

JAYPOL HS62

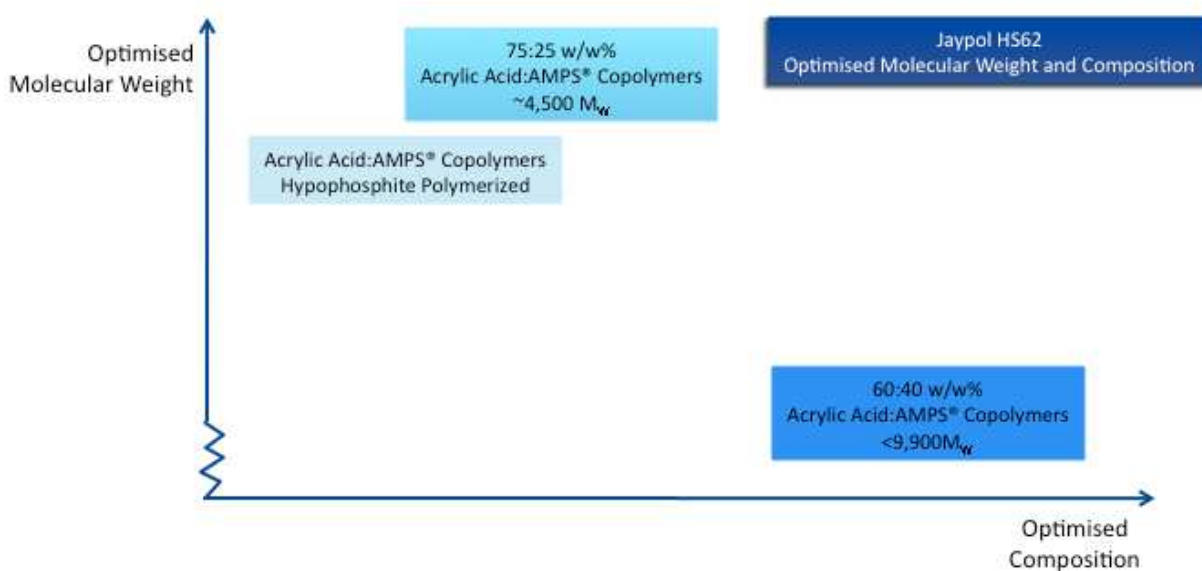
WATER TREATMENT SCALE INHIBITOR

Product Overview

JAYPOL HS62 is a sulphonated copolymer comprised of acrylic acid and 2-acrylamido-2methyl propane sulfonic acid designed for use in process water applications. Typical uses for **Jaypol HS62** include cooling water applications in stabilised phosphate and stabilised phosphate/zinc programmes. **Jaypol HS62** is also an effective additive for the control of calcium carbonate, calcium sulfate, calcium phosphonate, colloidal iron stabilisation and dispersion of iron oxides and hydroxides.

Optimised for Targeted Performance

Not all sulphonated polymers are created alike. **Jaypol HS62** is specifically engineered to provide optimum performance for calcium phosphate stabilisation and performance for common mineral scales encountered in stressed water applications. The performance of **Jaypol HS62** is driven by its composition and molecular weight. Versus competitive sulphonated copolymers, **Jaypol HS62** contains a high degree of sulfonation which allows increased performance for calcium phosphate, iron, and zinc stabilisation. Additionally, the molecular weight of **Jaypol HS62** is maintained in the range known to be effective for threshold inhibition, crystal modification, and particulate dispersion.



AMPS® is the Registered Trademark of The Lubrizol Corporation

Benefits

- Effective for control of a wide range of foulants:
 - Calcium Phosphate
 - Calcium Phosphonate
 - Zinc
 - Calcium Carbonate
 - Calcium Sulfate
 - Iron Oxides and Hydroxides
 - Colloidal Iron
 - Silt
- Highly tolerant to stressed water conditions
 - High pH and alkalinity
 - High calcium concentration
 - High dissolved solids
- Cost effective
- Compatible with other common additives
- Stable in acidic and alkaline formulations

Functionality

JAYPOL HS62 is an excellent choice for a wide range of water and system conditions due to its primary functional properties:

- **FUNCTIONALITY:**
 - Threshold Inhibition – A threshold inhibitor is an additive that has the ability to prevent precipitation of a substance at a sub-stoichiometric dosage. **JAYPOL HS62** acts as threshold inhibitor for common mineral scales such as CaCO_3 and CaSO_4 . This property can be enhanced when **JAYPOL HS62** is combined with phosphonates such as HEDP or PBTC.
 - Crystal Habit Modification – **JAYPOL HS62** has a direct impact upon the crystal habit of typical mineral scales. This functional property of **JAYPOL HS62** plays a critical role within the threshold inhibition mechanism. In addition, the crystal habit modification properties of **JAYPOL HS62** significantly limits the amount of adherent deposits to system surfaces when the limits of threshold inhibition are exceeded.
 - Particulate Dispersion – **JAYPOL HS62** is engineered with a molecular weight in the range known to be highly effective for general particulate dispersion. The sulphonate functionality of **JAYPOL HS62** adds dispersing properties for difficult particulates such as iron oxides and hydroxides. This span of dispersing properties makes **JAYPOL HS62** an ideal choice for the types of solids found in process water applications.
 - Stabilisation – Stabilisation of $\text{Ca}_3(\text{PO}_4)_2$, $\text{Zn}(\text{OH})_2$, and soluble iron is a critical functionality in many process applications, especially cooling water systems. **JAYPOL HS62** contains an optimised level of sulphonated monomer to provide exceptional performance as a stabiliser of calcium phosphate, zinc, and iron. **JAYPOL HS62** is a building block additive for scale and corrosion formulations where phosphate or phosphate and zinc are utilised. These formulations are commonly known as “stabilised phosphate” or “stabilised phosphate-zinc” programmes and require a robust polymer such as **JAYPOL HS62** with known stabilisation efficacy.

Use in Cooling Water Systems

JAYPOL HS62 is a polymer with multiple functionalities found useful in cooling water systems. The threshold inhibition properties **JAYPOL HS62** provide a good basis for combination with phosphonates to control calcium carbonate in moderate to severe application conditions. The crystal modification and particulate dispersion properties of **JAYPOL HS62** are highly functional in systems where high suspended solids or deposition is observed.

Possibly the most common use for **JAYPOL HS62** in cooling water systems is in stabilised corrosion control programs. In such applications, additives such as phosphate, polyphosphates, and zinc are utilised to inhibit mild steel corrosion. When phosphates and reverted polyphosphates react with calcium hardness present in the system circulating water, insoluble calcium phosphate will form. Calcium phosphate scale is a thermally insulating scale which can have a significant impact upon normal system flow and heat transfer efficiency. Similarly, when zinc is utilised as a cathodic corrosion inhibitor, it can form zinc hydroxide in alkaline cooling waters. When zinc is utilised, it is critical that the zinc is stabilised to prevent precipitation of zinc hydroxide in the bulk circulating water and not over stabilised such that it will not be available under the conditions observed at the cathode of the mild steel surface. **JAYPOL HS62** is a critical component to stabilised cooling water formulations based on its ability to stabilise both calcium phosphate and zinc.

