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Roshana Ab Avosh Co.

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Introduction

Acquiring the necessary technical knowledge in four years and relying on its own technical knowledge, Roshana Ab Avosh has implemented the biggest Polyaluminum Chloride production plan with a capacity of 20,000 tons per year (first phase) in Iran.

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Roshana Ab Avosh Co. is the first producer of liquid Polyaluminum Chloride with high alumina percentage (AvoPAC 17MB) and also is the first producer of Polyaluminum Chlorosulfate (AvoPAC 9HB) in Iran, in accordance with the latest international standards (EN 17034:2018 and DS/EN 883).

Polyaluminum Chloride, the top generation of coagulants

Polyaluminum Chloride (PAC) is a new and powerful coagulant and flocculant in water and wastewater treatment processes. The use of this material is increasing dramatically in a wide range of drinking water, sewage and industrial and Chemical wastewater treatment processes and it is used as a more efficient material than older coagulants such as Aluminum Sulfate (Alum), Ferric Chloride and Ferric sulfate in many water/wastewater treatment plants. In addition to developed countries such as United States, Canada, China, Italy, France and England, this material has been able to take its place as a popular coagulant in many industries in Iran and other Middle Eastern countries

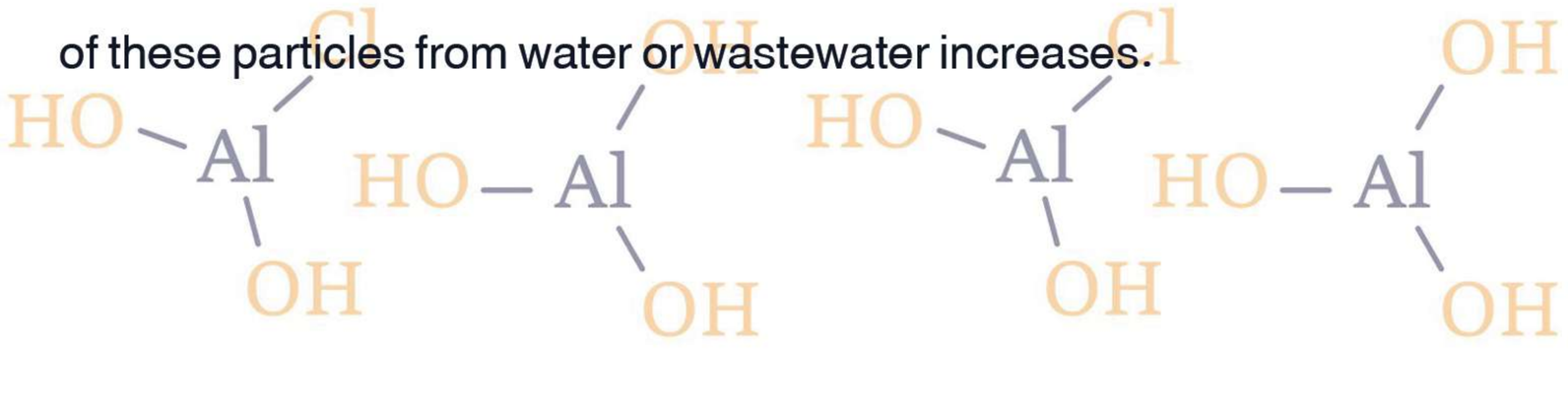
Polyaluminum Chlorides are a group of inorganic, pre-neutralized, and water soluble polymer compounds with a high charge density which are classified based on the alumina percentage, the degree of polymerization, and the basicity.This product is defined by the following empirical formula:

$$Al_2(OH)_nCl_{6\_n}$$

Polyaluminum Chlorosulfate (PACS) is another widely used product from the family of Polyaluminum Chlorides with the following empirical formula:

$$Al_2(OH)_nCl_{(6\_n\_2k)}(SO)_{4\ K}$$

Entering sulfate into the structure of PAC and forming PACS increases the coagulant's ability to interact with pollutants and suspended particles in water or wastewater, the size of the clots formed is larger and, consequently, the amount and rate of sedimentation and removal of these particles from water or wastewater increases.



