

*Paraben Free  
&  
Natural Preservative Systems*



*YOU CAN COUNT ON US,  
NATURALLY!*



**JEEN** INTERNATIONAL  
CORPORATION

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Formulating with JEECIDE<sup>®</sup> Products:  
**Featuring: JEEQUAT<sup>®</sup> MCA-1**



## Product Description

### JEEQUAT<sup>®</sup> MCA-1

**INCI:** Glycerin, Citric Acid, Lactic Acid, L-Ascorbic Acid, Didecylidimonium Chloride

The **JEEQUAT<sup>®</sup> MCA-1** is mild, yet effective, and impart little odor and color to a wide range of leave-on and rinse-off personal care and cosmetic products. They provide cost-effective alternatives to traditional preservative technologies by utilizing long-accepted organic acids and antioxidants.

**JEEQUAT<sup>®</sup> MCA-1** is a proprietary, easy to use, clear liquid blend that is free of parabens, isothiazolinones, phenoxyethanol and formaldehyde releasers.

## Personal Care and Cosmetic Applications

### Applications

- Creams, Lotions, Sunscreen Products
- Moisturizing Creams and Lotions
- Hair Care Styling Products, Lotions and Conditioners

### Formulating Tips

- Recommended formulation use level is 0.75 to 1.5%.
- Product can be used in either rinse-off or leave-on formulations.
- Product should be added at the end of the manufacturing process.
- **Suggested formulation pH range is 4.0 to 8.0,**
- Product is broad-spectrum, most effective against gram-positive bacteria, mold and yeast.

## General Specifications-Typical Properties

Appearance:	Light Yellow, Viscous Liquid
Odor:	Slight, Citric
pH (10% aq):	1.5 – 3.0
Water Solubility:	Complete

This document is for informational purposes only. Please contact your JEEN International Sales Representative before writing specifications on this product.

## Benefits

- Organic acid-based, alternative microbial control blend in a mild glycerin carrier
- Broad-spectrum microbial control
- Uniquely combines a quaternary ammonium compound to further boost microbial control in a wide range of formulations
- Organic acids provide both chelating and antioxidant effects
- Effective alternative to traditional preservatives
- Easy to use liquid

## General Handling and Storage

- Store in Clean, Dry Area
- Storage Conditions: 15 – 20 °C
- Shelf Life, Minimum: 18 Months
- Avoid Freezing

## Standard Packaging

- Drum: 135 pounds net weight
- Pail: 44 pounds net weight

## Minimum Inhibitory Concentration (MIC) Testing

The following chart provides MIC testing information at pH 6.5 for JEEQUAT MCA-1 against several organism species. The organisms tested include a range of bacterial, yeast and fungal strains, all of which are effectively addressed at typical product concentrations.

Organism	ATCC Number	MIC Percent @ pH 6.5
Escherichia coli	8739	0.9
Staphylococcus aureus	6538	0.8
Ent. cloacae	13047	1.0
Candida albicans	10231	0.5
Aspergillus brasiliensis	16404	0.5

## Challenge Testing

JEEQUAT MCA-1 has been challenge tested in several types of formulations for antimicrobial control. The information below provides results from two different types of formulations over a wide pH range, both of which outline the successful challenge testing results of JEEQUAT MCA-1 in typical cosmetic formulations.

### Challenge Test Formulation #1

*Formulation J4-35A: Cosmetic Cream, pH 4.2*

Ingredient	Supplier	INCI Name	Percent
Water		Deionized Water	69.5%
Apricot Kernel Oil	Jeen International	Prunus Armeniaca (Apricot) Kernel Oil	17.0%
JEECOL® CS-20-D	Jeen International	Cetearyl Alcohol and Cetareth-20	4.5%
JEECHEM® GMS-165	Jeen International	Glyceryl Stearate and PEG-100 Stearate	4.0%
JEEQUAT® MCA-1	Jeen International	Glycerin, Citric Acid, Lactic Acid, L-Ascorbic Acid, Didecyldimonium Chloride	1.0%

### Test Method and Acceptance Criteria

The method employed for the testing was USP <31>, Section 51, Antimicrobial Effectiveness Testing and Preservative Neutralization Validation. This method was chosen to determine if the alternative microbial control blend in JEEQUAT MCA-1 could provide the protection against typical strains of bacteria, yeast and mold found in cosmetic and personal care products.

