GPS Safety Summary

Amino tris (methylenephosphonic acid)
and its sodium salts

Chemical Identity

Brand names	**Briquest 301-50A; Briquest 301-30SH; Briquest 301-32S**	*CAS numbers*	**6419-19-8 (ATMP-H)** **20592-85-2 (ATMP-xNa)**
Chemical name (IUPAC)	**[bis (phosphonomethyl) amino] methyl phosphonic acid**	*Molecular formula*	**$C_3H_{12}NO_9P_3$** **$C_3H_{(12-x)}NO_9P_3Na_x$**
Synonyms	**Tris(methylene phosphonic acid) amine; ATMP-H; ATMP-xNa**	*Molecular weight*	**299 g/mol (ATMP-H)** **321 to 431 g/mol (ATMP-xNa)**

Applications

ATMP acid and its sodium salts are mainly used as scale inhibitors in water treatment. These phosphonate substances are also used in detergent and cleaning applications, in paper, textile and photographic industries and in off-shore oil applications.

Safety Assessment, Exposure and Risk Management Recommendations

Physical and chemical properties

Property	Result
Physical state (pure substance)	Solid at 20°C
Form	Manufactured as an aqueous solution
Colour	Colourless to pale yellow
Odour	Very faint
Freezing Point	ca. - 10°C
Relative density	1.3 – 1.4 at room temperature
Flash point	Not applicable to aqueous solution
Vapour pressure	Very low potential for volatility
Water solubility	Miscible
Octanol water partition	Low potential for bioaccumulation
Metal corrosion	May cause corrosion to metals

Health effects

ATMP acid, Na salt and 6Na salts cause serious eye irritation whereas ATMP-2Na to 5Na salts are not classified for eye irritation. For industrial uses, stringent safety measures must be observed. For more details, please refer to the Safety Data Sheet.
For consumer applications, ATMP is used in suitable concentrations according to appropriate regulations.

Environmental effects

ATMP acid and its sodium salts are soluble in water but they are not readily biodegradable. ATMP has a low potential for bioaccumulation and is not classified as dangerous for the environment.
Disposal, treatment or recycling must comply with applicable regulations to preserve the environment.

Regulatory information and certifications

Classification and labelling

EU regulation (EC) 1272/2008 (CLP)

Hazard class and category	Hazard Statement	Impacted substances
Metal corrosion, Cat. 1	H290 May cause corrosion to metals.	AMTP-H; ATMP-Na; ATMP-2Na
Eye irritation, Cat. 2	H319 Causes serious eye irritation.	AMTP-H; ATMP-Na; ATMP-6Na

Warning

N.B.: ATMP-3Na to 5Na salts are not classified at all, according to the regulation criteria.

Registration and certification

EU regulation for chemicals (EC) 1907/2006 (REACH)
ISO 9001: 2008 certified

ATMP acid and its sodium salts are formulated to comply with requirements of most stringent regulations for applicable consumer uses. They can be safely used in suitable concentrations according to appropate regulations.

GPS Safety Summary

This Product Safety Summary is intended to provide a general overview of the chemical substance in the context of ICCA Global Product Strategy. The information on the Summary is basic information and is not intended to provide emergency response information, medical information or treatment information. The summary should not be used to provide in-depth safety and health information. In-depth safety and health information can be found on the (extended) Safety Data Sheet (e)SDS for the chemical substance.

Amino tris (methylenephosphonic acid)
and its sodium salts

General Statement

ATMP acid and its sodium salts are mainly used as scale inhibitors in water treatment. These phosphonate substances are also used in detergent and cleaning applications, in paper, textile and photographic industries and in off-shore oil applications.

Pure ATMP is solid but the substance is manufactured and marketed as a colourless to pale yellow aqueous solution. ATMP acid and some of its sodium salts may cause corrosion to metals and may cause serious eye irritation to a varying degree dependent upon the pH/degree of neutralization.

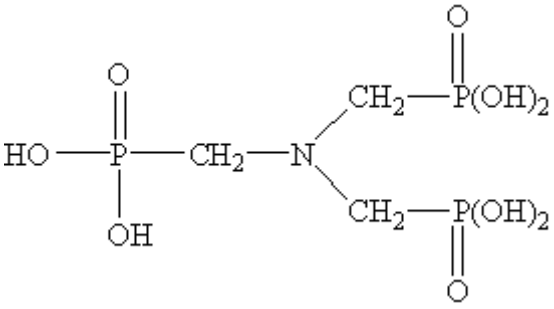
The marketed products, used in industry or for professional purpose, must be handled under stringent safety conditions at the workplaces, in accordance with the risk management measures to keep the exposure at a safe level and preserve human health and environment.

