
Technical Information

TI/ES 1410 e
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Korantin[®] PAT

® = Registered trademark of
BASF Aktiengesellschaft

Corrosion inhibitor for use in aqueous solutions and emulsions

Korantin PAT is a low-foaming corrosion inhibitor with a fungicidal effect at the concentrations at which it is normally employed.

Korantin PAT

Classification according to German chemicals legislation and European Union Directive 67/548/EEC:
See safety data sheet.

Chemical nature

Triethanolamine salt of a carboxylic monoalkylamide.

Properties

Korantin PAT is a clear or opalescent, brown liquid.

Product data

Active content	ca. 80 %	
Water content	ca. 20 %	DIN 51777
pH (1 % in water)	ca. 8.5	DIN 51369
Viscosity (23 °C)	ca. 250 mPa·s	Brookfield
Density (23 °C)	ca. 1.13 g/cm ³	DIN 51757
Setting point	ca. 5 °C	

The above information is correct at the time of going to press. It does not necessarily form part of the product specification. A detailed product specification is available from your local BASF representative.

Solubility

The following table shows the solubility of Korantin PAT in water and various solvents at 23 °C at a ratio of 10 parts Korantin PAT to 90 parts solvent.

Water	Clear solution
Soda ash solution, 5 %	Clear solution
Caustic soda, 10 %	Clear solution
White mineral spirits	Insoluble
Xylene	Insoluble
Sulphuric acid, 5 %	Insoluble
Ethanol	Clear solution
2-Propanol	Clear solution

Storage

Korantin PAT should be stored in a dry place.

Drums should be tightly resealed each time material is taken from them.

The solids can settle out to form a crystalline deposit if Korantin PAT is stored at temperatures below 10 °C. It can be reconstituted by heating to 30–40 °C in a heating cabinet or with external electrical elements. This does not impair its performance. It should be homogenised before use.

Internal electrical elements should not be used because of the localised anomalies in temperature that they cause.

Shelf life

Korantin PAT has a shelf life of at least six months in its original packaging at normal temperatures.

Applications

The main function of Korantin PAT is to protect exposed iron and steel surfaces being attacked by water or aqueous solutions in the neutral-to-alkaline pH range. It also provides temporary protection from atmospheric corrosion.

It can also be employed as a corrosion inhibitor for aluminium and zinc.

It is low-foaming in water, and it is not sensitive to water hardness.

Korantin PAT also acts as a fungicide or fungistat at the concentrations at which it is normally employed as a corrosion inhibitor.

It can be used in water-based hydraulic fluids, anti-corrosion cleaners, water-treatment formulations, anti-corrosion additives and, above all, metal-cutting fluids.

Inhibiting corrosion

The most important feature of Korantin PAT from the point of view of its performance is its ability to prevent corrosion on ferrous metals.

The following results were obtained in a test derived from DIN 51360, Part 1 (Herbert test) on mild steel and cast iron in the following media.

Distilled water	ca. 0.7 %
Potable water with a hardness of 1.8 mmol Ca ions/l (12.5° Clark)	ca. 0.7 %
Potable water with a hardness of 4.1 mmol Ca ions/l (28° Clark)	ca. 1.5 %
Artificially hardened water according to DIN 51360, 3.6 mmol Ca ions/l (25° Clark)	ca. 2 %

The corresponding figures for the test described in DIN 51360, Part 2 (cast iron-filter paper test) are as follows.

Distilled water	ca. 1 %
Potable water with a hardness of 1.8 mmol Ca ions/l (12.5° Clark)	ca. 1–1.5 %
Potable water with a hardness of 4.1 mmol Ca ions/l (28° Clark)	ca. 1.5–2 %
Artificially hardened water according to DIN 51360, 3.6 mmol Ca ions/l (25° Clark)	ca. 2–2.5 %

Synergistic effects with other corrosion inhibitors

Korantin PAT usually acts in synergy with other corrosion inhibitors, i. e. the performance of the whole is superior to the performance of the sum of each individual component. Some examples of corrosion inhibitors with synergistic effects are given below.

- Korantin LUB, Korantin MAT, Korantin SMK and amines such as alkanolamines
- Phosphates and alkanolamine salts of phosphoric acid
- Aliphatic carboxylic acids such as 2-ethylhexanoic acid, 3,5,5-trimethylhexanoic acid (isononanoic acid), octanoic acid, decanoic acid and undecanoic acid
- Aromatic carboxylic acids such as benzoic acid
- Aliphatic dicarboxylic acids such as azelaic and sebacic acid
- Substituted succinic and glutaric acids
- Amidocarboxylic acids and sulfamidocarboxylic acids
- Phosphonates and acid esters of phosphoric acid
- Corrosion inhibitors for copper such as tolyl triazole or mercaptobenzothiazole
- Fatty acids
- Inorganic corrosion inhibitors such as nitrites, nitrates, silicates, boric acid, borates, esters of boric acid, sarcosides, polycarboxylates, ammonia, sodium hydroxide and potassium hydroxide

Fungicidal activity

Tests at a series of different concentrations were performed in accordance with guidelines issued by the *Deutsche Gesellschaft für Mikrobiologie und Hygiene*.