For Category 2 products, the preservative is effective in the sample tested if:

- The concentration of viable bacteria demonstrate no less than a 2.0 log reduction from the initial count at 14 days and no increase from day 14 to day 28 and;
- The concentration of viable yeast and molds demonstrate no increase from the initial calculated count at 14 and 28 day.

## Challenge Test Results

Results of Challenge Testing with 1% JEEQUAT MCA-1: Recovery CFU/Gram

	Staphylococcus aureus (ATCC #6538)	Escherichia coli (ATCC #8739)	Pseudomonas aeruginosa (ATCC #9027)	Candida albicans (ATCC #10231)	Aspergillus brasiliensis (ATCC #16404)
Inoculum Level	5.90	6.20	6.01	5.33	4.70
Day 14	<1.00	<1.00	<1.00	3.62	4.20
Day 28	<1.00	<1.00	<1.00	<1.00	2.80
Validation*	+	+	+	+	+

\*indicates the antimicrobial control system was neutralized by a 1:10 dilution and chemical means

## Conclusion

The test material, JEEQUAT MCA-1, in the cosmetic cream formulation J4-35A conforms to the acceptance criteria for USP <31>, Section 51, Category 2 products.

## Challenge Test Formulation #2

Formulation J27-14DB: Daily Replenishing Lotion, pH 7.9

Ingredient	Supplier	INCI Name	Percent
Water		Deionized Water	74.4%
Jeesperse® ICE-T EUC-DRL	Jeen International	Glyceryl Stearate, PEG-100 Stearate, Stearic Acid, Cetearyl Alcohol, Lanolin Alcohol, Carbomer	2.80%
Sunflower Oil	Jeen International	Helianthus Annus (Sunflower) Seed Oil	4.50%
Petrolatum		Petrolatum	5.50%
Glycerin 99.7%	Jeen International	Glycerin	2.50%
Titanium Dioxide		Titanium Dioxide	0.20%
Jeecol® ODD	Jeen International	Octyldodecanol	3.00%
Jeechem® CTG	Jeen International	Caprylic/Capric Triglyceride	1.30%
Jeesilc® PDS-350	Jeen International	Dimethicone	3.50%
DL-Panthenol CG	Jeen International	DL-Panthenol	0.30%
Disodium EDTA		Disodium EDTA	0.30%
Vitamin E USP	Jeen International	Tocopheryl Acetate	0.30%
Sodium Hydroxide 18%		Sodium Hydroxide	0.80%
Jeequat® MCA-1	Jeen International	Glycerin, Citric Acid, Lactic Acid, L-Ascorbic Acid, Didecylidmonium Chloride	1.00%

## Test Method and Acceptance Criteria

The method employed for the testing was USP <31>, Section 51, Antimicrobial Effectiveness Testing and Preservative Neutralization Validation. This method was chosen to determine if the alternative microbial control blend in JEEQUAT MCA-1 could provide the protection against typical strains of bacteria, yeast and mold found in cosmetic and personal care products.

For Category 2 products, the preservative is effective in the sample tested if:

- The concentration of viable bacteria demonstrate no less than a 2.0 log reduction from the initial count at 14 days and no increase from day 14 to day 28 and;
- The concentration of viable yeast and molds demonstrate no increase from the initial calculated count at 14 and 28 day.

## Challenge Test Results

Results of Challenge Testing with 1% JEEQUAT MCA-1: Recovery CFU/Gram

	Staphylococcus aureus (ATCC #6538)	Escherichia coli (ATCC #8739)	Pseudomonas aeruginosa (ATCC #9027)	Candida albicans (ATCC #10231)	Aspergillus brasiliensis (ATCC #16404)
Inoculum Level (grams)	$1.10 \times 10^6$	$1.05 \times 10^6$	$1.10 \times 10^6$	$1.10 \times 10^5$	$1.05 \times 10^5$
Day 14	<10	<10	<10	<10	560
Day 28	<10	<10	<10	<10	<10
Validation*	+	+	+	+	+

Results of Challenge Testing with 1% JEEQUAT MCA-1: CFU Log Reduction

	Staphylococcus aureus (ATCC #6538)	Escherichia coli (ATCC #8739)	Pseudomonas aeruginosa (ATCC #9027)	Candida albicans (ATCC #10231)	Aspergillus brasiliensis (ATCC #16404)
Inoculum Level (grams)	$1.05 \times 10^6$	$1.10 \times 10^6$	$1.10 \times 10^6$	$1.10 \times 10^5$	$1.05 \times 10^5$
Day 14	5.09	5.07	5.09	4.09	2.27
Day 28	5.09	5.07	5.09	4.09	4.07
Validation*	+	+	+	+	+

## Conclusion

The test material, JEEQUAT® MCA-1, in the cosmetic cream formulation J27-14DB conforms to the acceptance criteria for USP <31>, Section 51, Category 2 products.