Indices for determining the quality of Polyaluminum Chloride

The Quality and Performance of Polyaluminum Chloride is identified with two main characteristics, i.e. alumina percentage and basicity. In fact, these two parameters determine the quality of PAC. The higher the percentage of alumina in PAC, the higher the charge density in the aqueous environment, which causes the formation of more flocs. Also, the higher basicity percentage, the larger flocs are formed and, consequently, coagulation/flocculation process of the particles in water is done better and faster.

Comparison of Polyaluminum Chloride (PAC), Aluminum Sulfate (Alum), and Ferric Chloride ($FeCl_3$)

Definition	Polyaluminum chloride	Aluminum sulfate	Ferric chloride
Consumption	Low	Medium and high	Medium and low
Water alkalinity reduction	Low	High	High
System salinity	Low	High	High
Reduction of COD and BOD	High	Low	High
Gypsum formation	No	Yes	No
Sulfate sludge	No	Yes	No
Corrosion of metal	Very low	High	High
Formed sludge Pigmentation	No	No	Yes

Comparison between liquid and solid Polyaluminum chloride

Solid Polyaluminum chloride	Liquid Polyaluminum chloride
✗ The need for a mixer tank to dissolve in water	✓ No need for a mixer tank
✗ The higher percentage of undissolved sediments in water	✓ Ability to inject directly from the reservoir tank
✗ Dust generation while adding it to the mixer tank	✓ No generation of dust and waste
✗ The need for more operators	✓ No need for an operator
✗ Higher price (up to more than 2.5 times) compared to liquid PAC	✓ Lower price compared to solid PAC
✗ Very fast absorption of environmental moisture (in most production grades)	✓ No formation of insoluble sediments in the water environment
✓ Shelf life up to more than 24 months	✗ Shelf life up to more than 12 months
✓ Easier packing and Transportation	✗ The need for tanks or containers for transportation and storage

Polyaluminium chloride Applications

In the water and all types of industrial and chemical wastewater treatment as coagulant for purification and clarification of industries and all types of industrial and chemical wastes:

- Drinking and Urban water
- Municipal and Urban sewage
- Effluent of textile and dyeing units
- Effluent of paper, cardboard and cellulose industries
- Effluent of leather industries
- Effluent of food and dairy, beverage and degreasing industries
- Effluent of the steel and power plant industries
- Leachate of urban waste
- Effluent of slaughterhouse, animal husbandry and meat processing industries
- Effluent of detergent, cosmetics and hygiene industries
- Effluent of sand washing industries
- Effluent of tile and ceramic industries
- Effluent of paint and resin industries
- Removal of toxic and dangerous metals and ionic compounds

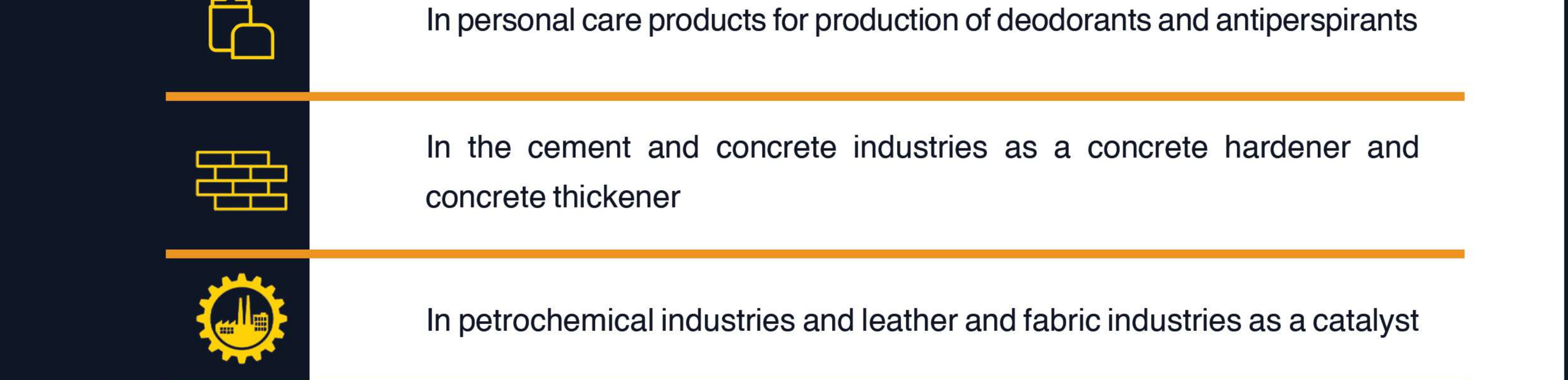
In pulp and paper production industries with the aim of producing a paper with higher strength and quality

