



BIOCIDES WET STATES PRESERVATION



Outline

- Introduction
- Microbiology
- Biocide chemistry
- Historical/Regulation
- Products
- Services
- Application



Introduction

Preservations:

Process by which chemical agents prevent microbial deterioration of materials and thus prolong the expected lifetime of products



Outline

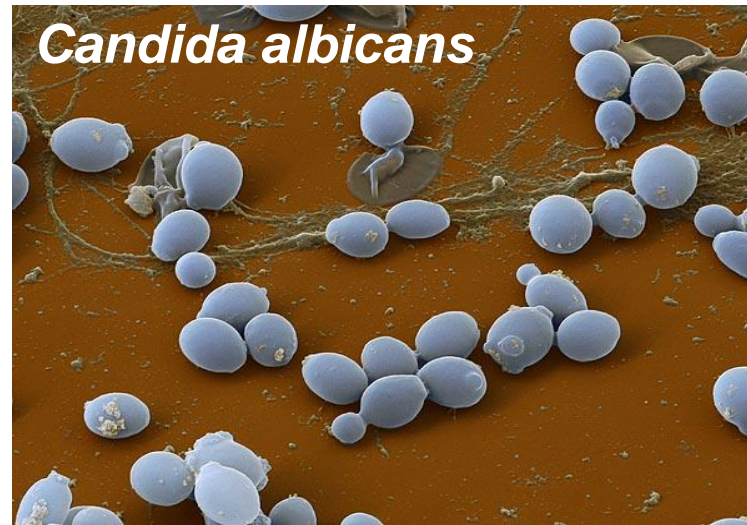
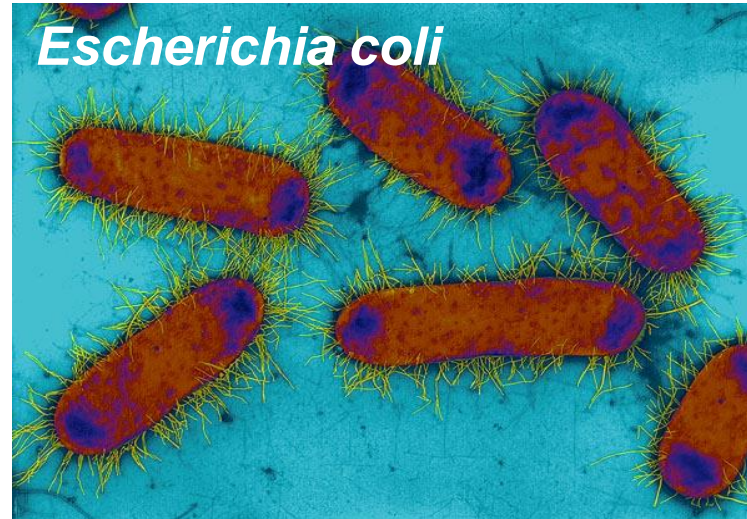
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Microorganisms

- Types of microorganisms
- Examples of microorganisms
- Favorable living conditions of microorganisms
- Effects of microbial spoilage

Example of Microorganisms

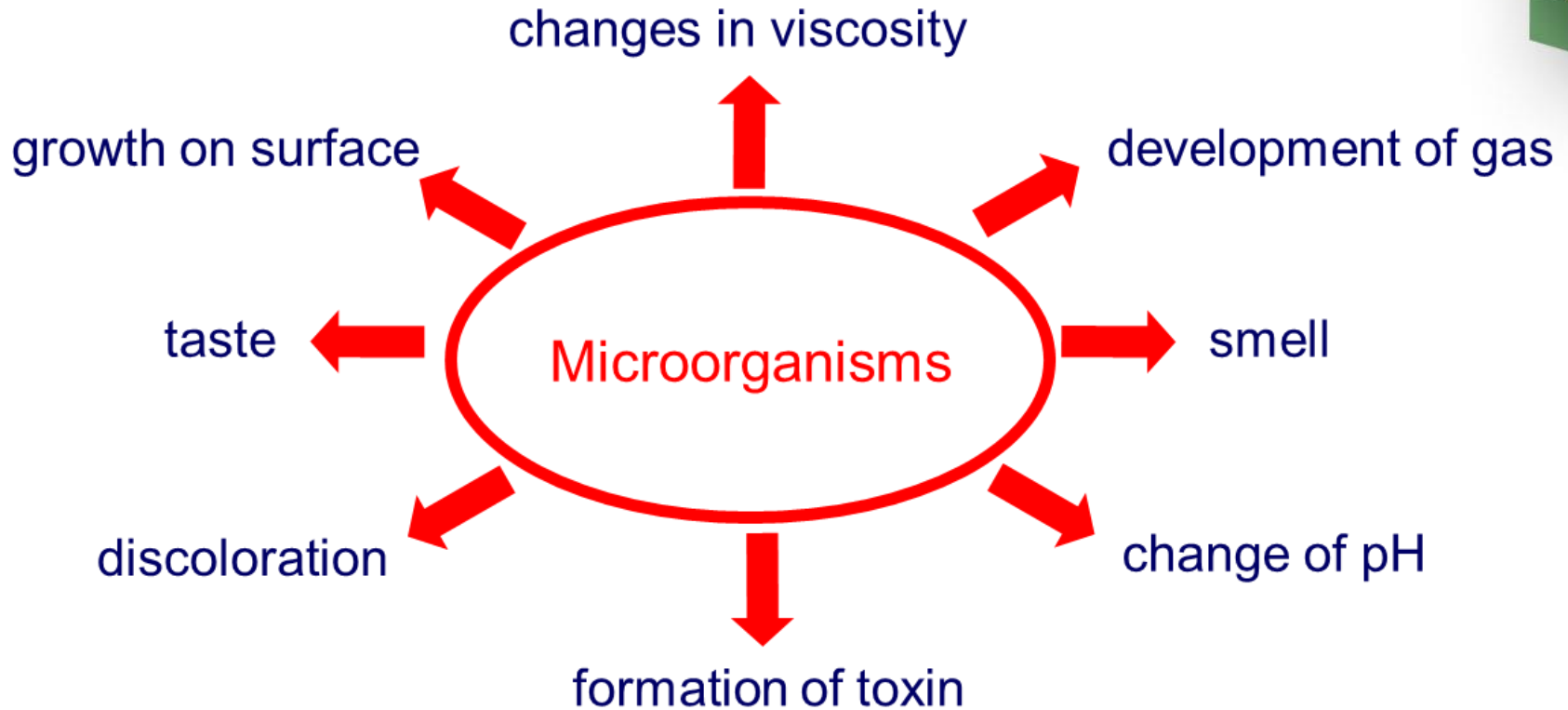


Favorable living conditions of microorganisms



	In-Can	Dry-Film	
	Bacteria	Fungi	Algal
Temperature	25-40	20-35	15-30
pH	Neutral – Alkaline	Neutral - Acid	Neutral
Nutrients	C, H, N	C, H, N	CO ₂
Trace Elements	+	+	+
Oxygen	O ₂ , SO ₄ , NO ₃	O ₂	O ₂
Water	+	+	+
Light	-	-	+

Direct effects of microbial spoilage





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Biocide Chemistry

- Mode of action of biocides
- Points of attack of the biocide
- Chemical reaction of the biocide
- Discussion of biocide A.I.

Mode Of Action Of Biocides



Depending on the mode of action two groups of antimicrobial agents can be differentiated:

Membrane-active Agents **→** physical interaction

- Alcohols
- Phenols
- QACs
- Acids

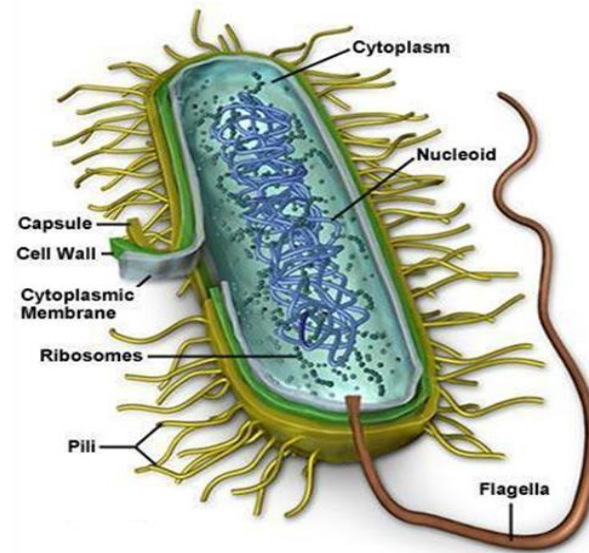
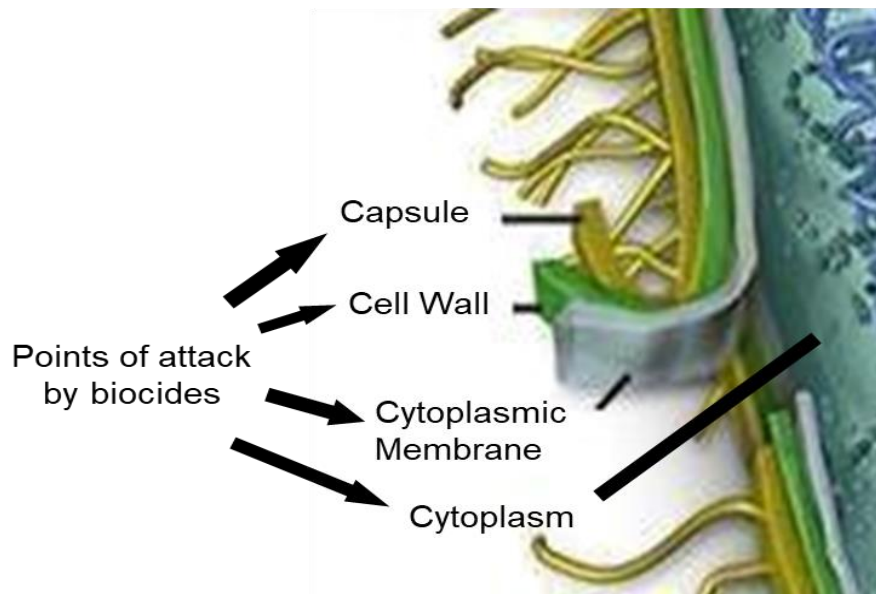
Electrophilic Agents **→** chemical interaction

- Aldehyde and aldehyde releaser (e.g. EDDM, TMAD)
- Activated halogen compounds (e.g. CMIT/MIT, Bronopol)

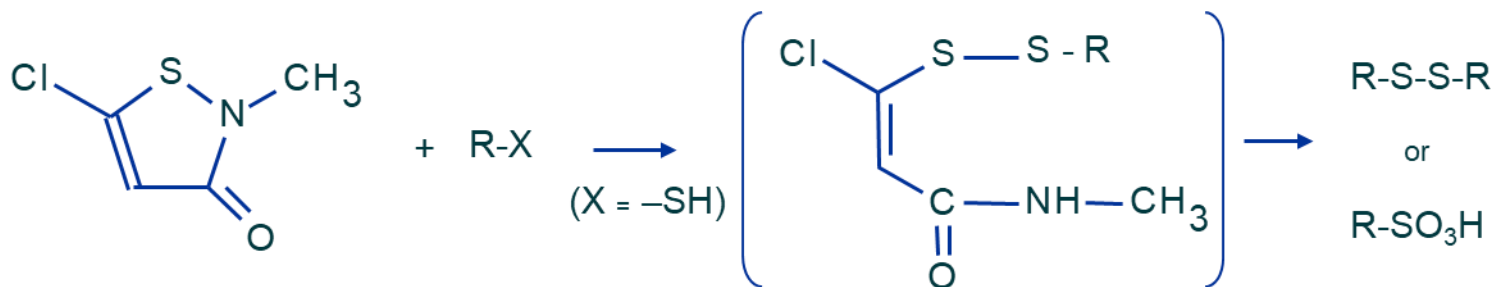
Point Of Attack Of The Biocides

Physical or chemical interaction of the biocide with the microorganisms lead to

- Destruction of cell walls
- Destruction of cell proteins e.g. DNA
- Inactivation of eg enzymes in the cell



Reaction of Isothiazolones



R = protein,
DNA,
enzyme

X = -SH (CMIT, MIT, BIT)
-NH₂ (CMIT)

Damaging Factors:

- Reduction of thiol groups → inactivation of e.g. enzymes
- Reaction with amine groups → damaging of e.g. DNA

Discussion Of The Active Ingredient



	Advantages	Disadvantages
Formaldehyde	Cost-effective Fast action Wide spectrum of effect	H317 Labelling (≥ 1000 ppm) Strong, pungent smell Formaldehyde-discussion
Formaldehyde Donor	Cost-effective Wide spectrum of effect	Some: H317-labelling Formaldehyde-discussion
Bronopol	Fast action Good toxicity-profile No formaldehyde-release	Only active against bacteria Risk of yellowing pH-limitation ($< 8,0$) Possible formation of nitrosamines in the presence of secondary amines
Phenoxyethanol	Very good toxicity-profile Useable at low-mid pH	Slow speed of action Weakness vs. yeast/ mould High use-levels required VOC-substance