June 13, 2014

**You Can Count On Us!..... Your Clear Choice for Preservatives.....**

Formulating with JEECIDE® Products:  
**Featuring: JEECIDE® CAP-1**

**NEW!**

JEEN International has recognized the need for a synergistic blend of conventional and non-conventional preservative ingredients that inhibit microbial growth

## Product Description

### JEECIDE® CAP-1

**INCI:** Hexylene Glycol, Caprylyl Glycol, Iodopropynyl Butylcarbamate, Phenoxyethanol

*JEECIDE® CAP-1 is an easy-to-use clear liquid preservative that is Paraben-free, Formaldehyde-free. Broad Spectrum capabilities killing bacteria, yeast, and mold.*

*JEECIDE® CAP-1 is compatible with anionic, cationic, and non-ionic surfactants and emulsifiers. It is toxicologically safe for use.*

*JEECIDE® CAP-1 is equally suitable for use in both rinse-off and leave-on products. It is effective in difficult to preserve Water/Silicone emulsions. It is also approved for use in the US but restricted in Japan and the EU.*

#### **pH Stability:**

*Stable in the usual operating range of 3 – 10*

## Applications:

- **Skin Care**
- **Hair Care**
- **Color Cosmetics**
- **Sun Care**

#### **Benefits:**

- **Broad Spectrum**
- **Globally approved**
- **Easy to use Liquid**
- **Compatible with:**
  - **Non-ionics**
  - **Cationics**
  - **Anionics**
- **Non-Toxic**

**Recommended Use Level:**  
**0.5 – 1.5%**

#### **Product Specifications:**

**Appearance @ 25°C:**  
**Clear to Amber Liquid**

**Odor:**  
**Slight, Characteristic**

**Specific Gravity:**  
**0.967 – 1.016**

**Standard Packaging:**  
**Drum:400lb**  
**Pail: 40lb**

## Solubility Data

Ingredient	Compatibility
Mineral Oil	D
Cyclomethicone	IS
Dimethicone 200/100 cst.	D
Caprylic/Capric Triglycerides	S
Water	D
Propylene Glycol	S
Ethanol 190 Proof	S
Isododecane	S
C12-15 Alkyl Benzoate	S
Isopropyl Myristate	S
Butylene Glycol	S
Phenyltrimethicone	S

D: Dispersible  
 IS: Insoluble  
 S: Soluble

#### **Preservative Compositional Breakdown:**

**Phenoxyethanol: 32 - 38%**  
**IPBC: 1.5 – 3.5%**

Formulating with JEECIDE® Products:  
**Featuring: JEECIDE® CAP-2**



JEEN International has recognized the need for a synergistic blend of conventional and non-conventional preservative ingredients that inhibit microbial growth

## Product Description

### JEECIDE® CAP-2

**INCI:** Caprylyl Glycol, Phenoxyethanol, Hexylene Glycol

*JEECIDE® CAP-2 is an easy-to-use clear liquid preservative that is both free of Parabens and Formaldehyde donors. With Broad Spectrum capabilities, JEECIDE CAP-2 is effective against bacteria, yeast, and mold.*

*JEECIDE® CAP-2 is compatible with anionic, cationic, and non-ionic surfactants and emulsifiers. It is toxicologically safe for use.*

*JEECIDE® CAP-2 is equally suitable for use in both rinse-off and leave-on products. It is effective in difficult to preserve Water/Silicone emulsions. It is also approved for use in the US, EU, and Japan.*

**pH Stability:**  
*Stable in the usual operating range of 3 – 10*

## Applications:

- **Skin Care**
- **Hair Care**
- **Color Cosmetics**
- **Sun Care**

### Benefits:

- **Broad Spectrum**
- **Globally approved**
- **Easy to use Liquid**
- **Compatible with:**
  - Non-ionics
  - Cationics
  - Anionics
- **Non-Toxic**