In personal care products for production of deodorants and antiperspirants

In the cement and concrete industries as a concrete hardener and concrete thickener

In petrochemical industries and leather and fabric industries as a catalyst

In detergent and cleaner industries as an additive to increase the quality and performance of detergents



Products

- **AvoPAC 17MB Liquid Polyaluminum Chloride with 17% alumina and moderate basicity**

  Liquid Polyaluminum Chloride (17%) with the brand name of AvoPAC 17MB is from the category of liquid PACs with moderate basicity and 16.5-17.5% alumina. AvoPAC 17MB is an aluminum-based coagulant with a high charge density which leads to a lower amount of consumption in the coagulation process as well as a reduction in the amount of produced sludge. The most appropriate application of this product is for the treatment of urban water, treatment of urban sewage and waste leachate and all types of industrial effluents and also in production processes of pulp and paper industries.

- **AvoPAC 9HB Liquid Polyaluminum Chloride with 9%-9.5% alumina and high basicity**

  High basicity liquid polyaluminum chloride with the brand name of AvoPAC 9HB, the latest grade of liquid Polyaluminum Chloride products produced by Roshan Ab avosh Company is from the category of liquid PAC with high basicity and 9-9.5% alumina which is produced in accordance with latest international standards (BS EN 17034:2018 and DS/EN 883). Due to the very low amount of aluminum free ion release, this product is considered as the best option for treatment and clarification of drinking water, treatment of incoming water and effluents into industrial water desalination systems which are also called Reverse Osmosis (RO). The coagulation and flocculation power of this product is high, which accelerates the process of treatment and separation of suspended substances in water or wastewater. Roshana Ab Avosh Co. has the honor of being known as the first and only producer of this product in Iran.

