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EcwaCide IT

TECHNICAL DATA SHEET

DESCRIPTION

EcwaCide IT Industrial Preservative 1.4% Active CIT/MIT (Methylchloroisothiazolone & Methylisothiazolone) Monovalent Stabilised.

FORMULATION/COMPOSITION

EcwaCide IT is a broad-spectrum CIT/MIT type liquid preservative. It can be used in most industrial water-based formulations as a guard against microbial spoilage.

EcwaCide IT is:

- Effective, at very low use levels, against a wide variety of Bacteria, Yeasts and Molds.
- Safer, economical and internationally acceptable.
- An excellent replacement for Formaldehyde (Formalin).

PHYSICAL & CHEMICAL PROPERTIES

Appearance	Colourless to Straw liquid
Active Ingredients	5-chloro-2-methyl-4-isothiazolin-3-one (CIT) (and) 2-methyl-4-isothiazolin-3-one (MIT)
pH (as manufactured)	1.7 - 3.2
Odour	Mild
S.G. (at 20°C)	1.140 - 1.146 g/cm ³
Solubility	Soluble in water, glycol and most lower alcohols
Stability in formulation	Stable at pH 2.0 - 9.0, up to 60°C
Shelf Life as supplied	At least 1 year at ambient conditions. At least 6 months at 50°C.

(These figures do not constitute a specification - please see Certificate of Analysis)

MANUFACTURER/SUPPLIER

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Information
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MICROBIOLOGICAL PROPERTIES

Bacteria	MIC (ppm Active)	% Dosage: Ecwacide IT
Gram-Positive		
Bacillus subtilis	3	0.021%
Staphylococcus aureus	2	0.014%
Streptococcus pyogenes	9	0.064%
Gram-Negative		
Corynebacterium sp.	3	0.021%
Escherichia Coli	3	0.021%
Klebsiella sp.	3	0.021%
Proteus vulgaris	5	0.036%
Pseudomonas Aeruginosa	5	0.036%
Salmonella typhosa	5	0.036%

Fungi	MIC (ppm Active)	% Dosage: Ecwacide IT
Aspergillus niger	9	0.064%
Candida albicans	5	0.036%
Penicillium funicollosum	5	5 0.036%
Saccharomyces cerevisiae	2	0.014%

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PROPERTIES/ APPLICATIONS/ USE

As can be seen from the table on the left, **EcwaCide IT** can be used at extremely low addition levels. It is this factor that makes **EcwaCide IT** a very safe and economical preservative. Please note that the table refers to the MIC (minimum inhibitory concentration) which is the level of preservative at which no further microbial growth will occur. It is recommended that **EcwaCide IT** be used at levels from 0.05% - 0.15%. Our experience over a number of years has indicated that a reliable starting point is 0.075 - 0.1% for the majority of formulations. The lower threshold of 0.05% use is only reliable in simple formulations, where pH is around 5.0 and ORP values are higher (+600mv). Higher levels may be needed when pH is >8.0 and/or if amines, sulfites, nitrites or other nucleophiles are present. Please see compatibility data for further info.

Calculations for batch addition rates (assuming a rate of 0.1%)

0.1% = 1g per 1Kg or 100g per 100Kg or 1Kg per 1000Kg

Batch Size in Kg:	100	200	250	400	500	750	1000	2000	3000	5000
EcwaCide IT:	100g	200g	250g	400g	500g	750g	1Kg	2Kg	3Kg	5Kg
Calculation	for EcwaCide IT in Kg = Batch Size (Kg) x Use Level (%) for EcwaCide IT in grams = Batch Size (Kg) x Use Level (%) ÷ 100									
Example	1000Kg x 0.1% = 1Kg EcwaCide IT 1000Kg x 0.1% x 1000 = 1000g EcwaCide IT									

WORKING WITH EcwaCide IT

At Ecwamix Chemical Systems, we have had a significant degree of experience with many of the frustrations experienced by formulators and manufacturers within the South African marketplace. Often good, reliable and simple information is hard to come by. In an attempt to better assist you in realising the maximum benefit from your choice to use **EcwaCide IT**, we have compiled the following information sharing section:

(these principles can be applied to the deployment of most other preservatives and our hope is that they assist in improving your production techniques and the quality of your final product)

The first matter to be dealt with, is to best understand the physical properties of **EcwaCide IT**:

Stability

EcwaCide IT is stable between pH 2.0 to 9.0, and up to temperature of 60°C, but will begin to degrade more rapidly as it nears these limits. It must be noted however that the actual need for preservation outside these limits becomes

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exponentially less likely.

If preservation outside these limits is required, it may assist to increase the dosage of **EcwaCide IT**. **EcwaCide IT** is more stable in hard water (tap water) than it is in de-ionised water. The difference is significant enough to recommend the use of hard water, providing that the cleanliness thereof can be established.

Addition

It is often recommended that the preservative should be added as early as possible in the production process, in order to minimise further contamination. This is not necessarily practical advice since the formulator may struggle to ascertain when is the appropriate "earliest" point, and questions must be raised as to how or why there would be further contamination during production.