**Recommended Use Level:**  
**0.5 – 1.5%**

### Product Specifications:

**Appearance @ 25°C:**  
**Clear to Amber Liquid**

**Odor:**  
**Slight, Characteristic**

**Specific Gravity:**  
**0.967 – 0.997**

**Standard Packaging:**  
**Drum: 400lb**  
**Pail: 40lb**

## Solubility Data

Ingredient	Compatibility
Mineral Oil	D
Cyclomethicone	IS
Dimethicone 200/100 cst.	D
Caprylic/Capric Triglycerides	S
Water	D
Propylene Glycol	S
Ethanol 190 Proof	S
Isododecane	S
C12-15 Alkyl Benzoate	S
Isopropyl Myristate	S
Butylene Glycol	S
Phenyltrimethicone	S

D: Dispersible  
 IS: Insoluble  
 S: Soluble

## Preservative Compositional Breakdown:

**Phenoxyethanol: 31.5 – 38.5%**

Continued....

## Formulating with JEECIDE® Products: Featuring: JEECIDE® CAP-2

**NEW!**

### Minimum Inhibitory Concentration (MIC)

**Objective:** Determine activity of JEECIDE CAP-2 to Minimum Inhibitory Concentration (MIC) broth tests.

**Procedure:** A standard microtiter plate MIC test was conducted in Tryptic Soy Broth (bacteria) Sabouraud Dextrose Broth (yeast and molds).

**Results:** As shown in Table 1, JEECIDE CAP-2 is very effective at low concentrations against gram negative and positive bacteria and effective against yeasts and molds.

Table 1.

Minimum Inhibitory Concentrations

Organism	ATCC #	JEECIDE CAP-2
<b>Gram-Negative bacteria</b>		
Burkholderia cepacia	25416	1250
Escherichia coli	8739	625-1250
Enterobacter gergoviae	33028	5000
Enterobacter aerogenes	13048	1250-2500
Flavobacterium odoratum	NCIB 13294	1250
Klebsiella pneumoniae	4352	625
Proteus mirabilis	9240	1250
Pseudomonas aeruginosa	9027	2500-5000
<b>Gram-positive bacteria</b>		
Staphylococcus aureus	6538	625
Staphylococcus epidermidis	12228	625
<b>Yeast</b>		
Candida albicans	10231	313
Saccharomyces cerevisiae	7752	<78
<b>Mold</b>		
Aspergillus niger	9642	<78
Pencillium sp.	Cosmetic isolate	<78



### Kill Test Data

JEECIDE CAP-2 has been tested using the tube testing method. Below are the results:

### JEECIDE CAP-2 @ 1%

		Results
<b>Bacteria</b>	<u>Pool 1</u>	<u>3</u>
	<u>Pool 2</u>	<u>3</u>
	<u>Pool 3</u>	<u>3</u>
<b>Yeast</b>	<u>Pool 4</u>	<u>3</u>
<b>Mold</b>	<u>Pool 5</u>	<u>3</u>

### Scale:

0 = No Kill  
 1 = Slight  
 2 = Moderate  
 3 = Kill





Formulating with JEECIDE® Products:  
**Featuring: JEECIDE® CAP-3**



JEEN International has recognized the need for a synergistic blend of conventional and non-conventional preservative ingredients that inhibit microbial growth

## Product Description

### JEECIDE® CAP-3

**INCI:** Hexylene Glycol, Caprylyl Glycol, Iodopropynyl Butylcarbamate, Phenoxyethanol

*JEECIDE® CAP-3 is an easy-to-use clear liquid preservative that is Paraben and Formaldehyde-free. With Broad Spectrum capabilities, JEECIDE CAP-2 is effective against bacteria, yeast, and mold.*

*JEECIDE® CAP-3 is equally suitable for use in both rinse-off and leave-on products. It is effective in difficult to preserve Water/Silicone emulsions. It is also approved for use in the US but restricted in Japan and the EU.*

*JEECIDE® CAP-3 is compatible with anionic, cationic, and non-ionic surfactants and emulsifiers. It is toxicologically safe for use.*

#### **pH Range:**

*Stable in the usual operating range of 3 – 10.*

## Applications:

- **Skin Care**
- **Hair Care**
- **Color Cosmetics**
- **Sun Care**

#### **Benefits:**

- **Broad Spectrum**
- **Globally approved**
- **Easy to use Liquid**
- **Compatible with:**
  - Non-ionics
  - Cationics
  - Anionics
- **Non-Toxic**