Discussion Of The Active Ingredient



	Advantages	Disadvantages
BIT	<ul style="list-style-type: none"> Very stable Wide pH-range Low toxicity 	<ul style="list-style-type: none"> H317-labeling (≥ 500 ppm) Slow speed of action Weakness vs. yeast/mould Gap against Pseudomonas
CMIT/MIT	<ul style="list-style-type: none"> Very fast action Wide spectrum of effect 	<ul style="list-style-type: none"> H317-labelling (≥ 15 ppm) No long term-protection pH-limitation (< 8.5)
MIT	<ul style="list-style-type: none"> Wide pH-range Low toxicity / good labeling 	<ul style="list-style-type: none"> Weakness vs. yeast/mould Slow speed of action Higher use-levels / costs
OIT	<ul style="list-style-type: none"> Good long term efficacy 	<ul style="list-style-type: none"> H317-labeling (≥ 500 ppm) Only active against moulds

Discussion Of The Active Ingredient



	CMIT/MIT	Formaldehyde	BIT
Temperature Stability	Up to 50 Degree	Up to 30 Degree	Up to 150 Degree
pH stability	Up to 8	Only stable at pH 6-8	Stable in pH 3-12
Amine stability	Not stable	NA	Stable
Reducing agent stability	Average	NA	Not stable
Heavy metal stabilizer	Need magnesium, copper salt stabilizer	NA	Not require
Speed Of Kill	Fast	Fast, with heat space protection	Slow
Long term protection	Depends on pH and temperature	Poor long-term performance	Good long-term performance
Odor	Mild	Mild/Pungent	Mild/ Odorless
Skin sensitizing	>15ppm, H317 Labelling	NA	>500ppm, H317 labelling
Euh208	>1.5ppm. May produce an allergic reaction	NA	>50ppm. May produce an allergic reaction



Outline

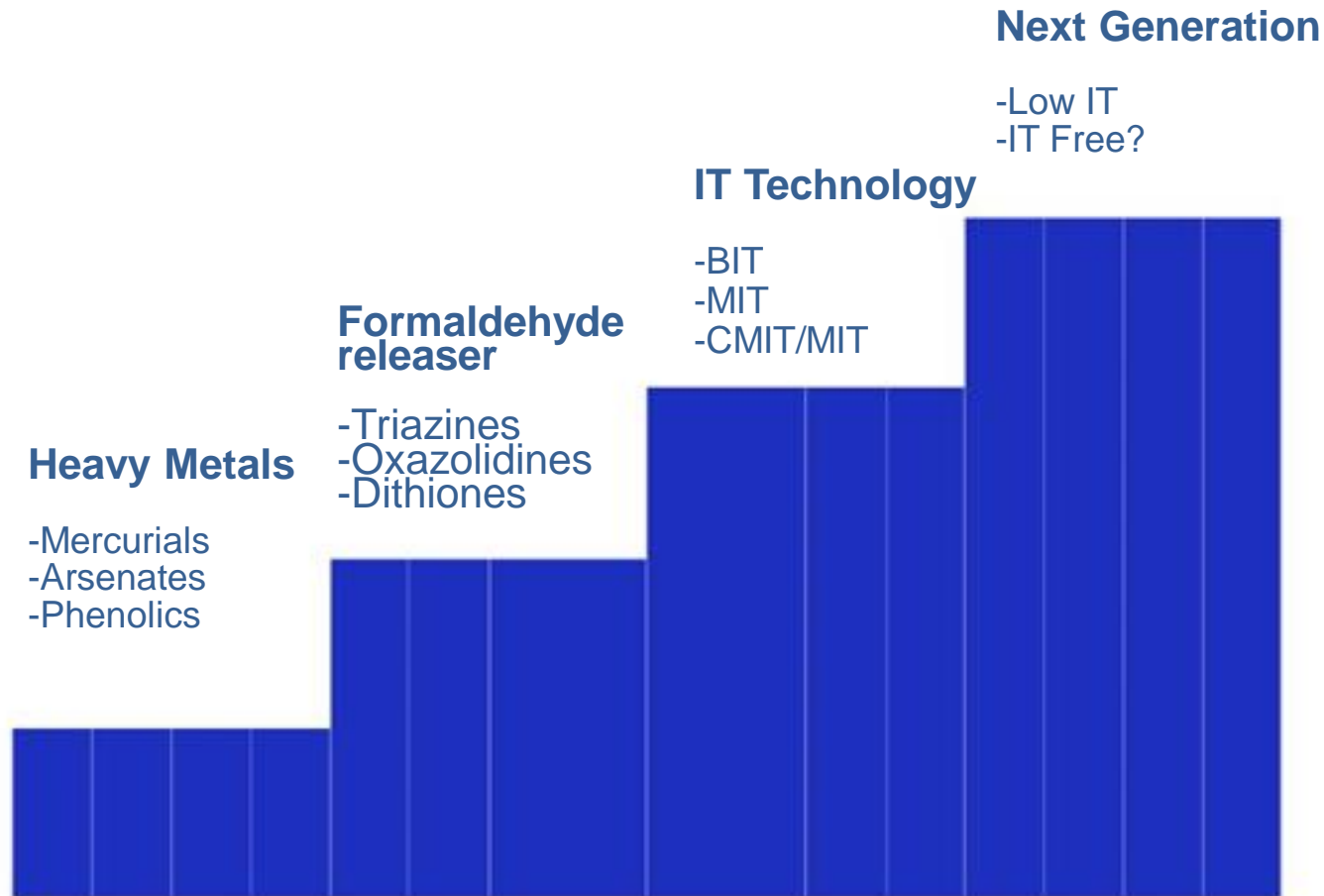
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Historical/Regulation

- Historical Development of Biocides
- New Challenges for Biocides
- EUH208 Restriction

Historical development of biocides



New Challenges For Preservatives



- **New labelling of MIT**
 - Both regulatory and liability issue
 - Affects ca. 80% of European in-can market
- **Reclassification of ZPT**
 - 2 year implementation cycle
 - Currently no change in status
 - Possible exceptions for socio-economic reasons
- **Environmental concerns regarding impact of dry film actives**
 - Need for control of algae
 - Interest in longer term performance

Contains <name of sensitising substance>.
May produce an allergic reaction”



BIT	≥ 50 ppm
CMIT/MIT	≥ 1.5 ppm
DCOIT	≥ 25 ppm
MIT	≥ 100 ppm
OIT	≥ 50 ppm
DBNPA	≥ 1000 ppm
Glutaraldehyde	Under Reviewed
IPBC	≥ 1000 ppm
MBIT	≥ 100 ppm
DTBMA	≥ 1000 ppm
BRONOPOL/Sodium NaOPP/OPP	Not classified as sensitizer



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Products

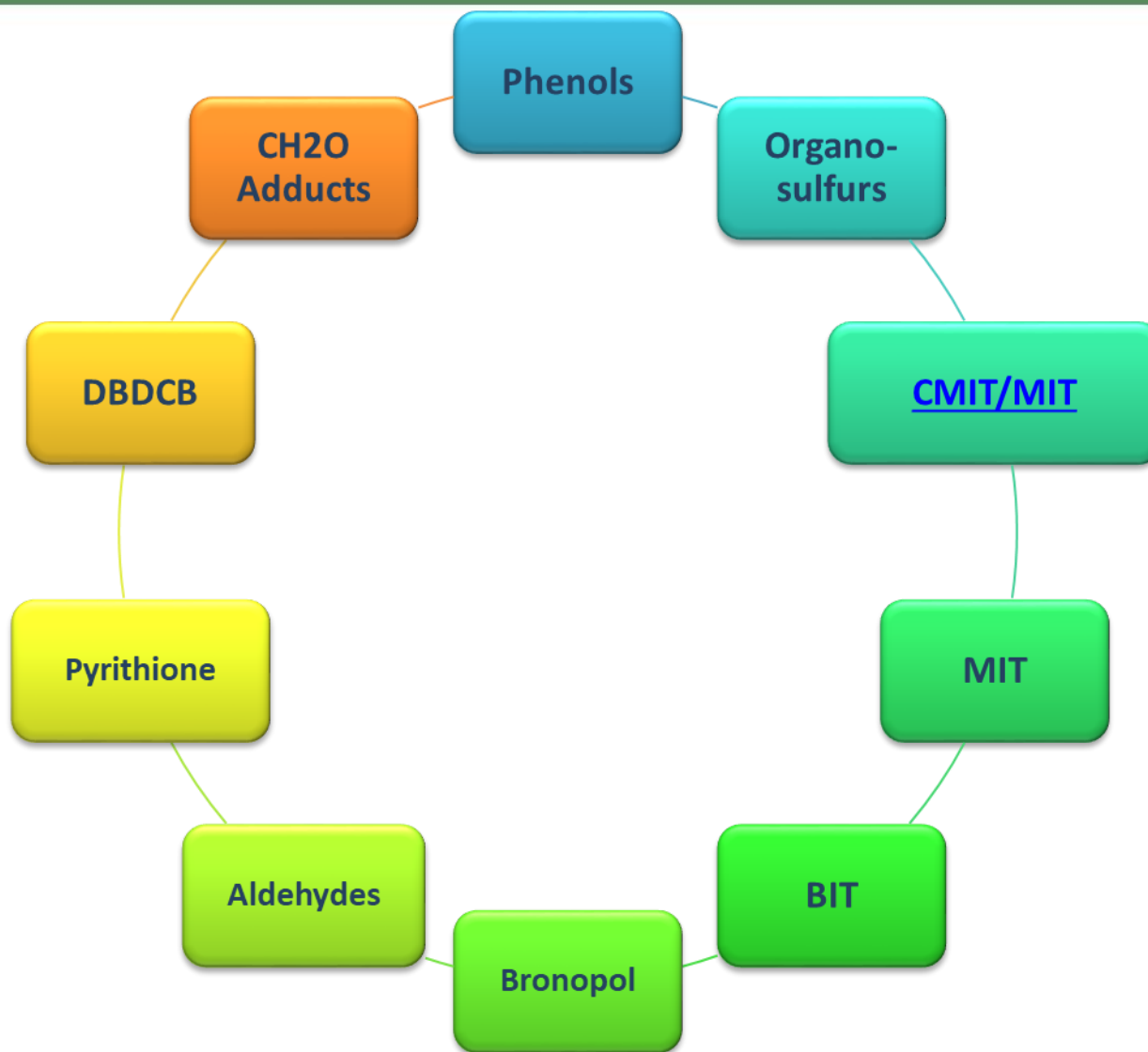
- Required features of biocides
- Typical Actives – Wet State Preservatives
- Products – Wet States Preservatives
- Plant hygiene products

Required features of biocides

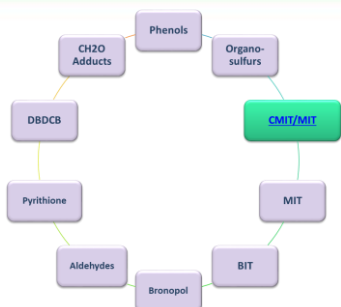


- High efficacy at a broad spectrum of microorganisms
 - Bacteria
 - Yeasts
 - Moulds
- Cost-efficacy
- Easy handling / easy to incorporate
- Stability
- pH-tolerance
- Low toxicity

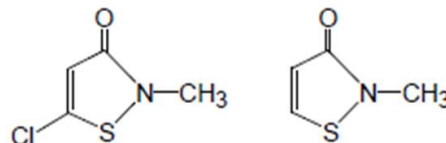
Typical A.I. – Wet State Preservatives



Typical A.I. – Wet State Preservatives



CMIT/MIT



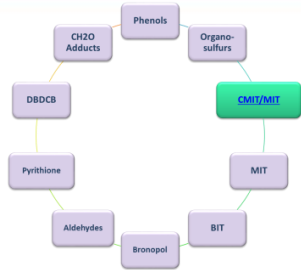
Advantages:

- Excellent cost /performance ratio
- Fast killing rate
- Broad spectrum

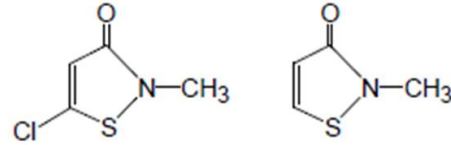
Disadvantages:

- Not stable in presence of Amines , sulfites, sulfides,...
- Requires special stabilization
- Decreased long term stability
- pH-stability between 3 – 9
- Temperature stability up to 40°C
- > 15 ppm require (H317) labeling