ATMP use in consumer products is minor, it may be found at low level in detergents, personal care products or fertilizers; it is formulated in suitable concentrations according to appropriate regulations to ensure safe use.

Chemical Identity

Name	ATMP acid	ATMP Na salt	Na salt	2 Na salt	3 Na salt	4 Na salt	5 Na salt	6 Na salt
Brand name	Briquest 301-50A	Briquest 301-30SH Briquest 301-32S						
CAS number	6419-19-8	20592-85-2		4105-01-5	7611-50-9	94021-23-5	2235-43-0	15505-05-2
EC number	229-146-5	243-900-0		223-878-9	231-520-8	301-416-8	218-791-8	239-534-6
Molecular formula	$C_3H_{12}NO_9P_3$	$C_3H_{(12-x)}NO_9P_3Na_x$	X = 1	X = 2	X = 3	X = 4	X = 5	X = 6
Molecular weight	299 g/mol	321 to 431 g/mol for x = 1 to 6	321	343	365	387	409	431
Chemical name (IUPAC)	[bis (phosphonomethyl) amino] methyl phosphonic acid							
EC name	Nitrilotrimethylene triphosphonic acid	Nitrilotrimethylene triphosphonic acid, sodium salt						
Synonyms	Amino tris(methyl phosphonic acid) ATMP, ATMP-H, NTMP Tris(methylene phosphonic acid) amine, Nitrilotri-methyl phosphonic acid	ATMP-xNa						

Structure:



x Na

with x = 1 to 6

Amino tris (methylenephosphonic acid) and its sodium salts belong to the ATMP category in that all category members are various ionized forms of the acid. These also include potassium and ammonium salts of that acid (not considered in this summary). The different salts are prepared by neutralizing the acid to a specific pH. The substances are available in aqueous solution only. The properties of the members of a category are consistent across all end points. Some properties for a salt, in ecotoxicity studies, for example, can be directly appreciated by analogy to the parent acid ones. Where studies results are available, the acid and salts are considered separately.

Uses and applications

ATMP may specifically be used as an intermediate for producing the phosphonates salts. The salt is used in situ (usually the case) or stored separately for further neutralization.

A major application of phosphonates is in treatment of cooling and boiler water systems as scale inhibitors. In particular, for ATMP and its sodium salts, prevention of the formation of calcium carbonate scale.
Phosphonates of this type are also used to prevent scale formation in “squeeze” applications in off-shore oilfield use.
Phosphonates are used as stabilizers for peroxides, particularly in pulp bleaching in paper industry or in the scouring and bleaching processes of textile industry.
Phosphonates of this category are used in consumer detergent applications as additives to provide a range of properties such as anti-redeposition and soil dispersion or as perborate and percarbonate stabilizers preventing decomposition by transition metals. These substances act as a chelating agent and hydrogen peroxide stabilisers in personal care products such as bar soaps and hair care preparations. Further uses in specific industrial and professional detergent formulations may be found in hard surface cleaning, vehicle washing and dairy cleaning
The substances are also dispersant and scale inhibiting agent in some agricultural fertilizer preparations.
They may be used also as a dispersant and viscosity conditioner in coatings and in ceramics slurry, they will be degraded in case of high temperature process.
Phosphonates can be used as chelating agent in weaving and dyeing industries and as metal surface treatment agent.

Physical/Chemical Properties

Phys/Chem Safety Assessment

Property	Value
Physical state	Solid at 20°C and atmospheric pressure
Form	Manufactured as an aqueous solution
Colour	Colourless to pale yellow
Odour	Very faint
Relative density	1.3 – 1.4 at room temperature
Freezing Point	ca. - 10°C at atmospheric pressure
Boiling Point	No data available (evaporation of aqueous solution followed by decomposition (≥ 178°C) of the substance)
Flash point	Not applicable to aqueous solution
Vapour pressure	≤ 2.7 x 10^{-9} Pa at 25°C (estimated)
Water solubility	500 - 1000 g/l at 25°C, miscible in water
Octanol Water partition coefficient (log Kow)	≤ - 3.53, low potential for bioaccumulation
Metal corrosion	May cause corrosion to metals

Based on available data, ATMP acid, ATMP-Na and 2Na salts are classified as corrosive to metals regarding physical and chemical hazards in accordance with EU regulation (EC) 1272/2008 criteria.