EcwaCide IT - can be added at any stage of the production providing that:

- Temperature is below 50°C, and the product will not be reheated past this point again.
- pH is between 2.0 - 9.0, and has been finalised, i.e. it won't be adjusted any further.
- Redox potential is low. From the point above, it is often common practice for many industrial formulations to contain a "Redox" or "Acid - Base" reaction. These are typically encountered when chemical acids such as Oleic Acid or Sulphonic (LABS/DBSA) are neutralised through the addition of inorganic bases (e.g. Sodium/Potassium Hydroxide, Ammonium Hydroxide, etc.) or organic Amine bases (e.g. TEA - Triethanolamine; MEA - Monoethanolamine, etc.). If such a principle is present in your formulation, then make sure that the reaction is entirely complete, the pH is stable and doesn't require any further adjustment, and then add the **EcwaCide IT**.

By now you are sure to have realised that the preservative is best added at, or near to, the end of your process. This is in fact the correct and most reliable solution!

If your concern is to limit microbial contamination during production, then the following needs to be considered:

EcwaCide IT will destroy any micro-organisms present at the time of addition but, like all other preservatives, it too is consumed in this process. The earlier the **EcwaCide IT** is introduced, the sooner it can begin to prevent further growth, but it is at risk of being degraded by further contamination as well as the aforementioned factors. If microbial problems are encountered, then the best solution is to:

- Increase the dosage of **EcwaCide IT**.
- Adopt better sanitation principles in the production environment.

Compatibility

EcwaCide IT is compatible with all surfactants and most ingredients used in water-based industrial formulations. Like many other preservatives it is incompatible with reducing agents, amines and other strong nucleophiles which, in some situations, could cause degradation of the active. To simplify this let's refer to the incompatible chemicals as "agents": These agents are made up of many chemicals which commonly occur in industrial formulations, but it must be stressed that they need to be in a 'free' form in order to cause degradation of the **EcwaCide IT**.

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These agents are made up of such chemicals as:

- Those ending with 'ite' e.g.- Sodium Sulphite, Sodium Nitrite.
- Strong bases/alkalis.
- Ammonia (Ammonium Hydroxide).
- Organic Amines e.g.- TEA, DEA, MEA, AMP-95, Morpholine, etc.

In the vast majority of formulations these ingredients are primarily used for the neutralisation (conversion to a salt) of some or other acid. As such they are no longer 'free' and thus should not cause the degradation of **EcwaCide IT**.

In conclusion

The compatibility issues only become of concern when any of these "agents" are present and when the pH exceeds 8.0 approaching 9.0! At this point it is unlikely that the **EcwaCide IT** would be totally depleted, but it is fair to say that the shelf-life of your product may be reduced. If this is the case, again an increase in dosage will aid matters. Again, this is justification for adding the preservative nearer the end of the production process and, as such, it can be considered more important to pay attention the aforementioned factors of "Stability" & "Addition".

Remember:

- Ensure that process temperature is below 50°C.
- Ensure that process pH is between 2.0 - 9.0, is stable and requires no further major adjustments.
- Use hard water (tap water) wherever suitable.
- Work Clean! - mixing vessels, implements and utensils should be regularly sterilised, a dilute solution of bleach (Sodium Hypochlorite) is usually sufficient. Flush well with water after cleaning!

In all instances in which it has been recommended to increase the dosage of **EcwaCide IT**, it should not be necessary to increase the dosage beyond 0.15%.

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TOXICOLOGY & SAFETY

Acute Toxicity: (product in form as supplied)		Safety Note
Oral LD50 (Rat)	> 2500 mg/Kg	Most biocides will be moderately to highly toxic in their form as supplied, EcwaCide IT is no exception. The product is however exceptionally safe once diluted to the recommended levels. You will note that the Inhalation level is most dangerous. Make sure, when handling the product as supplied, to: <ul style="list-style-type: none"> • Wear a suitable respirator with "Organic Gas" cartridges. • Wear <u>full</u> face protection. • Wear elbow length, Nitrile gloves. Always wash hands after handling! <i>Please request a copy of MSDS in order to establish best course of action in the event of exposure.</i>
Dermal LD50 (Rat)	> 4000 mg/Kg	
Inhalation LC (Rat) 4h	> 0.33 mg/dm ³ air 50	
Skin irritation	Corrosive	
Eye irritation	Corrosive - Risk of severe Corneal damage	
Sensitization	Sensitizer	

ENVIRONMENTAL, DEACTIVATION & DISPOSAL

Environmental

EcwaCide IT can be considered to be Environmentally acceptable since:

- It is high performance product, used at very low levels.
- It is rapidly degraded into safe, non-toxic and non-persistent substances.
- It does not Bio-accumulate, and hence is not persistent in the environment.
- It will not affect the functioning of wastewater treatment plants.

Deactivation & Disposal

Deactivation Solutions:

- 1.) Water + 5% Sodium Hypochlorite (as Bleach) + 5% Sodium Bicarbonate.
- 2.) Water + 5% Sodium Bisulphite + 5% Sodium Bicarbonate.

Either of the above solutions can be applied to any spillage of **EcwaCide IT** in order to deactivate the active ingredients. Spills and/or contamination should be liberally swabbed with 3 - 10 times the same volume of deactivation solution, and allowed a contact time of at least ten minutes, preferably 30 minutes. Heavy spills are best handled through the use of a suitable absorbent material, carefully collected, and disposed of in compliance with local government requirements. Do not dispose of into ground water!!! Up until it has bio-degraded this product is highly toxic to aquatic life.

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NB: If packaging is not to be returned to manufacturer - PLEASE destroy by puncturing in order that it may not be used for drinking water!

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