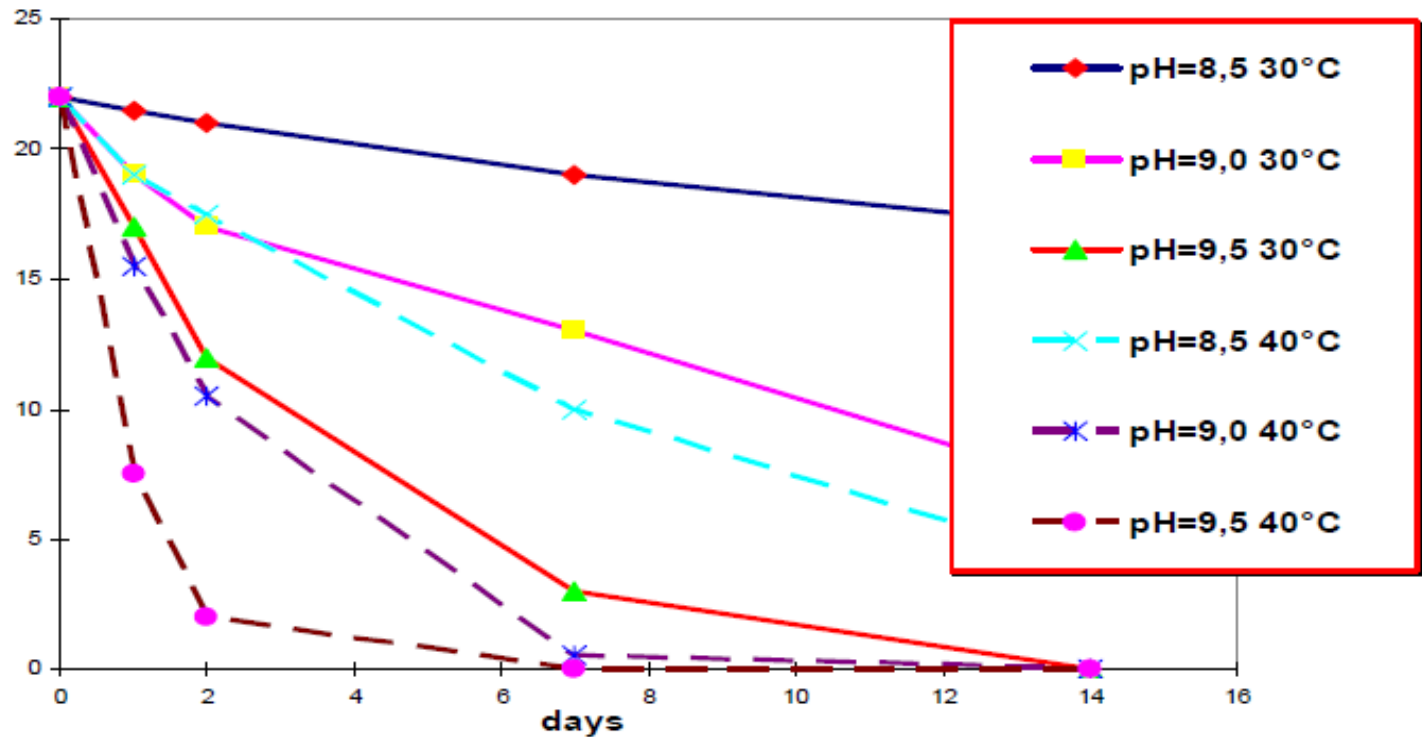
Typical A.I. – Wet State Preservatives



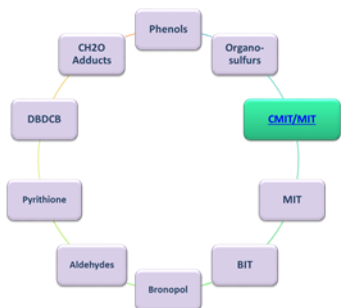
CMIT/MIT



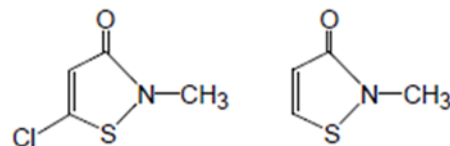
Stability of CMIT/MIT in Paints - Impact of pH or Temperature



Typical A.I. – Wet State Preservatives



CMIT/MIT



Single Active	K-BIO C515	CMIT/MIT 1.5%
	K-BIO C14	CMIT/MIT 14%
	K-BIO C19	CMIT/MIT (1:9) 10%
Formulative Products	K-BIO CB515	CMIT/MIT 0.5% BNP 15%
	K-BIO CB	CMIT/MIT 1% + BNP 7.5%
	K-BIO CE	CMIT/MIT + EDDM
	K-BIO CF	CMIT/MIT + Formalin

**NEW
PRODUCT**

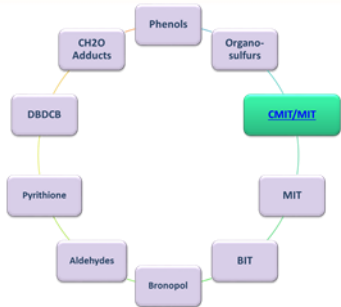
Typical A.I. – Wet State Preservatives



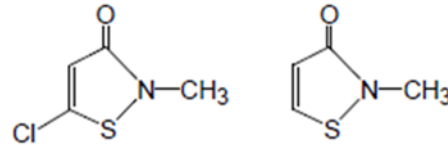
	C515	CB	C19
	CMIT/MIT 1.5	CMIT/MIT 0.5 BNP 15	CMIT/MIT 10
pH	< 9	< 8	Wide Range
Temperature	< 50°C	< 50°C	High Temp Tolerance
Stability against Amine	No	No	Improve
Labelling, H317	<0.1%	<0.3%	<0.15%
@Usage level 0.15% (CMIT/MIT ppm)	22.5ppm	7.5ppm 225ppm BNP	15ppm 135ppm MIT
Heavy Metal stabilizer	Yes	Yes	Yes
Speed of Kill	Fast	Fast	Fast/Slow
EUH208 compliant (@ use level)	No	No	No
Long term protection	No	No	Yes
Price	\$	\$\$	\$\$



Typical A.I. – Wet State Preservatives



CMIT/MIT



Disadvantages:

- Not stable in presence of Amines , sulfites, sulfides,...
- Requires special stabilization
- Decreased long term stability
- pH-stability between 3 – 9
- Temperature stability up to 40°C
- > 15 ppm require (H317) labeling



K-BIO C19



K-BIO C19



K-BIO C19



K-BIO CB515

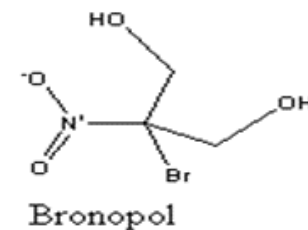
K-BIO[®] CB515



Active	CMIT/MIT(0.5%) + Bronopol (15%)
Form	Clear yellowish solution
Usage Level	0.05 – 0.15%
pH tolerated	4 – 8 (Optimum 7)
Max. Temp.	40°C
Application	Latex & polymer emulsion, Paint, HI&I, Textile, Ink, Adhesive...

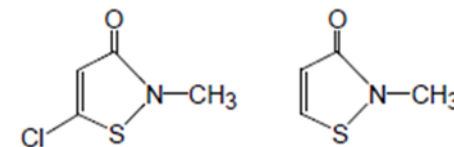
Product Highlights:

- Cost effective
- H317 compliant up to 0.3% Dosage level
- Formaldehyde Free, VOC Free
- Broad spectrum activity
- Indirect Food contact



Disadvantages

- pH limitation (<8)
- Risk of Yellowing





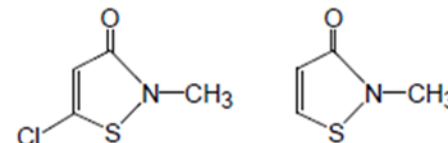
Active	CMIT/MIT (1:9) 10%
Form	Clear yellowish solution
Usage Level	0.05 – 0.15%
pH tolerated	4 – 11
Max. Temp.	60°C (MIT up to 100°C)
Application	Latex & polymer emulsion, Paint, HI&I, Textile, Ink, Adhesive...

Product Highlights:

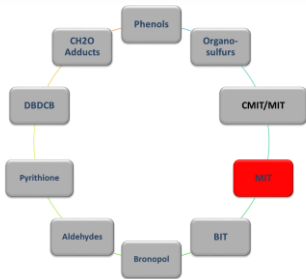
- Cost effective
- H317 compliant up to 0.15% Dosage level
- It combines initial rapid and powerful performance boost from 1% CMIT and stable long term protection from 9% MIT
- Good stability at high pH and temperature, versus conventional CMIT/MIT 3:1
- Indirect Food contact

Disadvantages

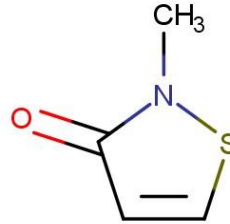
- More costly than conventional CMIT/MIT (3:1)



Typical A.I. – Wet State Preservatives



MIT



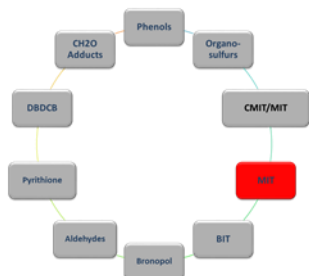
Characteristic:

- Broad spectrum
- High temperature tolerance (up to 80°C)
- Wide pH range (2-10)
- Stable with amine
- FDA
- Formaldehyde Free
- Halogen Free
- Salt free
- Slow acting

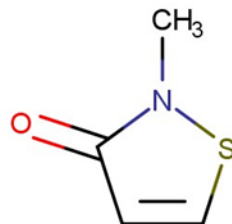
Benefits:

- Able to kill bacteria, yeast and mold
- Can be added for product required high heat production process
- Stable under alkaline condition
- Compatible with amine
- Indirect food contact
- Avoids formaldehyde problems
- Avoiding Absorbable Organic Halides
- It will not cause coagulation
- Suitable for long term protection

Typical A.I. – Wet State Preservatives



MIT



Single Active	K-BIO M10	MIT 10%
	K-BIO M20	MIT 20%
	K-BIO M50	MIT 50%
	K-BIO C19	CMIT/MIT 1: 9 (1%CMIT, 9%CMIT)
Formulative Products	K-BIO BM22	MIT 5% BIT 5%
	K-BIO BMc (Sunbio TM600)	MIT 2.3% BIT 2.3% CMIT/MIT 1.5%

**NEW
PRODUCT**

**NEW
PRODUCT**

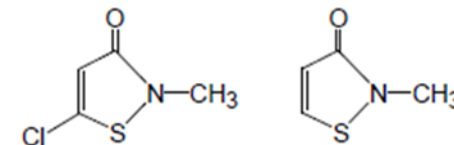
CDI
Creation Development Innovation



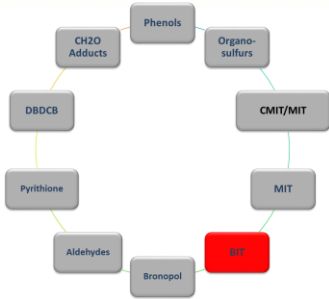
Active	CMIT/MIT (1:9) 10% (1% CIT, 9% MIT)
Form	Clear yellowish solution
Usage Level	0.05 – 0.3%
pH tolerated	4 – 11
Max. Temp.	60°C (MIT up to 100°C)
Application	Paints, adhesives, latex emulsions, tackifiers, mineral slurries, pigment dispersions, I&I and other technical, water-based products

Product Highlights:

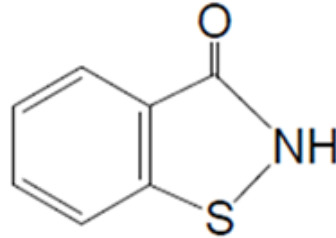
- More Cost effective than pure MIT
- It combines initial rapid and powerful performance boost from 1% CMIT and stable long term protection from 9% MIT
- H317 compliant up to 0.15% Dosage level
- Indirect Food contact



Typical A.I. – Wet State Preservatives



BIT



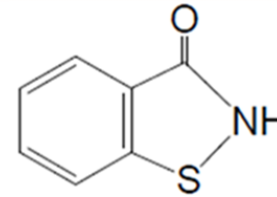
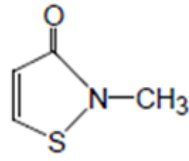
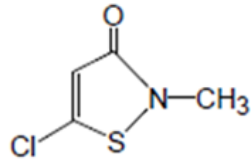
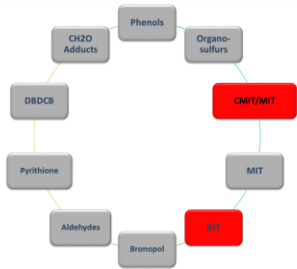
Characteristic:

- Broad spectrum
- High temperature tolerance (up to 100°C)
- Wide pH range (3-11)
- Stable with amine
- FDA / BgVV certification
- Formaldehyde Free
- Halogen Free

Benefits:

- Able to kill bacteria, yeast and mold
- Can be added for product required high heat production process
- Stable under alkaline condition
- Compatible with amine
- Indirect food contact
- Avoids formaldehyde problems
- Avoiding Absorbable Organic Halides