**Recommended Use Level:**  
**0.5 – 1.5%**

#### **Product Specifications:**

**Appearance @ 25°C:**  
**Clear to Amber Liquid**

**Odor:**  
**Slight, Characteristic**

**Specific Gravity:**  
**0.967 – 1.016**

**Standard Packaging:**  
**Drum:400lb**  
**Pail: 40lb**

## Solubility Data

Ingredient	Compatibility
Mineral Oil	D
Cyclomethicone	IS
Dimethicone 200/100 cst.	D
Caprylic/Capric Triglycerides	S
Water	D
Propylene Glycol	S
Ethanol 190 Proof	S
Isododecane	S
C12-15 Alkyl Benzoate	S
Isopropyl Myristate	S
Butylene Glycol	S
Phenyltrimethicone	S

D: Dispersible  
 IS: Insoluble  
 S: Soluble

#### **Preservative Compositional Breakdown:**

**Phenoxyethanol: 32 - 38%**  
**IPBC: 1.5 -3.5%**

Formulating with JEECIDE® Products:  
**Featuring: JEECIDE® CAP-4**

**NEW!**

JEEN International has recognized the need for a synergistic blend of conventional and non-conventional preservative ingredients that inhibit microbial growth

## Product Description

### JEECIDE® CAP-4

**INCI:** Phenoxyethanol, Caprylyl Glycol

*JEECIDE® CAP-4 is an easy-to-use clear liquid preservative that is Paraben-free and Formaldehyde-free. With Broad Spectrum capabilities.*

*JEECIDE CAP-4 is effective against bacteria, yeast, and mold.*

*JEECIDE® CAP-4 is compatible with anionic, cationic, and non-ionic surfactants and emulsifiers. It is toxicologically safe for use.*

*JEECIDE® CAP-4 is equally suitable for use in both rinse-off and leave-on products. It is effective in difficult to preserve Water/Silicone emulsions. It is also approved for use in the US, EU, and Japan.*

#### **pH Stability:**

*Stable in the usual operating range of 3 – 10*

## Applications

- **Skin Care**
- **Hair Care**
- **Color Cosmetics**
- **Sun Care**

#### **Benefits:**

- **Broad Spectrum**
- **Globally approved**
- **Easy to use Liquid**
- **Compatible with:**
  - **Non-ionics**
  - **Cationics**
  - **Anionics**
- **Non-Toxic**

**Recommended Use Level:**  
**0.5 – 1.5%**

#### **Product Specifications:**

**Appearance @ 25°C:**  
**Clear to Amber Liquid**

**Odor:**  
**Slight, Characteristic**

**Specific Gravity:**  
**1.026 – 1.0217**

**Standard Packaging:**  
**Drum: 400lb**  
**Pail: 40lb**

## Solubility Data

Ingredient	Compatibility
Water	IS
Mineral Oil	D
Apricot Kernel Oil	S
Jojoba Oil	S
Cyclomethicone	IS
PEG-8	S
Dimethicone 200/100 cst	D
Phenyltrimethicone	D
Glycerin	S
Propylene Glycol	S
Ethanol 190 Proof	S
C12-15 Alkyl Benzoate	S
Butylene Glycol	S
Polysorbate – 20	S
Polysorbate – 80	S
PEG-40 Hydrogenated Castor Oil	S

D: Dispersible  
 IS: Insoluble  
 S: Soluble

#### **Preservative Compositional Breakdown:**

**Phenoxyethanol: 53 - 58%**

Formulating with JEECIDE® Products:  
**Featuring: JEECIDE® CAP-5**

**NEW!**

JEEN International has recognized the need for a synergistic blend of conventional and non-conventional preservative ingredients that inhibit microbial growth

## Product Description

### JEECIDE® CAP-5

**INCI:** Phenoxyethanol, Caprylyl Glycol, Potassium Sorbate, Water, Hexylene Glycol

*JEECIDE® CAP-5 is an easy-to-use liquid preservative that is free of both Parabens and Formaldehyde donors. It's effective against bacteria, yeast, and mold. As the most powerful preservative in the JEECIDE® CAP line, CAP-5 is a preferred preservative among organizations worldwide.*

*JEECIDE® CAP-5 is compatible with anionic, cationic, and non-ionic surfactants and emulsifiers. It is toxicologically safe for use.*

*JEECIDE® CAP-5 is suitable for use in both rinse-off and leave-on products. It is effective in difficult to preserve Water/Silicone emulsions.*