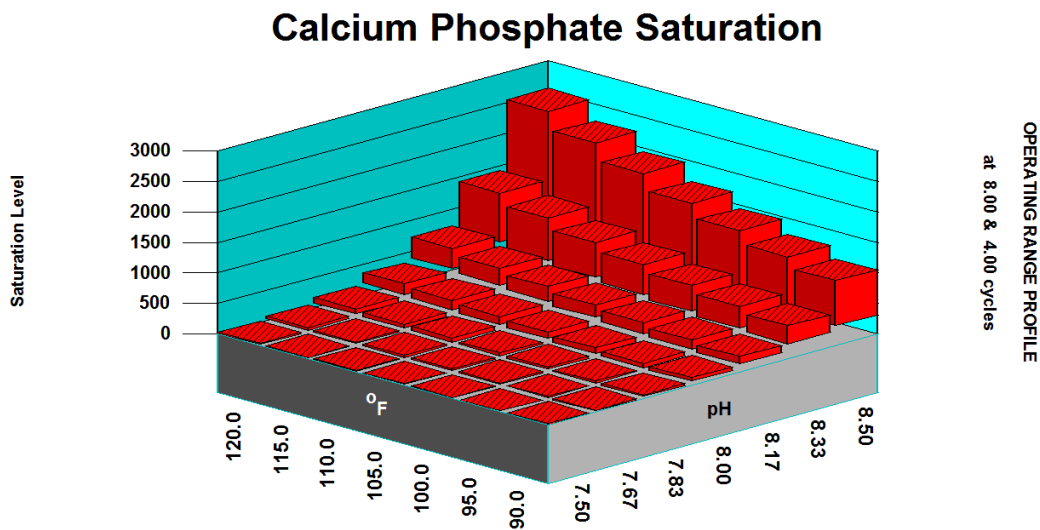
To illustrate the need for **JAYPOL HS62** in stabilised phosphate programmes, a typical low hardness water was modelled using WaterCycle® from French Creek Software.

Table 1 shows make-up water chemistry for a low hardness water with low to moderate alkalinity and iron.

Table 1: Make-Up Water Chemistry

Calcium (as CaCO ₃)	30.00
"M" Alkalinity (as CaCO ₃)	100.00
"P" Alkalinity (as CaCO ₃)	0.00
Iron (as Fe)	0.100
Phosphate (as PO ₄)	0.00
Pyrophosphate(as PO ₄)	0.00
Zinc (as Zn)	0.00
pH	7.00

A soft water formulation was chosen where 6 mg/l orthophosphate (as PO_4^{3-}) and 5 mg/l of polyphosphate (as P_2O_5) were selected as treatment levels. A 20% reversion of polyphosphate was assumed given an average holding time and bulk water temperature of 110°F. The water was subsequently modelled at 4 and 8 cycles to observe saturation levels for calcium phosphate given a range of temperature and pH. It can be observed in the following graph that calcium phosphate saturation has been exceeded even in low pH and temperature conditions. The saturation level reaches ~2,500X at typical system operating conditions of pH 8.5 and a maximum temperature of 120°F. Given the low degree of calcium phosphate solubility in normal cooling water conditions, it is essential that a carefully chosen polymer such as **JAYPOL HS62** is utilised.



Starting Point Formulations

Starting Point formulations are provided for reference purposes only. The user is responsible for assuring the suitability of any formulation based on the operating and water conditions observed in each specific application.

Cooling Water Formula A: Stabilised Phosphate – Aggressive Waters (LSI ~ 0 – 1.0)

Additive	Function	Active Concentration In Formula	Desired Concentration in Circulating Water (mg/l actives)
Jaypol HS62	Calcium Phosphate Stabiliser, Particulate Dispersant, Calcium Carbonate Inhibitor	8-10%	8-10
HEDP	Calcium Carbonate Inhibitor, Contributor to Mild Steel Corrosion Inhibition	2-4%	2-4
H ₃ PO ₄ or Na ₂ HPO ₄	Anodic Corrosion Inhibitor – Mild Steel	6-8% as PO ₄ ³⁻	6-8 as PO ₄ ³⁻
SHMP	Cathodic Corrosion Inhibitor – Mild Steel, Sequestration of Iron	3-6% as P ₂ O ₅	3-6 as P ₂ O ₅
Tolyltriazole	Copper Corrosion Inhibitor	2-3%	2-3
NaOH or KOH	Formulation pH Adjustment	to pH 12.0 – 12.5	-
DI Water	Formulation Diluent	q.s. to 100%	-

Cooling Water Formula B: Stabilised Phosphate/Zinc Aggressive Waters (LSI ~ 0 – 1.0)