Typical A.I. – Wet State Preservatives



BIT vs. CMI/MIT

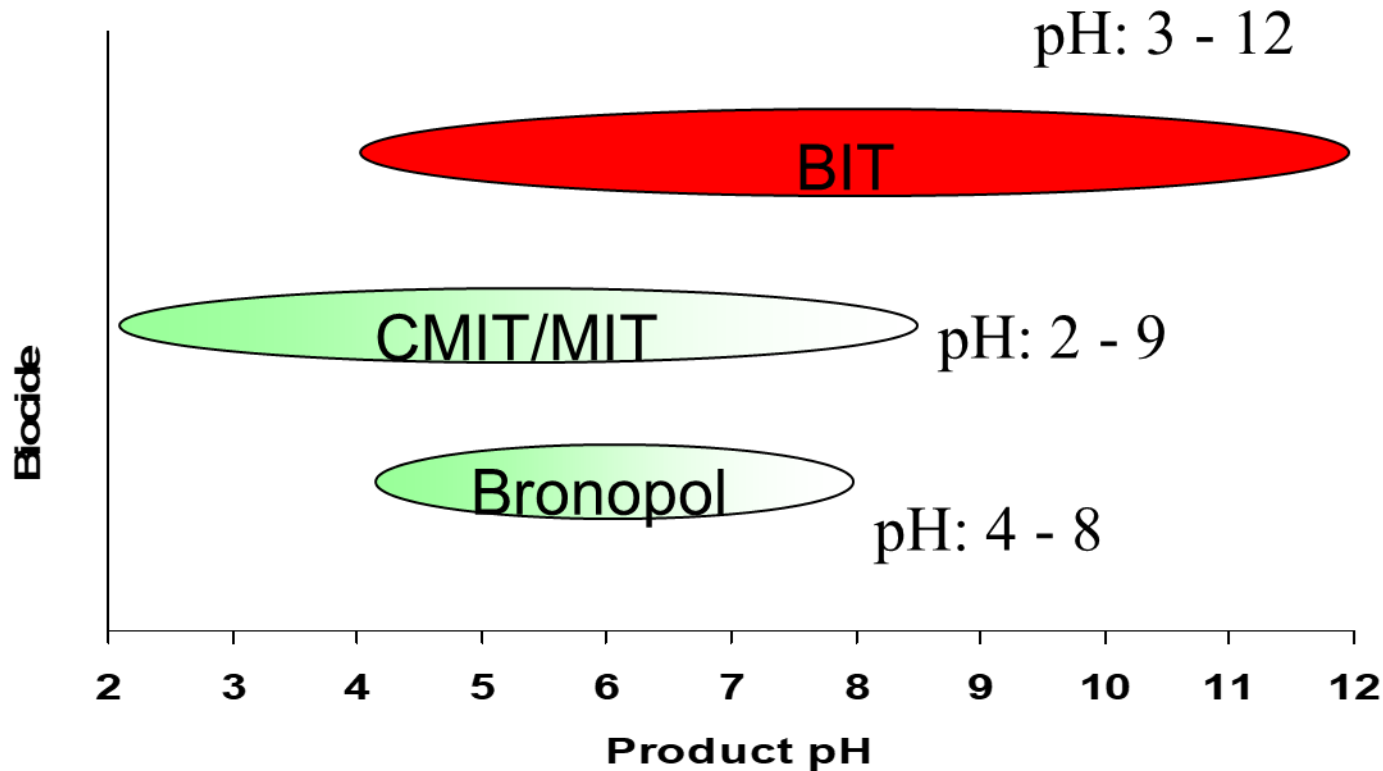


- Stability under alkaline and acidic conditions
 - CMI/MIT is unstable at pH above 9
 - BIT is stable in pH 3 -12
- Temperature stability
 - CMI/MIT is unstable above 50 degrees
 - BIT is stable up to 150 degrees
- Stability with presence amine
 - CMI/MIT decomposes quickly in presence of amine
 - BIT is stable in amine-containing environments
- Skin sensitizing
 - BIT limit 500ppm vs. CMI/MIT 15ppm limit

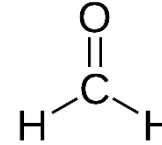
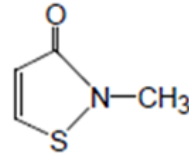
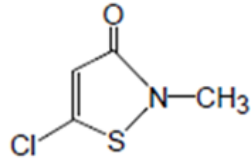
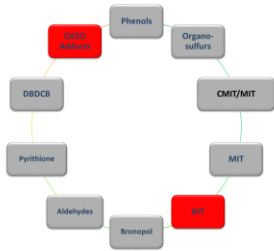
Typical A.I. – Wet State Preservatives



Preservative effective pH range



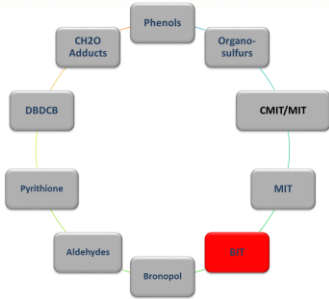
Typical A.I. – Wet State Preservatives



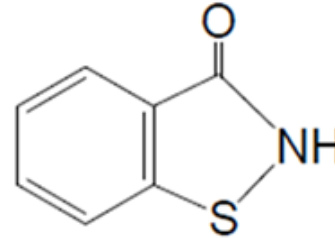
BIT vs. Formaldehyde Releaser

- BIT provide long term preservation
 - Formaldehyde release products are relatively unstable
- Formaldehyde was classified as carcinogens in June 2004 by the International Agency for Research on Cancer
- Formaldehyde usually present pungent odor
 - O-Formal is relatively worse than N-Formal
- Formaldehyde has weaker efficacy on mold

Typical A.I. – Wet State Preservatives



BIT



Disadvantages:

- Slower killing rate
- Not stable in the presence of strong oxidizer
- Efficacy gap against Pseudomonas strains
- No head space protection
- >500 ppm needs (sensitizer) H317 labeling
- >50 ppm needs EUH208 Labelling



K-BIO BMc



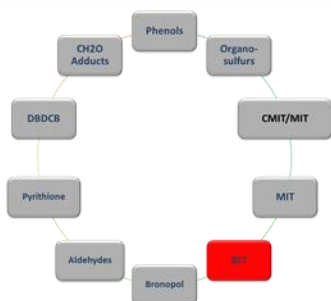
K-BIO C19



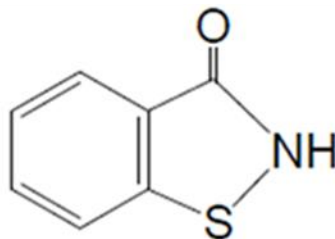
K-BIO LS Conc



Typical A.I. – Wet State Preservatives



BIT



Single Active	K-BIO B20S	20% BIT dipropylene glycol solution
	K-BIO B20	20% BIT clear water base
	K-BIO B20W	BIT 20% Aqueous dispersion
Formulative Products	K-BIO BM22	BIT 5% MIT 5%
	K-BIO BMc	BIT 2.3% MIT 2.3% CMIT/MIT 1.5%
	K-BIO BC	BIT 12% CMIT/MIT 0.6%
	K-BIO LS	BIT 5% SPT 5%
	K-BIO LS Conc	BIT 2.5% SPT 20% (EUH208)



Creation Developm

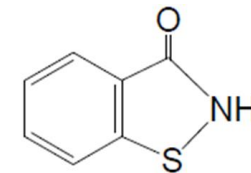
K-BIO[®] B20



Active	BIT 20%
Form	Clear yellow liquid
Usage Level	0.05 – 0.25%
pH tolerated	4 – 12
Max. Temp.	up to 100°C
Application	Latex & polymer emulsion, Paint, HI&I, Textile, Ink, Adhesive...

Product Highlights:

- Formaldehyde Free, **VOC Free**
- Broad spectrum activity
- Indirect Food contact, 175.105, 175.170, 176.180
- Ease of application, **directly soluble in water**
- Almost colorless
- **Cost effective** presentation of the globally accepted biocide, BIT

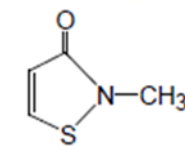
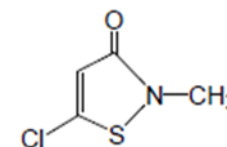
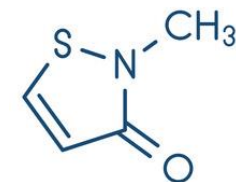
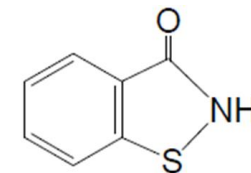




Active	BIT 5% MIT 2.5% CMIT/MIT 0.75%
Form	Milky Greenish
Usage Level	0.05 – 0.2%
pH tolerated	4 – 9
Max. Temp.	600C (BIT, MIT up to 1000C)
Application	Latex & polymer emulsion, Paint, HI&I, Textile, Ink, Adhesive...

Product Highlights:

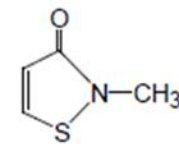
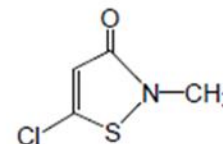
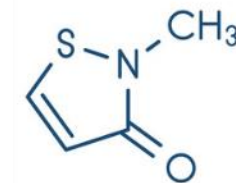
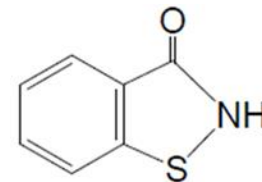
- Enhance efficacy to standard BIT/MIT system
- CIT increase initial microbial activity of BIT/MIT System, even at very low dosage of <1ppm
- **All in One BIT/MIT/CMITMIT**
 - Avoid handling single active CMIT/MIT (Skin sensitizing)
 - Ease of handling **single entity**
 - More cost effective,
- Formaldehyde Free, VOC Free
- Broad spectrum activity
- Indirect Food contact, 175.105, 175.170, 176.180





Product Highlights:

- BIT DEGRADATION CAUSE DOUBLE DOSAGE
E.g. Oxidative processes during manufacturing of polymer emulsions need additional BIT
- CIT INCREASE INITIAL MICROBIAL ACTIVITY
of BIT/MIT system even at very low dosage of <1ppm
- BOOSTER EFFECT OF CIT EVEN AT ALKALINE SYSTEM
e.g. at pH >8.5
 - CIT act as preservative booster during production & filling
 - When final product is stored, CIT is not long term stable & will not remain in the product

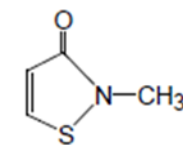
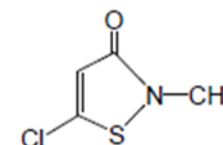
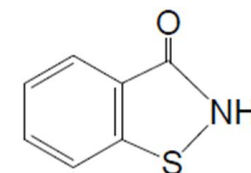




Active	BIT 12% CMIT/MIT 0.56%
Form	Solution
Usage Level	0.05 – 0.2%
pH tolerated	4 – 9
Max. Temp.	600C (BIT, MIT up to 1000C)
Application	Latex & polymer emulsion, Paint, HI&I, Textile, Ink, Adhesive...

Product Highlights:

- Enhance efficacy to standard BIT system
- CIT increase initial microbial activity of BITSystem, even at very low dosage of <1ppm
- **All in One BIT/CMITMIT**
 - Avoid handling single active CMIT/MIT (Skin sensitizing)
 - Ease of handling **single entity**
 - More cost effective,
- Formaldehyde Free, VOC Free
- Broad spectrum activity
- Indirect Food contact, 175.105, 175.170, 176.180



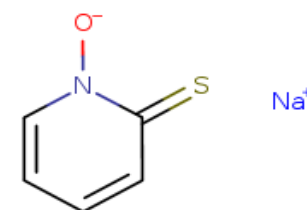
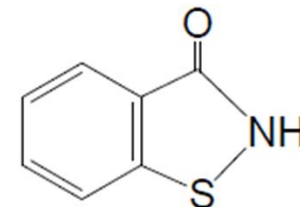
K-BIO[®] LS Con



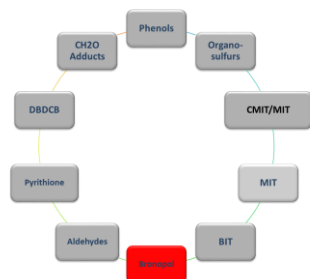
Active	BIT 2.5% SPT 20%
Form	Colorless liquid
Usage Level	0.1 – 0.2%
pH tolerated	4 – 12
Max. Temp.	Up to 80°C
Application	Latex & polymer emulsion, Paint, HI&I, Starch Solution, Mineral slurry, Pigment slurry, VAE emulsion...