#### **pH Range:**

*Stable in the usual operating range of 3 – 6.5*

## Applications

- **Skin Care**
- **Hair Care**
- **Color Cosmetics**
- **Sun Care**

#### **Benefits:**

- **Broad Spectrum**
- **Globally approved**
- **Easy to use Liquid**
- **Compatible with:**
  - Non-ionics
  - Cationics
  - Anionics
- **Non-Toxic**

**Recommended Use Level:**  
**0.5 – 1.5%**

#### **Product Specifications:**

**Appearance @ 25°C:**  
**Clear to Amber Liquid**

**Odor:**  
**Slight, Characteristic**

**Specific Gravity:**  
**1.015 – 1.065**

**Standard Packaging:**  
**Drum: 400lb**  
**Pail: 40lb**

## Solubility Data

Ingredient	Compatibility
Mineral Oil	D
Cyclomethicone	IS
Dimethicone 200/100 cst.	D
Caprylic/Capric Triglycerides	S
Water	D
Propylene Glycol	S
Ethanol 190 Proof	S
Isododecane	S
C12-15 Alkyl Benzoate	S
Isopropyl Myristate	S
Butylene Glycol	S
Phenyltrimethicone	S

D: Dispersible  
 IS: Insoluble  
 S: Soluble

#### **Preservative Compositional Breakdown:**

**Phenoxyethanol: 35-45%**  
**Potassium Sorbate: 8 – 15%**

## Formulating with JEECIDE<sup>®</sup> Products: Featuring: JEECIDE<sup>®</sup> CAP-5

**NEW!**

### Method of Addition:

It is suggested not to add this blend to a product at a temperature exceeding 70 - 75°C for extended time periods. For emulsion products, because of the excellent compatibility of this blend with most ingredients, incorporation of it during the cool-down phase of processing is preferred. It is soluble or dispersible in most non-polar materials. JEECIDE CAP-5 is not water soluble however for highly aqueous systems, the addition of a co-solvent, coupling agent or surfactant (eg. Polysorbate 20) in a 1:1 ratio will make it water soluble to obtain a clear system.



### Microbiological Challenge Studies:

A study was conducted using 2 formulations: an oil-in-water emulsion and a water-in-oil emulsion using 0.5% and 1.0% JEECIDE CAP-5. The protocol used was a modification of the CTFA Challenge Test using a 3 week re-challenge time period instead of a 4 week period. All samples were inoculated at the start of the study and sampled at 24 hours, 48 hours, 7 days, 14 days and 21 days. After 21 days, all samples were re-inoculated and subjected to a second challenge.

### Oil-in-Water Emulsion

Ingredients	Control	0.5% JEECIDE CAP-5	1.0% JEECIDE CAP-5
Water	70.50	70.00	69.50
Glycerin	4.00	4.00	4.00
Apricot Kernel Oil	17.00	17.00	17.00
Cetearyl Alcohol & Ceteareth-20	4.50	4.50	4.50
Glyceryl Stearate & PEG-100 Stearate	4.00	4.00	4.00
JEECIDE CAP-5	X	0.50	1.00

Test Organism	Unpreserved Control Initial Challenge			Unpreserved Control Re-challenge		
	24 hrs.	7 days	21 days	24 hrs.	7 days	21 days
S. aureus ATCC 6538	$7.4 \times 10^4$	$<10^3$	$<10$	$1.4 \times 10^6$	$4.3 \times 10^2$	$<10$
P. aeruginosa ATCC 9027	$2.5 \times 10^4$	$1.6 \times 10^7$	$1.9 \times 10^7$	$1.5 \times 10^7$	$2.0 \times 10^7$	$1.9 \times 10^7$
K. pneumoniae ATCC 4352	$1.6 \times 10^5$	$7.6 \times 10^4$	$4.0 \times 10^3$	$1.1 \times 10^6$	$1.6 \times 10^6$	$4.0 \times 10^5$
C. albicans ATCC 10231	$4.1 \times 10^4$	$8.3 \times 10^4$	$5.3 \times 10^4$	$4.0 \times 10^5$	$4.4 \times 10^5$	$8.0 \times 10^5$
A. niger ATCC 9642 + Penicillium sp. isolate	$3.4 \times 10^4$	$2.5 \times 10^4$	$1.4 \times 10^4$	$5.1 \times 10^4$	$3.0 \times 10^4$	$2.9 \times 10^4$