Additive	Function	Active Concentration In Formula	Desired Concentration in Circulating Water (mg/l actives)
Jaypol HS62	Calcium Phosphate Stabiliser, Zinc Stabiliser, Particulate Dispersant, Calcium Carbonate Inhibitor	8-10%	8-10
HEDP	Calcium Carbonate Inhibitor, Contributor to Mild Steel Corrosion Inhibition	2-4%	2-4
H ₃ PO ₄ or Na ₂ HPO ₄	Anodic Corrosion Inhibitor – Mild Steel	4-6% as PO ₄ ³⁻	4-6 as PO ₄ ³⁻
Zinc Sulfate	Cathodic Corrosion Inhibitor – Mild Steel	0.5-1.5% as Zn ²⁺	0.5-1.5 as Zn ²⁺
Benzyltriazole	Copper Corrosion Inhibitor	2-3%	2-3
H ₂ SO ₄	Formulation pH Adjustment	to pH ~ 2.0	-
DI Water	Formulation Diluent	q.s. to 100%	-

Cooling Water Formula C: Stabilised Phosphate – Moderate Waters (LSI ~ 1.0-2.0)

Additive	Function	Active Concentration In Formula	Desired Concentration in Circulating Water (mg/l actives)
Jaypol HS62	Calcium Phosphate Stabiliser, Particulate Dispersant, Calcium Carbonate Inhibitor	8-10%	8-10
HEDP	Calcium Carbonate Inhibitor, Contributor to Mild Steel Corrosion Inhibition	3-5%	3-5
H ₃ PO ₄ or Na ₂ HPO ₄	Anodic Corrosion Inhibitor – Mild Steel	3-5% as PO ₄ ³⁻	3-5 as PO ₄ ³⁻
STP	Cathodic Corrosion Inhibitor – Mild Steel, Sequestration of Iron	3-5% as P ₂ O ₅	3-5 as P ₂ O ₅
Tolyltriazole	Copper Corrosion Inhibitor	2-3%	2-3
NaOH or KOH	Formulation pH Adjustment	to pH 12.0 – 12.5	-
DI Water	Formulation Diluent	q.s. to 100%	-

Usage Notes

JAYPOL HS62 is stable if appropriately used. Storage in high density plastic or 316 stainless steel is recommended. Avoid extremes of temperature, Avoid storage or contact with mild steel, copper and aluminium.

In respect of handling no specific technical measures are required. Observe general health & safety rules [avoid contact with skin; wear goggles and gloves etc.] In the event of spillage, clean skin with plenty of water and soap. Flush eyes with water and a buffer solution. See respective Material Safety Data Sheet for additional information.

Physical Properties

Description:

JAYPOL HS62 is an sulphonated copolymer designed to control deposition of common mineral scale and solids typical to process water applications.

Appearance:

Colourless to pale yellow liquid

Bulk viscosity:

< 200cP (Brookfield RVT sp 2 @ 30 rpm)

Solubility:

Water soluble

Solids content:

approx. 43%

pH:

(1% aq solution) approx. 4.0

For more information, contact our Acrylates' Center of Excellence.

PHONE: +44(0)1274 549399
FAX: +44(0)1274 549851
EMAIL: acrylates@ispcorp.com

To find an ISP office near you, visit: www.ispcorp.com

EMAIL: info@ispcorp.com

FRANCE Tel: +33 (0) 1 49 93 21-58/59

UK Tel: +44 (0) 207 519-5054

SINGAPORE Tel: +656 223-3778

GERMANY Tel: +49 (0) 2236 9649-260

USA Tel: +1 973-628-4000

BRAZIL Tel: +55 11 3649-0420

The information contained in this document and the various products described are intended for use only by persons having technical skill and at their own discretion and risk after they have performed necessary technical investigations, tests and evaluations of the products and their uses. While the information herein is believed to be reliable, we do not guarantee its accuracy and a purchaser must make its own determination of a product's suitability for purchaser's use, for the protection of the environment, and for the health and safety of its employees and the purchasers of its products. Neither ISP nor its affiliates shall be responsible for the use of this information, or of any product, method or apparatus described in this document. Nothing herein waives any of ISP's or its affiliates' conditions of sale, and WE MAKE NO WARRANTY, EXPRESS OR IMPLIED, OF MERCHANTABILITY OR FITNESS OF ANY PRODUCT FOR A PARTICULAR USE OR PURPOSE. We also make no warranty against infringement of any patents by reason of purchaser's use of any information, product, method or apparatus described in this document.