Product Highlights:

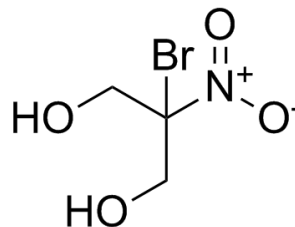
- Designed for EUH208 compliant, up to 0.2%
 - BIT 50ppm
- MIT-free, CIT-free, HCHO-free for 'green' water-based products
 - Ideal when use of use of formaldehyde and MIT is not permitted
- Broad spectrum activity, bacteria, yeast and fungal growth
- Free of toxic heavy chemical, cost effective solution



Typical A.I. – Wet State Preservatives



Bronopol



Advantages:

- Broad-spectrum activity, effectively kill bacteria and mold
- EN71-9 compliant, can be used for toy products
- Bronopol is non-irritant to healthy human skin at recommended use concentrations of 0.01-0.1%.
- It is used to preserve hypoallergenic skin creams and baby products
- VOC Free, APEO Free
- EUH208 compliant

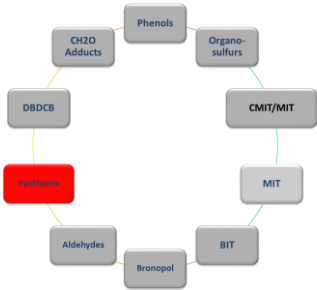
Disadvantages:

- Potential yellowing
- Degraded above pH7 and release free formaldehyde

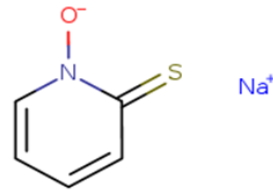
K-BIO BNPD 10	BNPD 10%
K-BIO BNPD 20	BNPD 20%
K-BIO BNPD 99	BNPD (99% Solid)
K-BIO CB515	CMIT/MIT 0.5% BNPD 15%



Typical A.I. – Wet State Preservatives



Sodium Pyrithione



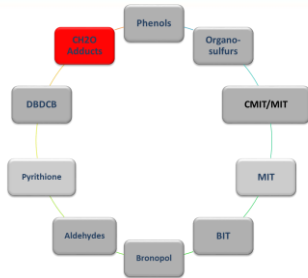
Advantages:

- SPT is an effective and high active broad-spectrum antimicrobial preservative that acts against moulds, yeasts, bacteria & algae.
- EUH208, Not classified as sensitizer

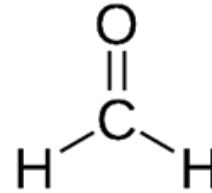
K-BIO SPT40	SPT 40%
K-BIO LS	SPT 5% BIT 5%
K-BIO LS Con	SPT 20% BIT 2.5%
K-BIO BW211	SPT MBIT



Typical A.I. – Wet State Preservatives



Formaldehyde Releaser



Advantages:

- Provide Head Space Protection
- Fast killing rate
- Good sanitizing effect
- Cost effective
- H317 up to 1000ppm

Disadvantages:

- May be pungent
- Carcinogenic classification

K-BIO HHT	HHT \geq 78%
K-BIO MBM	Methylenebismorpholine
K-CARE HG	Sodium hydroxymethylglycinate



Active	Sodium hydroxymethylglycinate
Form	Colorless to light yellow transparent liquid
Usage Level	0.05-0.5%
pH tolerated	3.0 – 12.0
Max. Temp.	Up to 60 Degree
Application	HI&I, Starch base adhesive, water-based inks, polishes, textiles, pulp and paper, air fresheners, car care products, lubricants.

Product Highlights:

- **Virtually zero free formaldehyde**
- Active ingredient part of Annex 6 EU-Cosmetic regulation
- Widely used in HI&I and cosmetic industry
- Non smelling formaldehyde releaser
- Provides head-space protection
- Highly efficient against bacteria & fungi

Disadvantages

- Risk of coloration if formulated with citric perfumes

OTHER PRODUCTS – PAINT & COATING



Product	A.I.	Characteristic
K-BIO® C515	CMIT/MIT 1.5%	Cost effective preservatives. CMIT/MIT is the second most important preservative used in Polymer Emulsions. Due to H317, consumption of CMIT/MIT has reduced and biocides to gain include SPT, FR's and Bronopol...
K-BIO CE	CMIT/MIT + EDDM	Cost effective preservatives. Common use grade
K-BIO CF	CMIT/MIT + Formalin	Cost effective preservatives. Common use grade
K-BIO® C19	CMIT 1% MIT 9%	Cost effective. H317 compliant up to 0.15% Dosage level It combines initial rapid and powerful performance boost from 1% CMIT and stable long term protection from 9% MIT
K-BIO® B20	Benzisothiazolinone	BIT is the leading biocide consumed within the global Polymer Emulsions industry. BIT is relatively expensive to use, it can be used alone or in combination. Not stable with redox agent.
K-BIO® BMc	BIT MIT CMIT/MIT	Enhance efficacy to standard BIT/MIT system CIT increase initial microbial activity of BIT/MIT System, even at very low dosage of <1ppm One product = Acticide MBS + Acticide RS
K-BIO BM22	BIT 5% MIT 5%	Direct equivalent to Acticide MBS, double concentration (2X)
K-BIO® HHT	HHT	Fast kill rate. Cost effective.





Outline

- Introduction
- Microbiology
- Biocide chemistry
- Historical/Regulation
- Products
- Services
- Application

For Better Preservative Application

CDI Efficacy Test Procedure



Summary of CDI Test Procedure

Biocide stability and Compatibility test



Analysis of microbial contamination



Selection of suitable biocide and input dosage

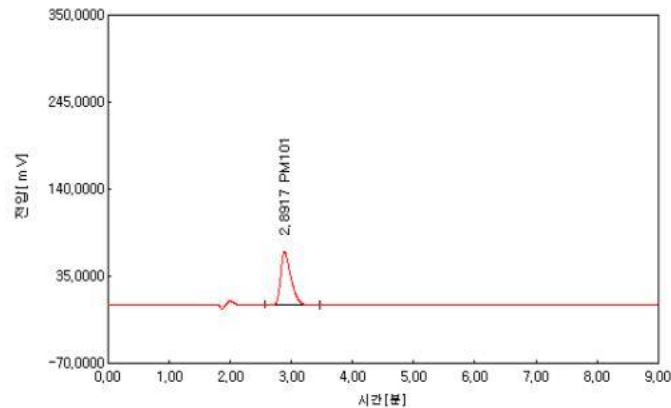


Consulting Report

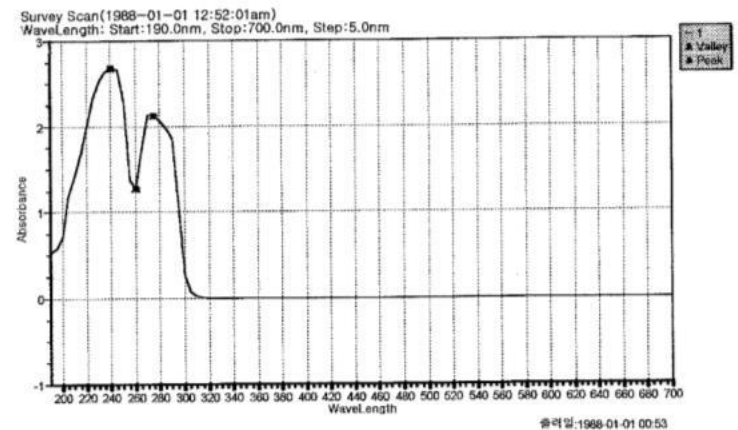
Biocide stability and Compatibility test (I)

Biocide stability test

Evaluation of the content of biocide at various manufacturer's operation process (ex. Temperature, pH etc.) by use of HPLC and UV spectrophotometer to estimate the stability of applied biocide during the manufacturing process



HPLC Analysis Data



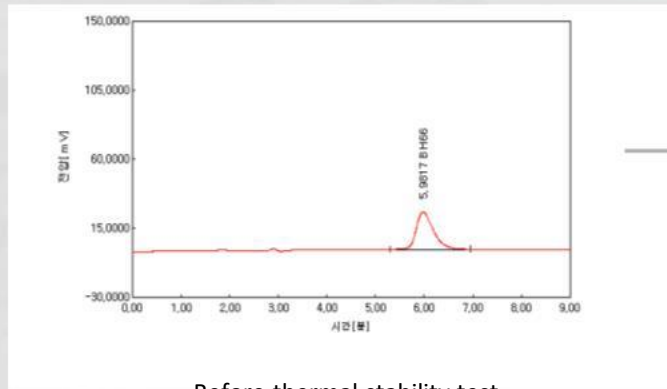
UV Spectrophotometer Analysis Data

Biocide stability and Compatibility test (II)

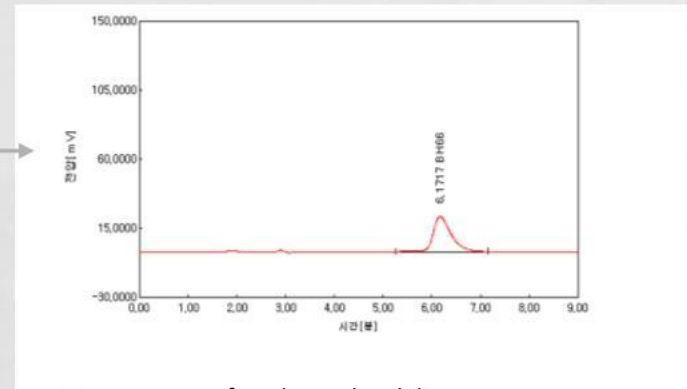
Compatibility test

Evaluate the compatibility between applied biocide and end products by checking the thermal stability of biocide in end products by use of chemical and microbial tests

Chemical analysis
(HPLC Data)



Before thermal stability test



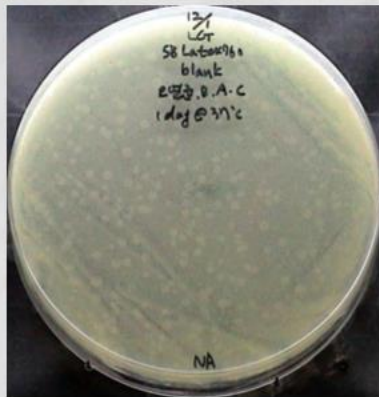
After thermal stability test

Microbial analysis
(Halo Test)

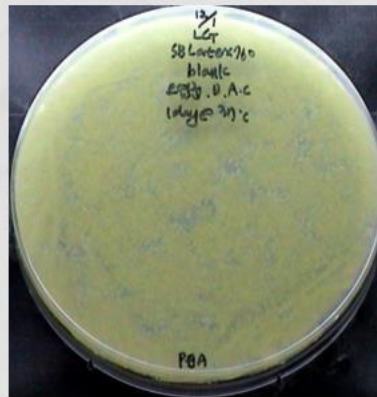


Analysis of Microbial Contamination

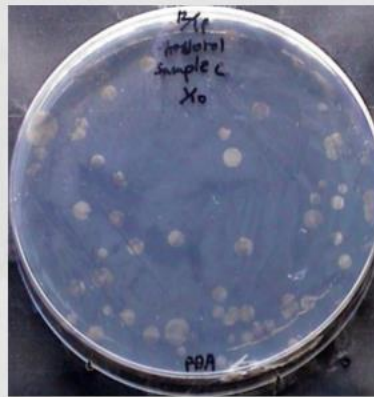
Analysis of bacteria and fungi in contaminated products by use of Plate count agar and MPN method



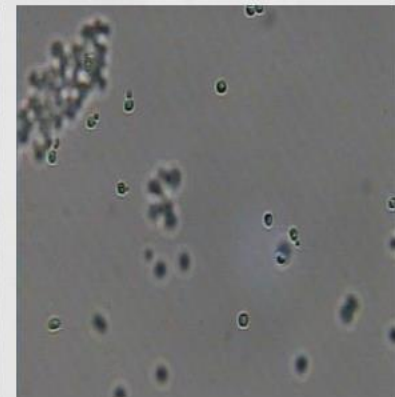
Bacterial contamination



Fungal contamination
(Filamentous Fungi)



Fungal contamination
(Yeast)



Photograph of Yeast
Isolated from
contaminated Ink
(X 400)

Identification by use of 16S rRNA Gene Sequence Technology

TACCGTATAACACTATTTCCGCATGGAAGAAAGTTGAAAGGCGCTTTTTCGTCCTACTGATGGATGGACCCGCGGT
 GCATTAGCTAGTTGGTGAGGTAACGGCTACCAAGGCAACGATGCATAGCCGACCTGAGAGGGTGATCGGCCAC
 ACTGGGACTGAGACACGGCCAGACTCTACGGGAGGCAGCAGTAGGGAATCTTCGGCAATGGACGAAAGTCT
 GACCGAGCAACGCCGCGTGAGTGAAGAAGTTTTTCGGATCGTAAACTCTGTTGTTAGAGAAGAACAAGGATGA
 GAGTANAACGTTATCCCTTGACGGTATCTAACCAGAAAGCCACGGCTAACTACGTGCCAGCAGCCGCGGTAAT
 ACGTAGGTGGCAAGCGTTGTCCGGATTTATTGGGCGTAAAGCGAGCGCAGGCGGTTTCTTAAGTCTGATGTGAAA
 GCCCCGGCTCAACCGGGGAGGGTCATTGAAACTGGGAGACTTGAGTGCAGAAGAGGAGAGTGGAATTCCAT
 GTGTAGCGGTGAAATGCGTAGATATATGGAGGAACACCAGTGGCGAAGGCGGCTCTCTGGTCTGTAACGACGC
 TGAGGCTCGAAAGCGTGGGGAGCGAACAGGATTAGATACCTGTTAGTCCACGCCGTAACGATGAGTGCTAAG
 TG