Formulating with JEECIDE® Products:  
**Featuring: JEECIDE® CAP-5**



**Water-In-Oil Emulsion**

Ingredients	Control	0.5% JEECIDE CAP-5	1.0% JEECIDE CAP-5
Water	59.70	59.20	59.20
Glycerin	4.00	4.00	4.00
Butylene Glycol	3.00	3.00	3.00
Sodium Chloride	0.30	0.30	0.30
Cyclomethicone	7.00	7.00	7.00
Dimethicone	2.00	2.00	2.00
Isostearyl Palmitate	4.00	4.00	4.00
Isododecane & Dimethicone Crosspolymer-3	10.00	10.00	10.00
Cyclomethicone & PEG/PPG-18/18 Dimethicone	10.00	10.00	10.00
<b>JEECIDE CAP-5</b>	X	0.50	1.00

Test Organism	Unpreserved Control Initial Challenge			Unpreserved Control Re-challenge		
	24 hrs.	7 days	21 days	24 hrs.	7 days	21 days
S. aureus ATCC 6538	2.0 x 10 <sup>4</sup>	4.0 x 10 <sup>3</sup>	<10	9.5 x 10 <sup>2</sup>	<10	<10
P. aeruginosa ATCC 9027	4.4 x 10 <sup>4</sup>	7.1 x 10 <sup>4</sup>	7.2 x 10 <sup>3</sup>	3.6 x 10 <sup>4</sup>	3.5 x 10 <sup>4</sup>	1.1 x 10 <sup>5</sup>
K. pneumoniae ATCC 4352	1.1 x 10 <sup>5</sup>	1.1 x 10 <sup>5</sup>	<10	8.0 x 10 <sup>3</sup>	3.4 x 10 <sup>3</sup>	<10
C. albicans ATCC 10231	1.1 x 10 <sup>4</sup>	8.5 x 10 <sup>3</sup>	8.7 x 10 <sup>3</sup>	1.5 x 10 <sup>3</sup>	4.8 x 10 <sup>3</sup>	1.7 x 10 <sup>3</sup>
A. niger ATCC 9642 + Penicillium sp. isolate	2.0 x 10 <sup>3</sup>	1.2 x 10 <sup>4</sup>	2.2 x 10 <sup>3</sup>	2.0 x 10 <sup>3</sup>	1.7 x 10 <sup>3</sup>	2.2 x 10 <sup>3</sup>

Formulating with JEECIDE<sup>®</sup> Products:  
**Featuring: JEECIDE<sup>®</sup> CAP-5**



Test Organism	0.5% JEECIDE CAP-5 Initial Challenge			0.5% JEECIDE CAP-5 Re-challenge		
	24 hrs.	7 days	21 days	24 hrs.	7 days	21 days
S. aureus ATCC 6538	<10	<10	<10	<10	<10	<10
P. aeruginosa ATCC 9027	<10	<10	<10	<10	<10	<10
K. pneumoniae ATCC 4352	<10	<10	<10	<10	<10	<10
C. albicans ATCC 10231	$1.1 \times 10^2$	<10	<10	<10	<10	<10
A. niger ATCC 9642 + Penicillium sp. isolate	$3.0 \times 10^1$	<10	<10	<10	<10	<10

Test Organism	1% JEECIDE CAP-5 Initial Challenge			1% JEECIDE CAP-5 Re-challenge		
	24 hrs.	7 days	21 days	24 hrs.	7 days	21 days
S. aureus ATCC 6538	<10	<10	<10	<10	<10	<10
P. aeruginosa ATCC 9027	<10	<10	<10	<10	<10	<10
K. pneumoniae ATCC 4352	<10	<10	<10	<10	<10	<10
C. albicans ATCC 10231	<10	<10	<10	<10	<10	<10
A. niger ATCC 9642 + Penicillium sp. isolate	$2.0 \times 10^1$	<10	<10	<10	<10	<10

Formulating with JEECIDE® Products:  
**Featuring: JEECIDE® CAP-5**



**NEW!**

## Results:

### Oil-in-Water

The **JEECIDE CAP-5** at 1.0% killed all the challenge organisms within 24 hours after each challenge. At 0.5%, activity was slower versus yeast and mold than against bacteria after the first challenge, but molds were reduced to less than 10 per gram within 48 hours (results not shown). After the second challenge, 0.5% was effective against all organisms within 24 hours.