- **AvoPAC 13LB Liquid Polyaluminum Chloride with 13% alumina and low basicity**

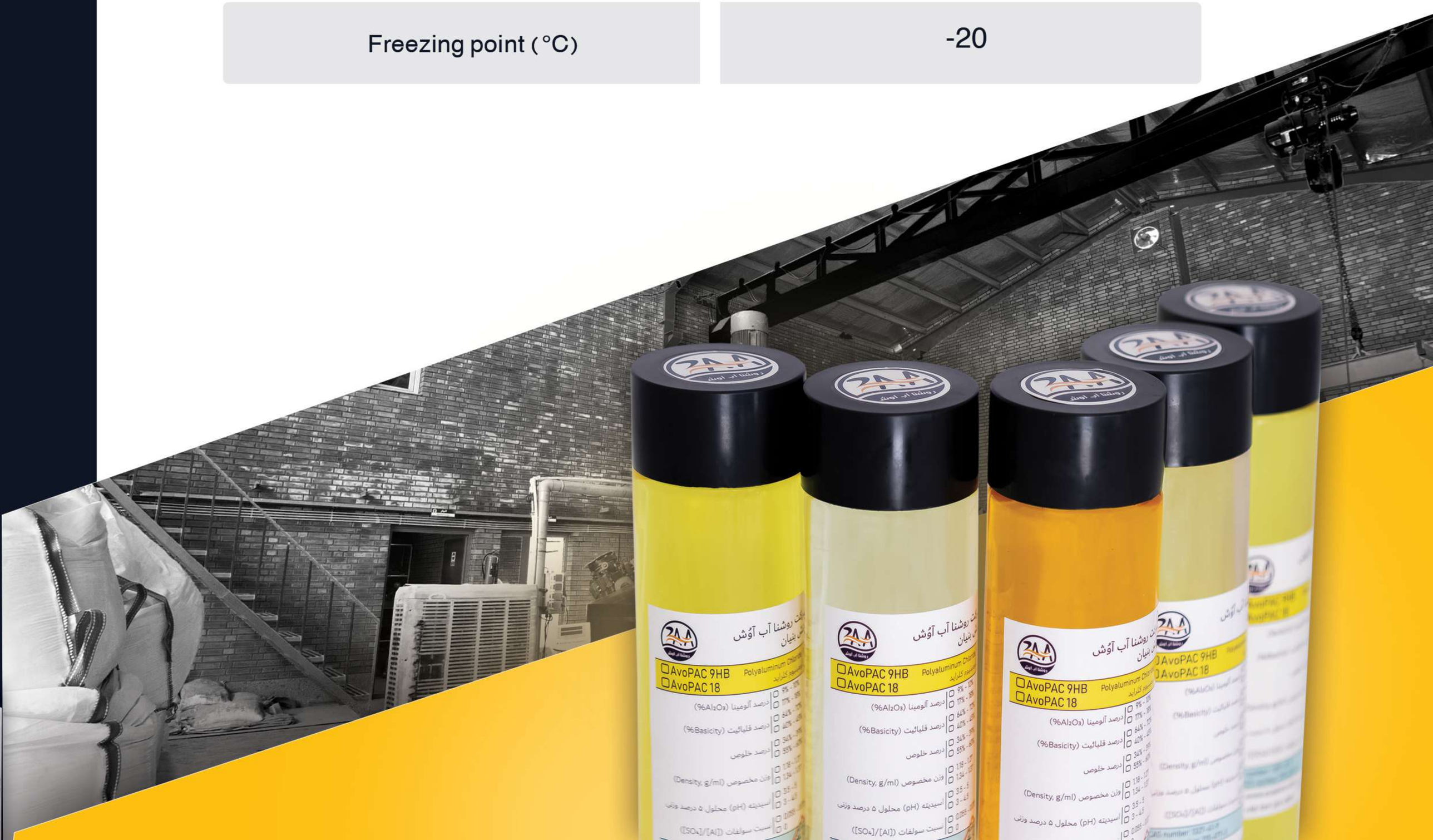
  Liquid Polyaluminum Chloride (13%) with the brand name of AvoPAC 13LB is from the category of liquid PAC with low basicity and 12.5-13.5% alumina. The most appropriate application of this product is for the treatment of water and effluents with high alkalinity (pH > 10) It is like the effluent of some textile and dyeing factories.

- **AvoPAC 10MB Liquid Polyaluminum Chloride with 10% alumina and moderate basicity**

  Liquid Polyaluminum Chloride (10%) with the brand name of AvoPAC 13LB is from the category of liquid PAC with moderate basicity and 9.5-10.5% alumina. This grade of liquid polyaluminum chloride is recommended as the most affordable option for treating wastewater that does not require complete treatment or treating wastewater that is less sensitive.