Query: KY5_27F_Eo

View all seq View(acc) View(zZ) NJ Tree Add query to cart Add to cart

Rank	Name/Title	Authors	Strain	Accession	Pairwise Similarity	Diff/Total nt	megaBLAST score	BLASTH score
1	<i>Enterococcus gallinarum</i>	(Bridge and Sneath 1982) Collins et al. 1984	CECT970(T)	AJ420805	99.700	2/667	1302	1302
2	<i>Enterococcus casseliflavus</i>	(ex Vaughn et al. 1979) Collins et al. 1984	CECT969(T)	AJ420804	99.700	2/667	1302	1302
3	<i>Enterococcus saccharolyticus</i>	(Farrow et al. 1985) Rodrigues and Collins 1991	ATCC 43076(T)	DQ411816	98.201	12/667	1233	1231
4	<i>Enterococcus malodoratus</i>	(ex Pette 1955) Collins et al. 1984	NCFB 846(T)	Y18339	97.751	15/667	1219	1219
5	<i>Enterococcus raffinosus</i>	Collins et al. 1989	NCMB 12901(T)	Y18296	97.601	16/667	1211	1211
6	<i>Enterococcus gilvus</i>	Tyrrell et al. 2002	ATCC BAA-350(T)	DQ411810	97.598	16/666	1207	1207
7	<i>Enterococcus devriesei</i>	Svec et al. 2005	LMG 14595(T)	AJ891167	97.301	18/667	1211	1211
8	<i>Enterococcus pseudoavium</i>	Collins et al. 1989	NCFB 2138(T)	Y18356	97.301	18/667	1211	1211
9	<i>Enterococcus viikkiensis</i>	Rahkila et al. 2011	IE3.2(T)	HQ378515	97.301	18/667	1211	1211
10	<i>Enterococcus phoeniculicola</i>	Law-Brown and Meyers 2003	JLB-1(T)	AY028437	97.143	19/665	1170	1164
11	<i>Enterococcus canintestini</i>	Naser et al. 2005	LMG 13590(T)	AJ888906	97.001	20/667	1211	1203
12	<i>Enterococcus avium</i>	(ex Nowlan and Deibel 1967) Collins et al. 1984	NCFB 2369(T)	Y18274	97.001	20/667	1195	1195
13	<i>Enterococcus faecium</i>	(Oria-Jensen 1919) Schleifer and Kilpper-Bälz 1984	ATCC 19434(T)	DQ411813	96.992	20/665	1162	1152
14	<i>Enterococcus aquimarinus</i>	Svec et al. 2005	LMG 16607(T)	AJ877015	96.988	20/664	1170	1174
15	<i>Enterococcus italicus</i>	Fortina et al. 2004	DSM 15952(T)	AEPV01000109	96.852	21/667	1166	1166
16	<i>Enterococcus hirae</i>	Farrow and Collins 1985	CECT279(T)	AJ420799	96.847	21/666	1162	1152
17	<i>Enterococcus dispar</i>	Collins et al. 1991	ATCC 51266(T)	AF061007	96.847	21/666	1201	1187
18	<i>Enterococcus villorum</i>	Vancanneyt et al. 2001	LMG 12287(T)	AJ271329	96.842	21/665	1158	1152
19	<i>Enterococcus ratti</i>	Teixeira et al. 2001	ATCC 700914(T)	AF539705	96.697	22/666	1158	1152
20	<i>Enterococcus thailandicus</i>	Tanasupawat et al. 2008	FP48-3(T)	EF197994	96.697	22/666	1154	1144
21	<i>Enterococcus durans</i>	(ex Sherman and Wing 1937) Collins et al. 1984	CECT411(T)	AJ420801	96.697	22/666	1154	1144
22	<i>Enterococcus sanguinicola</i>	Carvalho Mda et al. 2008 (invalid)	SS-1729(T)	AY321376	96.692	22/665	1150	1140

Identification

Identification of the microorganisms isolated from contaminated products by various kinds of biochemical tests



Pseudomonas spp .

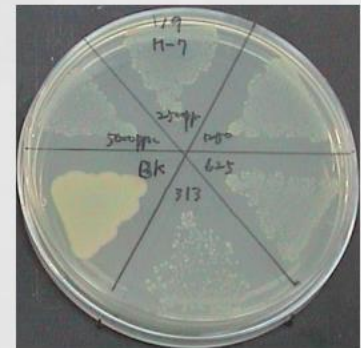
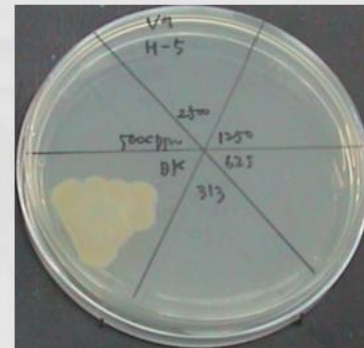
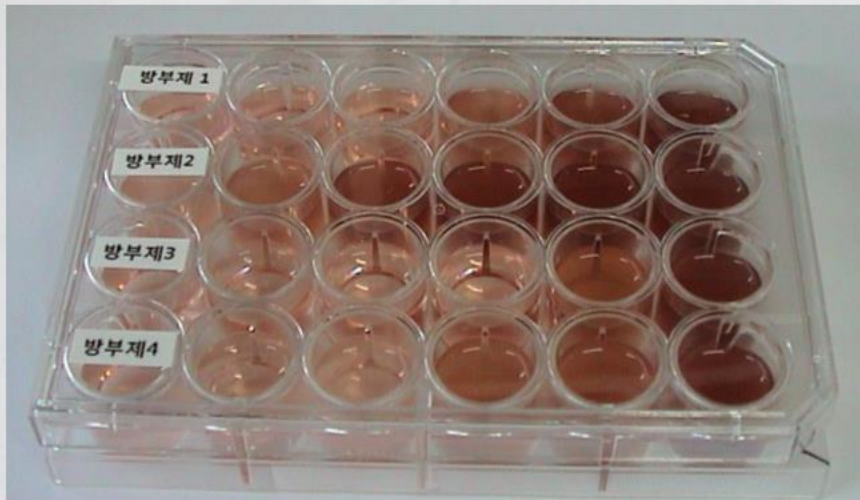


Pseudomonas putida

Selection of suitable biocide and input dosage (I)

MIC Test

Determination of MIC(Minimum Inhibitory Concentration) value of various biocide products to isolated microorganism to find out the suitable biocide product to control the isolated microorganism



MBC (Minimum Biocidal Concentration)

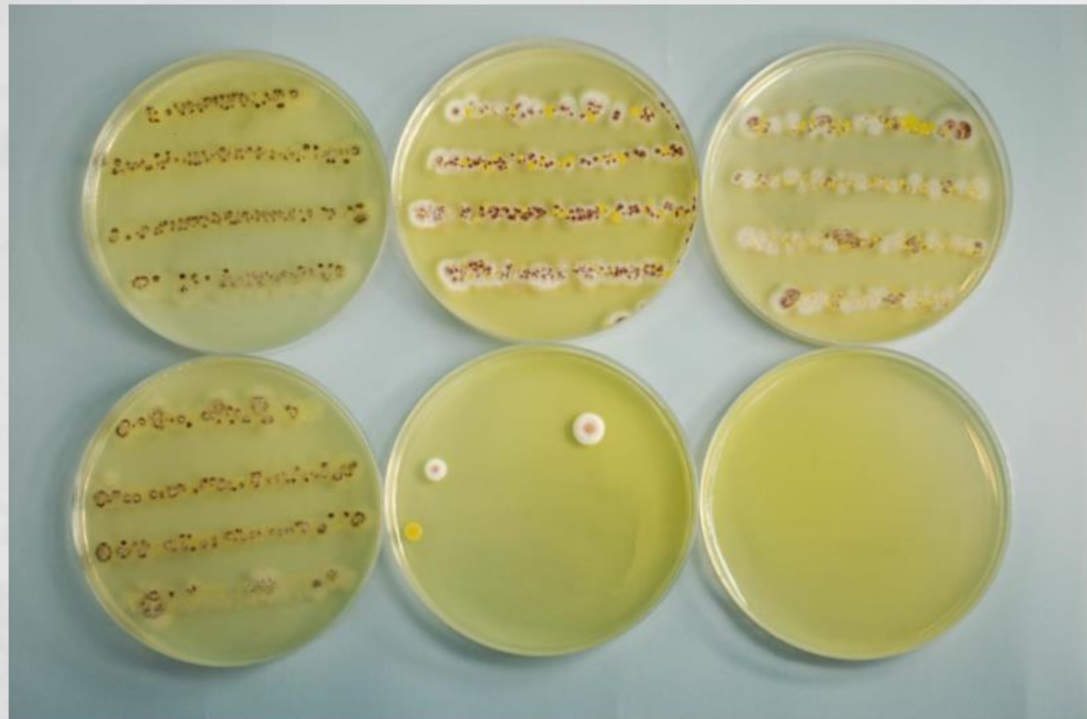
Selection of suitable biocide and input dosage (II)

Challenge Test

By evaluate the resistance of aqueous based products containing various concentration of biocide against microorganisms isolated from contaminated product, determine the optimized input dosage of applied biocide

Control (Without Biocide)

Control (Adding Biocide)



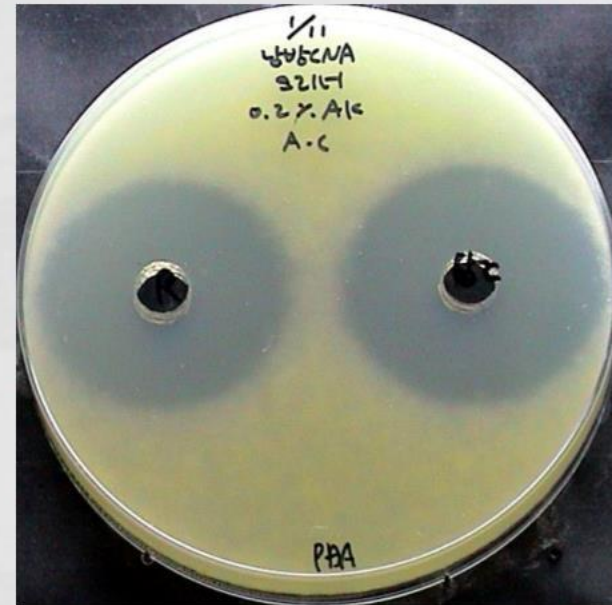
Selection of suitable biocide and input dosage (III)

Zone of Inhibition Test

Evaluate the anti bacterial and antifungal activities of products containing biocides by measuring the size of zone of inhibition



Anti bacterial activity test

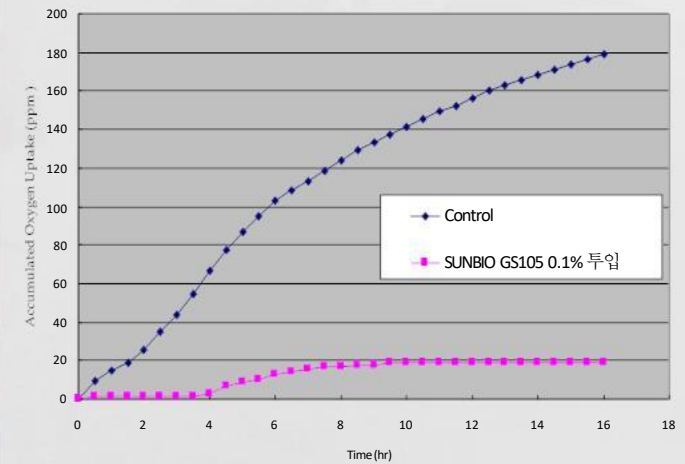
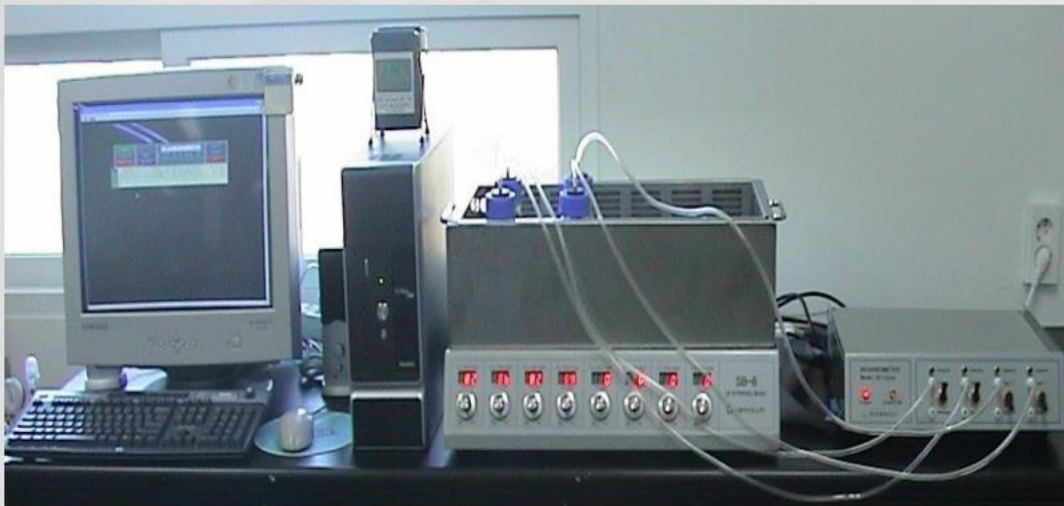


Anti fungal activity test

Selection of suitable biocide and input dosage (IV)

Respirometer

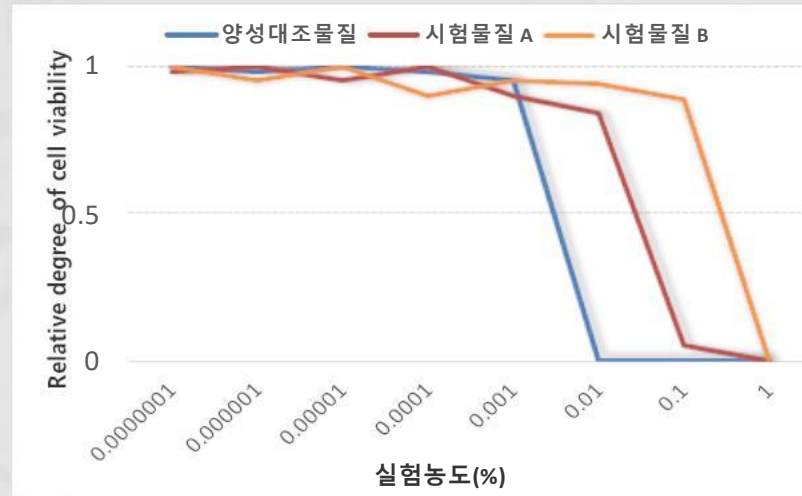
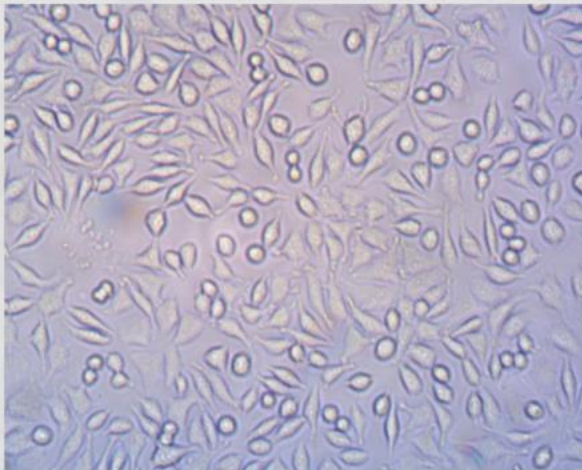
Simulation test for evaluation of biodegradability of organic material by contaminated bacteria and biocidal activity of selected biocide by use of respirometer



Safety Test of Biocides

Cytotoxicity Test

By the method of ISO 10993-5:2009, measure cytotoxicity of a biocide :
Qualitative and quantitative analysis of all culture of animal cells show
Cellular Toxicity Index.



