be metered directly from the container into the irrigation ditch, directly into the furrow, or through a pipe line or injector pump.  
   If you are interest in and want to know more about polyacrylamide, please come and click our website, you will find what you want.
5. **Why would people want to use polyacrylamide?**  
   [**PAM Polyacrylamide**](http://www.njgaokechem.com/Polyacrylamide.htm) is highly effective in reducing soil erosion off of fields and can increase water infiltration into irrigated furrows. It has been shown to significantly that polyacrylamide reduce soil erosion by 90-95 percent when applied to irrigation water. Increases in water infiltration rates vary from 20-60 percent from trials and experiments listed below in the "links" section. The increased use and distribution of [**polyacrylamide products**](http://www.njgaokechem.com/product.htm) in the past few years has brought down product prices, making polyacrylamide a more economical BMP option. Polyacrylamide's many forms and application techniques make integration into the farmer's irrigation routine smooth and relatively easy once the initial set-up is complete. Relatively low cost, high reduction of irrigation-induced erosion and soil loss, ease of use and integration, make polyacrylamide a best management practice worth looking into by any agricultural operation.
6. **Why would people prefer to use granular polyacrylamide to liquid polyacrylamide in irrigated furrows?**  
   An experiment have done to test on two different application techniques of polyacrylamide ([**polyacrylamide liquid**](http://www.njgaokechem.com/Polyacrylamide.htm) and [**polyacrylamide granular**](http://www.njgaokechem.com/Polyacrylamide.htm)) showed both reduced sediment loss and increased water infiltration into the soil. The experiment was designed to determine if granular polyacrylamide could be as effective at reducing erosion in furrows when applied starting at the beginning of the head ditch (where it has not yet thoroughly dissolved) as when applied to the furrows further down the head ditch.    
   The two forms of polyacrylamide were supposed to be applied at similar rates, but liquid polyacrylamide ended up being applied at a rate of 0.9 lb/acre and the granular polyacrylamide at a rate of 1.8 lb/acre.  The difference was caused by the changes in volume of water flowing in the head ditch during the experiment and by other changes in irrigation management on the commercial farm.  For soil erosion the check furrows lost 322 lb/ac of sediment off of the field in the runoff water during a single irrigation. Furrows irrigated with granular polyacrylamide lost 7 lb/ac of sediment off of the field, while those irrigated with the liquid solution of polyacrylamide lost 104 lb/ac.  Remember though, the granular polyacrylamide was applied at a rate double the liquid.   
   In increasing water infiltration, the check furrows lost 37.5 percent of the water as runoff and 62.5 percent was infiltrated. Out of the total water applied treated with granular polyacrylamide, 26.5 percent was lost as runoff and 73.3 percent of the water infiltrated into the soil. Out of the total water treated with liquid polyacrylamide, 29.1 percent was lost as runoff and 70.8 percent of the water infiltrated.  Granular polyacrylamide used as a "patch" was effective to control the loss of sediment and increase water infiltration.
7. **Is polyacrylamide stable?**  
   In dilute aqueous solution, such as in the use of Enhanced Oil Recovery applications, polyacrylamide polymers are susceptible to chemical, thermal, and mechanical degradation. When the labile amine moiety hydrolyzes at elevated temperature or pH, chemical degradation occurs, It will resulting in the evolution of ammonia and a remaining carboxyl group. Thus, the degree of anionicity of the molecule increases. Thermal degradation of the vinyl backbone can occur through several possible radical mechanisms, including the autooxidation of small amounts of iron and reactions between oxygen and residual impurities from polymerization at elevated temperature. Mechanical degradation can also be an issue at the high shear rates experienced in the near-wellbore region. However, cross-linked variants of polyacrylamide have shown greater resistance to all of these methods of degradation, and have proved much more stable.
8. **What is the potential health effects of polyacrylamide?**  
   Eye: May cause eye irritation.   
   Skin: May cause skin irritation.   
   Ingestion: May cause irritation of the digestive tract.   
   Inhalation: May cause respiratory tract irritation.   
   Chronic: Chronic inhalation and ingestion may cause effects similar to those of acute inhalation and ingestion.
9. **What is the safety and health issues of polyacrylamide?**  
   Public perception is often that all chemicals are harmful. We have to tell you that they are not – chemicals are the building blocks of all living things. Acrylamide is a naturally occurring chemical found in a wide variety of foods, such as potatoes. There is a current controversy being debated in the media about “free acrylamide” causing cancer. It is being alleged that when the acrylamide component of a food product is heated to an extremely high temperature in the cooking process, its chemical structure is altered and in some instances acts as a cancer causing agent.  
   Actually, polyacrylamide, while using acrylamide as one of the raw materials in the chemical formula, is a man-made potassium-based chemical compound, it is found environmentally safe for use in drinking water treatment and agricultural production. It is not used in applications where extremely high heat is recommended. It’s like comparing apples and oranges - there is no correlation between the two.  
   Anionic polyacrylamide is a “non-toxic” chemical compound. Quality anionic polymers are:  
   1. Environmentally benign (safe)  
   2. Harmless to fish and aquatic organisms, wildlife, and plants  
   3. Non-combustible  
   4. Biodegradable
10. **What is the first aid measures of polyacrylamide?**  
    Eyes: Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.   
    Skin: Flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.   
    Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.   
    Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid if cough or other symptoms appear.   
    Notes to Physician: Treat symptomatically.
11. **What is the environmental effects of polyacrylamide?**  
    It is known that polyacrylamide used in agriculture may contaminate food with the nerve toxin acrylamide. While polyacrylamide itself is relatively non-toxic, it is known that commercially available polyacrylamide contains minute residual amounts of acrylamide remaining from its production, usually less than 0.05% w/w. However, unpolymerized acrylamide, which is a neurotoxin, can be present in very small amounts in the polymerized acrylamide, therefore it is recommended to handle it with caution.  
    Additionally, there are concerns that polyacrylamide may de-polymerise to form acrylamide. In one (much debated) study conducted in 1997 at Kansas State University, the effect of environmental conditions on polyacrylamide were tested, and it was shown that degradation of polyacrylamide under certain conditions does in fact cause the release of acrylamide.
12. **What is the handling and storage methods of polyacrylamide?**  
    Handling: Wash thoroughly after handling. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Avoid ingestion and inhalation. Store protected from light.   
    Storage: Store in a cool, dry, well-ventilated area away from incompatible substances.
13. **What is the exposure controls and personal protection of polyacrylamide?**  
    Exposure Controls   
    Engineering Controls: Use adequate ventilation to keep airborne concentrations low.   
    OSHA Vacated PELs: Acrylamide: 0.03 mg/m3 TWA Sodium Azide: No OSHA Vacated PELs are listed for this chemical. Water: No OSHA Vacated PELs are listed for this chemical.   
    Personal Protective Equipment   
    Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.   
    Skin: Wear appropriate protective gloves to prevent skin exposure.   
    Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.