The column on the left shows the minimum biostatic concentration, i. e. the percentage of Korantin PAT required to prevent further bacterial and fungal growth. The column on the right refers to the minimum biocidal concentration. This is the percentage of Korantin PAT required to kill off bacteria and fungi.

Microorganisms	Minimum biostatic concentration in %	Minimum biocidal concentration in %
Bacteria		
<i>Staphylococcus aureus</i>	0.25	0.5
<i>Escherichia coli</i>	2.5	5.0
<i>Klebsiella pneumoniae</i>	5.0	5.0
<i>Proteus vulgaris</i>	2.5	5.0
<i>Pseudomonas aeruginosa</i>	5.0	5.0
Fungi		
<i>Candida albicans</i>	0.25	0.5
<i>Oidium lactis</i>	0.1	0.1
<i>Aspergillus niger</i>	0.5	0.5

The above figures illustrate the versatility of Korantin PAT. It can be used:

1. As a corrosion inhibitor;
2. As a biocide to protect concentrates from attack by bacteria and fungi. It generally needs to be added to concentrates at levels of 5 % and above;
3. As a fungicide to protect dilute formulations from attack by fungi, even if they have already begun to decompose. Bacterial growth can be either be tolerated, or it can be inhibited if necessary by adding biocides based on boric acid, etc., at concentrations of between 0.5 % and 1 %.

The above figures above also show that there is a threshold concentration below which Korantin PAT has no effect on microbial growth. There is no risk of disruption in activated-sludge sewage treatment plants if it is present in dilute concentrations, because the minimum biostatic and biocidal concentrations are all in the same order of magnitude.

Korantin PAT therefore offers distinct advantages in formulating cutting fluids and water-based hydraulic fluids. Highly potent biocides, which are damaging to the health and the environment, can be dispensed with, but severe microbial and fungal growth can still be prevented.

A further advantage is that Korantin PAT is most effective at preventing fungal growth, but boric acid-based products are largely ineffective in this area. Combinations of these two types of product offer a number of possibilities.

One of two basic approaches can be adopted.

1. Korantin PAT and products based on boric acid can be combined to provide high levels of protection against corrosion and microbial and fungal growth.
2. Korantin PAT be combined with corrosion inhibitors other than those that contain boron. Sulphur compounds should not be used, because they can give rise to unpleasant odours. This approach tolerates some bacterial growth, but formulations can be devised to ensure that the bacteria do not get out of hand.

Foaming

Dilute aqueous solutions of Korantin PAT do form a certain amount of foam, but any foam that does form readily breaks down. It may be advisable to add a defoamer if it is used in grinding or other processes in which large volumes of air are entrained.

Emulsions that contain Korantin PAT can have an increased tendency to foam, but this can be counteracted in moderately hard water by adding mixtures of Sokalan® CP types and alkanolamine salts of fatty acids in carefully adjusted proportions.

Behaviour in hard water

Korantin PAT itself is not affected by water hardness. It does not precipitate in the presence of calcium and magnesium ions. However, it does contain traces of insoluble by-products, and these can give rise to a haze or slight turbidity, especially in hard water. Most formulations contain solubilizers to prevent this happening, but these by-products can precipitate if conditions are unfavourable, such as in formulations that contain no solubilizer. Salts of 2-ethylhexanoic acid are very effective solubilizers, but Korantin PAT itself can also take on the role of a solubilizer at higher concentrations.

Suggested formulations

Suggested formulations are given in our Technical Information leaflet on "Technical cleaners" (TI/ES 1167 e).

Safety

We know of no ill effects that could have resulted from using Korantin PAT for the purpose for which it is intended and from processing it in accordance with current practice.

According to the experience we have gained over many years and other information at our disposal, Korantin PAT does not exert any harmful effects on health, provided that it is used properly, due attention is given to the precautions necessary for handling chemicals, and the information and advice given in our safety data sheet are observed.

Handling

All contact with the eyes must be avoided, and safety glasses must be worn. The usual precautions when handling chemicals should be observed.

Ecology

Biodegradability

More than 60 % of the Korantin PAT present was removed in the static Zahn-Wellens Test (OECD 302 B/ISO 9888/EEC 88/302 C), expressed as chemical oxygen demand (COD).

Hazard labelling

Details are given in our safety data sheet.

Note

The information submitted in this publication is based on our current knowledge and experience. In view of the many factors that may affect processing and application, these data do not relieve processors of the responsibility of carrying out their own tests and experiments; neither do they imply any legally binding assurance of certain properties or of suitability for a specific purpose. It is the responsibility of those to whom we supply our products to ensure that any proprietary rights and existing laws and legislation are observed.

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