SERVICES



- Raw materials are more and more sensitive to micro-organisms.
- Production plants are subject to recurrent infections from raw materials, storage tanks, processing water etc..
- CDI Plant Hygiene audits help customers to identify the major risks of infections.
- CDI supports customers in implementing a customized hygiene program with specific cleaning/sanitizing procedures and microbiological monitoring.

Product	Actives	Benefits
K-BIO® DBNPA20	DBNPA	<ul style="list-style-type: none">• Quick kill for curative treatment of processing water, raw materials & intermediates (0.05 – 0.2 %)• Broad activity spectrum• No residues• Also used as a surface disinfectant in water solution (1 – 2 %)

Question to ask at customer call



1. What is the pH of the product and does it stay stable?
2. What type of product / application we are talking about?
Type Of Binder, %PVC, Exterior/Interior, Require years of protections
3. Any restrictions coming from the regulatory issues?
5. Any restrictions coming from the production process
(high temperature, pH shifts etc.)?
6. What are they using currently for preservation?
7. Are they content or do they need to improve the existing preservation? If improvement is asked for, what contamination occurs
(Bacteria/Yeast/Fungi/Algae)?
8. Is the customer paying good attention on plant hygiene or not that much?
9. Is the product stored prolonged?
10. Is it exported to hot climates?



Outline

- Introduction
- Microbiology
- Biocide chemistry
- Historical/Regulation
- Products
- Services
- **Applications**

OTHER PRODUCTS – PAINT & COATING



Product	A.I.	Characteristic
K-BIO® C515	CMIT/MIT 1.5%	Cost effective preservatives. CMIT/MIT is the second most important preservative used in Polymer Emulsions. Due to H317, consumption of CMIT/MIT has reduced and biocides to gain include SPT, FR's and Bronopol...
K-BIO® CB	CMIT/MIT, Bronopol	Cost effective. H317 compliant up to 0.3% Dosage level. Indirect Food contact
K-BIO® MIT10	MIT 10	More stable around redox agent versus BIT. Long term protection. Heat and high pH stable.
K-BIO® C19	CMIT 1% MIT 9%	Cost effective. H317 compliant up to 0.15% Dosage level It combines initial rapid and powerful performance boost from 1% CMIT and stable long term protection from 9% MIT
K-BIO® B20/B20S/B20W	Benzisothiazolinone	BIT is the leading biocide consumed within the global Polymer Emulsions industry. BIT is relatively expensive to use, it can be used alone or in combination. Not stable with redox agent.
K-BIO® BMc	BIT MIT CMIT/MIT	Enhance efficacy to standard BIT/MIT system CIT increase initial microbial activity of BIT/MIT System, even at very low dosage of <1ppm
K-BIO® MBc	MBIT CMIT/MIT	Enhance efficacy to standard BIT/MIT system. MBIT formulated with CMIT/MIT, MIT or BIT offers significantly better preservation than MIT/BIT combinations
K-CARE® HG	Sodium Hydroxymethylglycinate	It is a preservative derived from the naturally occurring amino acid, glycine, the safest preservative. EN71 compliant. Non skin sensitizing
K-BIO® HHT	HHT	Fast kill rate. Cost effective.

OTHER PRODUCTS – POLYMER EMULSION



Product	A.I.	Characteristic
K-BIO® C515	CMIT/MIT 1.5%	Cost effective preservatives. CMIT/MIT is the second most important preservative used in Polymer Emulsions. Due to H317, consumption of CMIT/MIT has reduced and biocides to gain include SPT, FR's and Bronopol...
K-BIO® CB	CMIT/MIT, Bronopol	Cost effective. H317 compliant up to 0.3% Dosage level. Indirect Food contact
K-BIO® MIT10	MIT 10	More stable around redox agent versus BIT. Long term protection. Heat and high pH stable.
K-BIO® C19	CMIT 1% MIT 9%	Cost effective. H317 compliant up to 0.15% Dosage level It combines initial rapid and powerful performance boost from 1% CMIT and stable long term protection from 9% MIT
K-BIO® B20	Benzisothiazolinone	BIT is the leading biocide consumed within the global Polymer Emulsions industry. BIT is relatively expensive to use, it can be used alone or in combination. Not stable with redox agent.
K-BIO® BMc	BIT MIT CMIT/MIT	Enhance efficacy to standard BIT/MIT system CIT increase initial microbial activity of BIT/MIT System, even at very low dosage of <1ppm
K-BIO® MBc	MBIT CMIT/MIT	Enhance efficacy to standard BIT/MIT system. MBIT formulated with CMIT/MIT, MIT or BIT offers significantly better preservation than MIT/BIT combinations
K-CARE® HG	Sodium Hydroxymethylglycinate	It is a preservative derived from the naturally occurring amino acid, glycine, the safest preservative. EN71 compliant. Non skin sensitizing
K-BIO® HHT	HHT	Fast kill rate. Cost effective.

OTHER PRODUCTS – CONSTRUCTION



			Bactericide	Fungicide	Algaecide	Tile Grouts	Gypsum Board	Concrete Admixture Polycarboxylates	Concrete Admixture Lignosulphonate
Product	A.I.								
K-FILM® IPBC Tech	IPBC	powder		+		*	*		
K-FILM® BCM50 SC	BCM	Dispersion		+		*	*		
K-FILM® D50SC	Diuron	Dispersion			+	*			
K-FILM® IC515	IPBC, BCM	Solution		+	+	*			
K-FILM® ZPTC	ZOE	Dispersion	+	+	+	*	*		
K-BIO® OF	OIT, Formaldehyde	Solution	+	++	+				+
K-BIO® OM	OIT, MIT	Solution	+	++	+				+
K-BIO® C515	CMIT/MIT	Solution	+	+	+			+	
K-BIO® CF	CMIT/MIT, Formaldehyde	Solution	+	+	+			+	

OTHER PRODUCTS – ADHESIVE



Product	A.I.	Characteristic
K-BIO® C515	CMIT/MIT 1.5%	CMIT/MIT is the most effective biocide used in adhesives. It is typically added at 0.1 % to the adhesive formulation to give 15 ppm.
K-BIO® CB	CMIT/MIT, Bronopol	Cost effective. H317 compliant up to 0.3% Dosage level. Indirect Food contact
K-BIO® MIT10	MIT 10	More stable around redox agent versus BIT. Long term protection. Heat and high Ph stable.
K-BIO® C19	CMIT 1% MIT 9%	Cost effective. H317 compliant up to 0.15% Dosage level It combines initial rapid and powerful performance boost from 1% CMIT and stable long term protection from 9% MIT
K-BIO® B20	Benzisothiazolinone	BIT is the leading biocide consumed within the adhesive industry. BIT is relatively expensive to use, it can be used alone or in combination. Not stable with redox agent.
K-BIO® BMc	BIT MIT CMIT/MIT	Enhance efficacy to standard BIT/MIT system CIT increase initial microbial activity of BIT/MIT System, even at very low dosage of <1ppm
K-BIO® MBc	MBIT CMIT/MIT	Enhance efficacy to standard BIT/MIT system. MBIT formulated with CMIT/MIT, MIT or BIT offers significantly better preservation than MIT/BIT combinations



OTHER PRODUCTS – ADHESIVE



Product	A.I.	Characteristic
K-CARE® HG	Sodium Hydroxymethylglycinate	It is a preservative derived from the naturally occurring amino acid, glycine, the safest preservative. EN71 compliant. Non skin sensitizing. Suitable for use with starch, dextrin and animal glues.
K-BIO® ADH	Chloracetamide	Especially suitable for natural base adhesive e.g. starch, dextrin, animal glues etc where BIT fail to preserve
K-BIO® PCMC	PCMC	Especially suitable for natural base adhesive e.g. starch, dextrin, animal glues etc where BIT fail to preserve
K-BIO® OPP	OPP	Especially suitable for natural base adhesive e.g. starch, dextrin, animal glues etc where BIT fail to preserve

OTHER PRODUCTS – PIGMENT AND MINERAL SLURRY

Product	A.I.	Characteristic
K-BIO® C515	CMIT/MIT 1.5%	Cost effective preservatives. CMIT/MIT dominates in the preservation of kaolin, which is the largest segment within the slurry market.
K-BIO® C19	CMIT 1% MIT 9%	Cost effective. H317 compliant up to 0.15% Dosage level It combines initial rapid and powerful performance boost from 1% CMIT and stable long term protection from 9% MIT
K-BIO® CB	CMIT/MIT, Bronopol	Cost effective. H317 compliant up to 0.3% Dosage level. Indirect Food contact
K-BIO® B20	Benzisothiazolinone	BIT is widely used in mineral slurries to protect the product during storage and usage. BIT is typically applied at an application rate of 0.1 % to 0.2 %.
K-BIO® BMc	BIT MIT CMIT/MIT	Enhance efficacy to standard BIT/MIT system CIT increase initial microbial activity of BIT/MIT System, even at very low dosage of <1ppm
K-BIO® MBc	MBIT CMIT/MIT	Enhance efficacy to standard BIT/MIT system. MBIT formulated with CMIT/MIT, MIT or BIT offers significantly better preservation than MIT/BIT combinations
K-BIO® PCMC	PCMC	For for calcium carbonate preservation
K-BIO® OPP	OPP	For for calcium carbonate preservation
K-CARE® HG	Sodium Hydroxymethylglycinate	It is a preservative derived from the naturally occurring amino acid, glycine, the safest preservative. EN71 compliant. Non skin sensitizing
K-BIO® SPT40	Sodium Pyrithione	Used as fungicide in textiles. Least toxic material, replace OPBA, TBPT. Typical usage rate 1%.

OTHER PRODUCTS – HPC



Product	A.I.	Characteristic
K-CARE® PND	1,3-Propanediol	COSMA organic certification. Reproducible. No visible Irritation. Emollients. Moisturizer. Solvents. Toners. Thickeners. Plant extracts and diluents. Active ingredient carriers. Natural preservatives
K-CARE® GG	Caprylhydroxamic Acid	It is a mild and natural antimicrobial derived from coconut oil. It provides guaranteed, broad-spectrum performance against bacteria and fungi.
K-CARE® HG	Sodium Hydroxymethylglycinate	It is a preservative derived from the naturally occurring amino acid, glycine, the safest preservative.
K-CARE® PE	Phenoxyethanol	It is a biocide which is most active against gram-negative bacteria, used in combination with other preservatives.
K-CARE® CG	CMIT/MIT	Cost effective preservatives.
K-CARE® GM-A	Diazolidinylurea	It is widely used as antiseptic. Strong moisture absorbability. Particular smell. Easily dissolved in water but hardly in oil. Highly effective against gram +ve and gram -ve bacteria. They are popular biocides used in the personal care industry with sales of \$ 19 million.
K-CARE® GM-115	Imidazolidinyl Urea	Antimicrobial preservative in cosmetics and topical pharmaceutical preparations. Highly effective against gram +ve and gram -ve bacteria. They are popular biocides used in the personal care industry with sales of \$ 19 million.
K-CARE® DM	DMDM Hydantoin	It has compatibility with cation, anion and nonionic surfactant, emulsifier and protein. Effectively constrain the growing of gram +ve and gram-ve bacterium, yeasts & mildew.
K-CARE® B20	Benzisothiazolinone	Commonly use in homecare product.