Health Effects

Human Health Safety Assessment

Effect Assessment	Result
Acute Toxicity Oral/inhalation/dermal	Not classified for acute toxicity, based on available studies results on oral and dermal routes of exposure.
Irritation / corrosion Skin/Eye	Based on available data, ATMP-4Na salt may be a mild irritant and 5Na may be slightly irritating to the skin, not resulting in classification. ATMP acid, Na and 6Na salts cause serious eye irritation. ATMP-2Na to 5Na salts are not classified for eye irritation.
Sensitisation	Not classified for skin sensitization, based on animal data and human exposure reports (ATMP salts are not classified by analogy with ATMP acid).
Toxicity after repeated exposure Oral/inhalation/dermal	Not classified for toxicity after repeated exposure, based on ATMP acid studies results.
Genotoxicity / Mutagenicity	Not classified either for mutagenicity or genotoxicity. Neither the acid nor the salt induced gene mutations in bacteria. ATMP-6Na salt did not induce chromosome damage either *in vitro* or *in vivo* and ATMP and its salts do not have any structural alerts for genotoxic activity.

Carcinogenicity	Not classified for carcinogenicity. ATMP sodium salts are not expected to be carcinogenic; by analogy with ATMP acid studies results.
Toxicity for reproduction	ATMP acid is not toxic for reproduction, based on rats three-generation study. By analogy, ATMP salts are not expected to have a toxic effect neither on fertility nor on development.

Low pH (<2) would predict that ATMP acid should be severely irritant or corrosive to skin as well as eyes, however available existing animal data indicating non-classification take precedence in accordance with EU regulation (EC) 1272/2008 criteria.

Environmental Effects

Environment Safety Assessment

Effect Assessment	Result
Aquatic Toxicity	Not harmful to aquatic organisms (short term and long term exposure) ATMP can lead to growth inhibition in algae, but this effect is a consequence of the substance's complexation with essential nutrients and not of true toxicity.

Fate and behaviour	Result
Biodegradation	Neither readily nor inherently biodegradable Partially photodegradable over short time period
Bioaccumulation potential	Not potentially bioaccumulative (Log Kow = -3.53)
PBT / vPvB conclusion	Not considered to be either PBT or vPvB

Based on available data, ATMP acid and its salts are not classified as dangerous for the environment, according to EU regulation (EC) 1272/2008.

Exposure

Exposure assessment is based on overall releases that may occur during a given lifecycle stage of the substance. The potential of the effects on human health and on environment is considered in the risk assessment and the risk of exposure is controlled from manufacture to end-use product by appropriate risk management measures.

Human health

ATMP acid is manufactured in industry, in closed, automated processes which ensure that the risk is controlled. However, workers may be exposed during un(loading), mixing, sampling, analysis or maintenance operations and particularly in case of batch processes and spray applications. Where there is a risk of exposure, it should be kept as minimum as possible and at safe levels (strictly below exposure limits, when applied) by the use of appropriate risk management measures as suitable collective and personal protective equipment, good industrial hygiene practices and risk communication through appropriate training of workers.

Consumers are likely to come in contact with the substance when using detergents, personal care products or garden fertilizers containing ATMP. ATMP is formulated in suitable concentrations to comply with requirements of the most stringent regulations for all applicable consumer uses. Conditions of safe use, written on the packaging, ensure controlled consumer risk of exposure.

Environment

Based on the relevant physical-chemical properties, the known uses and the fact that it is not readily biodegradable, ATMP and its salts will partition primarily to water and suspended sediments. ATMP and its salts are not expected to bioaccumulate.
The extremely low vapour pressure and very high water solubility of ATMP and its salts indicate that volatilization is negligible.

On industrial and professional sites, controlled aqueous releases are directed to a waste water treatment plant. Consumer applications effluents must be directed to a municipal waste water treatment plant. In the treatment plants the substance will be removed from waste water by adsorption onto the sludges which may be applied as agricultural fertilizer.