AvoPAC 17MB Specifications

Cas number	1327- 41- 9
Appearance	Pale yellow liquid
Chemical formula	$Al_2(OH)_n Cl_{6\_n}$
Weight percentage of alumina (Al_2O_3)	16.5 - 17.5
Weight percentage of Chlorine ion	19.5 - 21.3
Weight percentage of sulfate ion	0
Density at 20 °C	1.34 - 1.37
Basicity percentage	38 - 45
The percentage of insoluble substances in water	Insignificant
Turbidity (NTU)	Less than 20
pH of the solution (5% weight percentage)	3 - 4.5
Viscosity in 20 °C (mPA.s)	10 - 50
Freezing point (°C)	-20



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AvoPAC 9HB Specifications

Cas number	1327- 41- 9
Appearance	Colorless yellowish liquid
Chemical formula	$Al_2(OH)_n Cl_{(6\_n\_2k)}(SO_4)_k$
Weight percentage of alumina (Al_2O_3)	9 - 9.5
Weight percentage of Chlorine ion	10.14 - 11.28
Weight percentage of sulfate ion	1.10 - 1.50
Density at 20 °C	1.20 - 1.25
Basicity percentage	64 - 72
The percentage of insoluble substances in water	Insignificant
Turbidity (NTU)	Less than 20
pH of the solution (5% weight percentage)	3.5 - 5
Viscosity in 20 °C (mPA.s)	10 - 30
Freezing point (°C)	-10 C °

AvoPAC 13LB Specifications

Cas number	1327 - 41 - 9
Appearance	Colorless yellowish liquid
Chemical formula	$Al_2(OH)_n Cl_{6-n}$
Weight percentage of alumina (Al_2O_3)	12.5 - 13.5
Weight percentage of Chlorine ion	24.04 - 24.54
Weight percentage of sulfate ion	0
Density at 20 °C	1.28 - 1.33
Basicity percentage	10 - 20
The percentage of insoluble substances in water	Insignificant
Turbidity (NTU)	Less than 5
pH of the solution (5% weight percentage)	2.5 - 4
Viscosity in 20 °C (mPA.s)	10 - 30
Freezing point (°C)	-20

AvoPAC 10MB Specifications

Cas number	1327 - 41 - 9
Appearance	Colorless yellowish liquid
Chemical formula	$Al_2(OH)_n Cl_{6\_n}$
Weight percentage of alumina (Al_2O_3)	9.5 - 10.5
Weight percentage of Chlorine ion	23 - 24.5
Weight percentage of sulfate ion	0
Density at 20 °C	1.25 - 1.30
Basicity percentage	35 - 40
The percentage of insoluble substances in water	Insignificant
Turbidity (NTU)	Less than 10
pH of the solution (5% weight percentage)	3.2 - 4.5
Viscosity in 20 °C (mPA.s)	12 - 25
Freezing point (°C)	-15 C °

AvoPAC 30M (Polyaluminum Chloride Powder)

polyaluminum chloride Powder 30% with the brand name of AvoPAC 30MB with an alumina content of more than 28% is a well-known and common coagulant with high purity and the highest level of quality compared to similar industrial samples. The production process of AvoPAC 30MB is carried out with the most advanced drying technology (Spray Dryer) from the 17% liquid PAC product under the brand name AvoPAC 17MB of Roshana Ab avosh Company. Due to the strong neutralization of colloidal particles and the selective absorption of soluble substances, this product is the most suitable option for urban water treatment, industrial and chemical effluents, and production processes in the paper, cardboard, and cellulose industries.

AvoPAC 30MB Specifications	
Cas number	1327 - 41 - 9
Appearance	Pale yellow powder (Spray Dried Type)
Chemical formula	$Al_2(OH)_nCl_{6-n}$
Weight percentage of alumina (Al_2O_3)	30 ± 2
Weight percentage of Chlorine ion	< 37.5
Weight percentage of sulfate ion	Insignificant
Basicity percentage	45 - 80
The percentage of insoluble substances in water	< 1.5
pH of the solution (%1 weight percentage)	3.5 - 5
Packing	25 kg double layer bag
Shelf life	More than 24 months

Product Packing:

- 25 KG Gallon
- 280 KG Barrel
- 1000 Liter Protective Tanks (IBC)
- 5,10,15 Tones Tanks
- 25 Tones Tankers

1000 Liter Protective Tanks (IBC)

25 KG Gallon

25 Tones Tankers

5,10,15 Tones Tanks

280 KG Barrel

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