OTHER PRODUCTS – HPC



Product	A.I.	Characteristic
K-CARE® LS	Benzisothiazolinone Sodium Pyrithione	Commonly use in homecare product.
K-CARE® PCMX	PCMX	It is a secure, high-efficient, broad spectrum and low-toxic antiseptic. It has large potency to Gram-positive, Gram-negative, epiphyte and mildew approved by FDA .
K-CARE® IP10	IPBC	Is used within the personal care industry where antifungal activity is required.
K-CARE® CHG	Chlorhexidine gluconate	It is a disinfect and antiseptic medicine, bactericide, strong function of broad-spectrum bacteriostasis, kill gram-positive bacteria gram-negative bacteria.
K-CARE® OCT	Piroctone Olamine	It destroys the fungus infection that is responsible for the dandruff and works against the formation of new dandruff, makes the scalp stay clean, itch free.
K-CARE® PHMB	PHMB	It is a fast-acting and broad spectrum antimicrobial, providing activity against a wide range of bacteria and viruses.
K-CARE® Chlorphenisin	Chlorphenisin	It is a preservative helps to prevent or retard the growth of microorganisms, and thus protects the product from spoiling.
K-CARE® SPT40	Sodium Pyrithione	Used in various antidandruff shampoos at use levels ranging from 1% - 2% by weight
K-CARE® TC	Triclosan	Used as a bacteriostat. Odour free, kind to the skin. very effective against gram +ve bacteria. Triclosan (100 % ai) is used at 0.2 % of the final product.
K-CARE® TS	Triclocarban	is used as a bacteriostat in deodorant soap bars. Deodorant soaps are designed to minimize odors by reducing and inhibiting the growth of odor causing microorganism.

OTHER PRODUCTS – HPC



Product	A.I.	Characteristic
K-CARE® BAC	Benzalkonium chloride	It is a quaternary ammonium compound used as a biocide, a cationic surfactant. active against gram positive and gram-negative bacteria, as well as yeasts and molds.
K-CARE® BNPD	Bronopol 99%	Bronopol is extremely effective in combination with numerous other biocides, for example certain isothiazolones, quaternary ammonium salts and IPBC.
K-CARE® Climbazole	Climbazole	It is a topical antifungal agent commonly used in the treatment of human fungal skin infections, It has shown a high efficacy against pityrosporum ovale .
K-CARE® PE91	PE 90%, EHG10%	Formulative New Generation Preservatives. EGH is preservative derived from glycerol.
K-CARE® PE73	PE 70%, EHG30%	Formulative New Generation Preservatives. EGH is preservative derived from glycerol.
K-CARE® DI	DMDMH + IPBC	Popular preservatives combining strong bactericide and fungicide.
K-CARE® UI	Diazolidinyl Urea IPBC	It is heat sensitive and should be added to the water phase or to the emulsified portion of the formulation at a proper temperature, add during the cool down stage.

OTHER PRODUCTS – INK & FOUNTAIN SOLUTION



Product	A.I.	Characteristic
K-BIO® C515	CMIT/MIT 1.5%	Cost effective preservatives.
K-BIO® C19	CMIT 1% MIT 9%	Cost effective. H317 compliant up to 0.15% Dosage level It combines initial rapid and powerful performance boost from 1% CMIT and stable long term protection from 9% MIT
K-BIO® CB	CMIT/MIT, Bronopol	Cost effective H317 compliant up to 0.3% Dosage level Indirect Food contact
K-BIO® B20	Benzisothiazolinone	Wide PH and temperature tolerance. Good long term protection.
K-BIO® BMc	BIT MIT CMIT/MIT	Enhance efficacy to standard BIT/MIT system CIT increase initial microbial activity of BIT/MIT System, even at very low dosage of <1ppm
K-BIO® MBc	MBIT CMIT/MIT	Enhance efficacy to standard BIT/MIT system MBIT formulated with CMIT/MIT, MIT or BIT offers significantly better preservation than MIT/BIT combinations
K-CARE® BNPD	Bronopol 99%	Bronopol is extremely effective in combination with numerous other biocides, for example certain isothiazolones, quarternary ammonium salts and IPBC.
K-CARE® HG	Sodium Hydroxymethylglycinate	It is a preservative derived from the naturally occurring amino acid, glycine, the safest preservative. EN71 compliant. Non skin sensitizing
K-BIO® HHT	HHT	Low cost. Fast speed killing Head space protection

OTHER PRODUCTS – TEXTILE



Product	A.I.	Characteristic
K-BIO® C515	CMIT/MIT 1.5%	Cost effective preservatives.
K-BIO® C19	CMIT 1% MIT 9%	Cost effective. H317 compliant up to 0.15% Dosage level It combines initial rapid and powerful performance boost from 1% CMIT and stable long term protection from 9% MIT
K-BIO® CB	CMIT/MIT, Bronopol	Cost effective. H317 compliant up to 0.3% Dosage level. Indirect Food contact
K-BIO® B20	Benzisothiazolinone	Wide PH and temperature tolerance. Good long term protection.
K-BIO® BMc	BIT MIT CMIT/MIT	Enhance efficacy to standard BIT/MIT system CIT increase initial microbial activity of BIT/MIT System, even at very low dosage of <1ppm
K-BIO® MBc	MBIT CMIT/MIT	Enhance efficacy to standard BIT/MIT system. MBIT formulated with CMIT/MIT, MIT or BIT offers significantly better preservation than MIT/BIT combinations
K-CARE® HG	Sodium Hydroxymethylglycinate	It is a preservative derived from the naturally occurring amino acid, glycine, the safest preservative. EN71 compliant. Non skin sensitizing
K-BIO® PHMG	Poly(hexamethylene biguanide) hydrochloride	Binds electrostatically to negatively charged fibres. Antimicrobial textile, Improved freshness, hygiene, odour control
K-BIO® SPT40	Sodium Pyrithione	Used as fungicide in textiles. Least toxic material, replace OPBA, TBPT. Typical usage rate 1%.
K-FILM® IC515	IPBC, BCM	Most popular fungicide used in exterior textile preservation.

OTHER PRODUCTS – MWF



Product Group	Product	A.I.	Use level in dilute (ppm)	Soluble		Semi-Synthetic		Synthetic	
				Concentrate	Post Addition	Concentrate	Post addition	Concentrate	Post Addition
Bactericide	K-BIO® HHT78	Hexahydrotriazine (HHT)	1000-3000	*	*	*	*	*	*
	K-BIO® MWF	Methylene bismorpholine (MBM)	1000-3000	*	Δ	*	Δ	*	Δ
	K-BIO® EDDM	Ethylenedioxydimethanol (EDDM)	700-2000	*	*	*	*	*	*
	K-BIO® B20S	BIT 20% (DPG)	800-1600	*	Δ	*	Δ	*	Δ
	K-BIO® B20W	BIT 20% (Dispersion)	800-1600	*	Δ	*	Δ	*	Δ
	K-BIO® B20	BIT 20% (In water)	800-1600	*	Δ	*	Δ	*	Δ
	K-BIO® BMc	BIT5%MIT2.5%CMIT/MIT0.75%	400-800	*	Δ	*	Δ	*	
	K-BIO® C14	CMIT/MIT 14%	100-200		*		*		*
	K-BIO® C515	CMIT/MIT 1.5%	1000-2000		*		*		*
	K-BIO® CB	CMIT/MIT 1% BNP 7.5%	1000-2000		*		*		*
	K-BIO® GLUT50	Glutaraldehyde	220-670		*		*		*
	K-BIO® PCMC	PCMC	100-200	*	*	*	*	*	*
Fungicide	K-FILM® SPT40	Sodium Pyrithione (NaPT)	150-400	*	*	*	*	*	*
	K-FILM® OIT10	OIT 10%	500-1000		*		*		*
	K-FILM® OPP	OPP 97%	100-200	*	*	*	*	*	*
	K-FILM IP40	IPBC 40%	150-400	*	Δ	*	Δ	*	Δ

* Broad Spectrum

Δ Formula Specific

OTHER PRODUCTS – MWF



Product	Advantage	Use level in final diluted MWF
K-BIO® HHT78	Safest and most economical way to preserve MWF.	0.10 to 0.15 %
K-BIO® MWF	Safest and most economical way to preserve MWF.	
K-BIO® EDDM	Less skin sensitizing versus HHT	
K-BIO® B20W	Formaldehyde Free	
K-BIO® BMc	Formaldehyde Free	
K-BIO® C14	Quick kill for tankside	
K-BIO® CB	Quick kill for tankside, more stable than CMIT/MIT alone	
K-BIO® GLUT50	Especially tankside additions where speed of kill is important.	Initial 220 to 670ppm
K-BIO® GLUT50	Especially tankside additions where speed of kill is important.	Weekly maintenance 90-440ppm
K-BIO® PCMC	Very good skin compatibility and easy biodegradability. Effective removing Biofilm	0.1-0.2% w/w of product
K-FILM® SPT40	Single most important fungicide used in the global MWF. Very suitable for use in combination with bactericides.	125 to 250 ppm.
K-FILM® OIT10	OIT would be a very successful fungicide in metalworking fluid concentrates were it not for its stability problems.	initial dose of 25-75 ppm
K-FILM® OIT10	OIT would be a very successful fungicide in metalworking fluid concentrates were it not for its stability problems.	maintenance dose of 5-30 ppm active ingredient every four weeks
K-FILM® OPP	Very good skin compatibility and easy biodegradability. Effective removing Biofilm	0.1-0.2% w/w of product
K-FILM IP40	It is sold as a 40 % dispersion. IPBC is suitable for use in all MWF concentrates and tankside additions.	0.125% w/w of product.

OTHER PRODUCTS – Paper, Cooling, Oilfield



		Paper	Cooling	Oilfield	Bacterial	Fungal	Algal	SRB	Ph	Contact Time	Stability In use solution	Solubility In H2O	Broad Spectrum	No Odor
Product	A.I.													
K-BIO® C14	CMIT/MIT 14%	+	+	+/-	+	+	+	+/-	6.5-9	5-6	Yes	High	+	+
K-BIO® MT30	TCMTB	+	-	-	-	+	-	?	?	?	Yes	Low	-	-
K-BIO® MBT	MBT	+	-	-	+	+/-	+/-	?	?	?	No	Low	+	-
K-BIO® THPS	THPS	+/-	+	+	+	+/-	+	+	?	?	'Yes	'Yes	-	+
K-BIO® GLUT50	Glutaraldehyde 50%	+	+	+	+	-	-	+	6.5-9	3-4	'Yes	High	-	-
K-BIO® DBNPA20	DBNPA 20%	+	+	+/-	+	-	-	?	<8.5	<1	No	High	-	+
K-FILM IPBC TECH	IPBC 99%	+	+	-	+/-	+	+/-	?	3-Oct	?	'Yes	Low	-	+
K-BIO BNPD 30	Bronopol 30%	+/-	+	-	+	-	-	?	<8	QK	'Yes	High	-	+

OTHER PRODUCTS – LEATHER



		Advantage	Disadvantage
Product	A.I.		
K-FILM® MT30	2(thiocyanomethylthio) benzothiazole	Superb performance in pelt houses Low pH levels ; Low doses ; Broad spectrum ; Good prices	One gap in its spectrum – Trichoderma from wood ; Fat loving molecule ; Skin irritation
K-FILM® MBT	Sodium Mercaptobenzothiazole	Inexpensive (half the TCMTB price) ; less fat loving ; Can be added at both high and low pH levels	Double the TCMTB dose is required
K-FILM® IC515	IPBC 5% BCM 20%	TCMTB and MBT free. No gap for Trichoderma. No skin sensitizing. No pungent odor. Safer preservatives.	
K-FILM® OIT20	OIT 20%	High potency ; Low doses ; Broad spectrum	One gap in its spectrum – Trichoderma from wood ; Fat loving molecule ; Skin irritation
K-FILM® BCM50	Carbendazim 50%	High potency ; Low doses ; Broad spectrum. Can be used with IPBC or OIT for broad spectrum.	
K-FILM® PCMC	PCMC	Effective against most leather relevant molds species. Secondary co biocide when TCMTB fail.	Fail in the tropical chamber, while they succeed in the real world. High dose ; High Cost
K-FILM® OPP	OPP	Effective against most leather relevant molds species. Secondary co biocide when TCMTB fail.	Fail in the tropical chamber, while they succeed in the real world. High dose ; High Cost

OTHER PRODUCTS – LEATHER



		Advantage	Disadvantage
Product	A.I.		
K-BIO®CQ	CMIT/MIT QUAT	Microbicide for the prevention of bacterial growth during soaking. To avoid hide damage caused by micobes.	
K-BIO®DMDTC	dimethyldithiocarbamate sodium salt.	Microbicide for the prevention of bacterial growth during soaking. To avoid hide damage caused by micobes.	

Question to ask at customer call



1. What is the pH of the product and does it stay stable?
2. What type of product / application we are talking about?
Type Of Binder, %PVC, Exterior/Interior, Require years of protections
3. Any restrictions coming from the regulatory issues?
5. Any restrictions coming from the production process
(high temperature, pH shifts etc.)?
6. What are they using currently for preservation?
7. Are they content or do they need to improve the existing preservation? If improvement is asked for, what contamination occurs
(Bacteria/Yeast/Fungi/Algae)?
8. Is the customer paying good attention on plant hygiene or not that much?
9. Is the product stored prolonged?
10. Is it exported to hot climates?



Thank You