Risk Management Recommendations

Human health

For industrial and professional uses of ATMP in solution and as recommended for the use of any chemical product, workers must be well informed and trained and must refer to the (extended) Safety Data Sheet (eSDS).
Where there is a risk of exposure to ATMP in solution (during (un)loading, mixing, sampling, analysis or maintenance operations and particularly in case of batch processes and spray applications), it must be controlled by handling the product under an adequate ventilation with an effective exhaust ventilation system. Appropriate personal protective equipment must be worn as recommended in the (e)SDS (safety spectacles, goggles or a face shield depending on the task, appropriate gloves, protective suit). In case of mist, spray or aerosol exposure, a respirator with approved filter should be used. General industrial hygiene measures are required to ensure safe handling of the substance: Emergency equipment immediately accessible; use well-maintained PPE; wash hands and skin following contact; do not eat, drink or smoke at the workplace.

As ATMP is corrosive to metals, acid resistant materials should be used. It should not be mixed with incompatible materials such as strong oxidizing agents or alkalis and caustic products.

For consumer uses, ATMP in solution is formulated in suitable concentrations, according to appropriate regulations. Final products can be used safely in the conditions of use written on the packaging (avoid contact with eyes by using suitable eye protection).

Environment

Whilst not classified for environmental hazard, ATMP is shown to have some effect on aquatic organisms. All industrial, professional and consumer aqueous releases that may contain the substance must be controlled and directed to a (biological) waste water treatment plant.
Disposal, treatment or recycling of industrial waste must comply with applicable regulations to preserve environment.

State Agency Review

ATMP acid and its Na salts have been registered under:	EU regulation (EC) 1907/2006 (REACH)
ATMP acid and its Na salts have been reviewed under the following regulatory and/or voluntary programmes:	High Production Volume Chemicals Programme, published by UNEP in 2004 EU HERA project (established by Cefic and AISE) in 1999

Regulatory Information / Classification and Labelling

Classification and labelling of ATMP acid and its salts according to EU regulation (EC) 1272/2008 (CLP):

Classification	Hazard statements	Acid	Na salt	2 Na salt	3 Na salt	4 Na salt	5 Na salt	6 Na salt
Metal Corrosion, Category 1	H290 May cause corrosion to metals.	X	X	X				
Eye Irritation, Category 2	H319 Causes serious eye irritation.	X	X					X
Not classified					X	X	X	

Labelling		Acid	Na salt	2 Na salt	3 Na salt	4 Na salt	5 Na salt	6 Na salt
Pictogram Signal word	 Warning	X	X	X	No pictogram, no signal word			
	 Warning							X
Precautionary statements:								
P234 Keep only in original container.		X	X	X				
P264 Wash … thoroughly after handling.		X	X					X
P280 Wear protective gloves/protective clothing/eye protection/face protection.		X	X					X
P390 Absorb spillage to prevent material damage.		X	X	X	No Precautionary statement			
P305+P351+P338 If IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.		X	X					X
P337+P313 If eye irritation persists: get medical advice/attention.		X	X					X
P406 Store in corrosive resistant/... container with a resistant inner liner.		X	X	X				

Contact Information within Company

For further information on this substance or Product Safety Summaries in general, please contact:

Rhodia Global Product Strategy: http://www.rhodia.com/en/sustainability/global_product_strategy/index.tcm

Contact: globalproductstrategy@eu.rhodia.com

Additional Information

ICCA Global Product Strategy: http://www.icca-chem.org/en/Home/ICCA-initiatives/global-product-strategy/

(extended) Safety Data Sheet available on demand: http://www.rhodia.com/en/contact/contact_form_business.tcm

Glossary of technical terms: http://www.rhodia.com/en/sustainability/global_product_strategy/glossary/index.tcm

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Disclaimer

The information provided in the present Safety Summary is based on European data available in REACH regulatory dossier (EC N°1907/2006) and is correct to the best of our knowledge, information and belief at the date of its publication. Such information is only intended to provide a general overview of the chemical substance in the context of ICCA Global Product Strategy and is not to be considered as a warranty or quality specification. It does not replace the safety data sheet and technical sheets. Thus, the information provided in this Safety Summary only relates to the designated specific product and may not be applicable if such product is used in combination with other materials or in another manufacturing process, unless otherwise specifically indicated. It does not release the user from ensuring he is in conformity with all regulations linked to its activity.