### Water-in-Oil

The **JEECIDE CAP-5** was effective against bacteria within 24 hours after each challenge. At 1.0%, the **JEECIDE CAP-5** was faster against yeast and mold than at 0.5% after the first challenge but no organisms were detected 24 hours after the second challenge in the presence of 0.5% or 1.0% **JEECIDE CAP-5**.

### Kill Test Data

JEECIDE CAP-5 has been tested using the tube testing method. Below are the results:

### JEECIDE CAP-5 @ 1%

		<u>Results</u>
<u>Bacteria</u>	<u>Pool 1</u>	<u>3</u>
	<u>Pool 2</u>	<u>3</u>
	<u>Pool 3</u>	<u>3</u>
<u>Yeast</u>	<u>Pool 4</u>	<u>3</u>
<u>Mold</u>	<u>Pool 5</u>	<u>3</u>

### Scale:

0 = No Kill  
1 = Slight  
2 = Moderate  
3 = Kill

### **You Can Count On Us!**

All suggestions and data in this bulletin are based on information we believe to be reliable. They are offered in good faith. However, no guarantee is made or implied as conditions and methods of use of our products are beyond our control. We recommend that the prospective user determine the suitability of our materials and suggestions on an experimental basis before adopting them on a commercial scale. Statements as to the use of our products are not to be construed as recommendations for their use in the infringement of any patents.



Formulating with JEECIDE® Products:  
**Featuring: JEECIDE® NAS-CC**



Jeen International Corporation is one of the largest manufacturers of preservatives for personal care and pharmaceutical applications. Considering the emerging need in the global market for natural preservatives, JEEN proudly introduces Jeeicide® NAS- CC natural preservatives for personal and health care products, developed as an alternative to synthetically derived preservative systems. Revision Date: 3/1/2010

## Product Description

### JEECIDE® NAS-CC

**INCI:** *Murraya Koenigii* (Curry) Leaf Oil, *Cinnamomum Zeylanicum* (Cinnamon) Leaf Oil, *Sesamum Indicum* (Sesame) Oil

*JEECIDE® NAS-CC is a Natural Antimicrobial Ingredient. The Curry Leaf & Cinnamon Leaf plants are cultivated on a plantation spread over 100 acres, and the extraction is carried out in a GMP processing unit that is FDA approved.*

*JEECIDE® NAS-CC is a broad based spectrum natural liquid preservative system, suitable for personal care and cosmetic applications. It has been designed specifically for formulations with a pH < 6.0. It is effective against Gram-positive & Gram-negative bacteria, yeast and mold. Being non-toxic, it is very safe and effective to use.*

#### pH Stability:

**JEECIDE® NAS-CC** provides excellent protection at pH 6 and can widely be used at pH 3-7.

## Applications

- Skin Care
- Hair Care
- Sun Care
- Color Cosmetics

#### Recommended Use Levels:

**0.75 – 1.2%**

#### Benefits:

- Broad Spectrum Activity
- Non-Toxic
- Wide Application Use
- Excellent bacterial and Fungal Control
- Ensured Safety – No Label Required

#### Preservative Compositional Breakdown:

Jeecide NAS-CC is a Proprietary blend of:

- *Murraya Koenigii* (Curry) Leaf Oil
- *Cinnamomum Zeylanicum* (Cinnamon) Leaf Oil

## Solubility Data

Ingredient	Compatibility
Mineral Oil	D
Cyclomethicone	IS
Dimethicone 200/100 cst.	D
Caprylic/Capric Triglycerides	S
Water	D
Propylene Glycol	S
Ethanol 190 Proof	S
Isododecane	S
C12-15 Alkyl Benzoate	S
Isopropyl Myristate	S
Butylene Glycol	S
Phenyltrimethicone	S

D: Dispersible  
 IS: Insoluble  
 S: Soluble

#### Product Specifications:

**Appearance:**  
**Pale Yellow Liquid**

**Specific Gravity:**  
**0.92 +/- 0.01**

**Vapor Pressure (mm Hg):**  
**<0.75 mmHg**

**Packaging Information:**  
 Drum: Net Wt: 55.12 Lbs. (25 Kgs.)  
 Pail: Net Wt: 22 Lbs. Net (9.97 Kgs.)

Continued....

## Formulating with JEECIDE® Products: *Featuring: JEECIDE® NAS-CC*

**NEW!**

### Method of Addition:

Jeecide® NAS- CC is typically used at 0.75 – 1.2% in rinse-off and leave on product formulations.

Jeecide® NAS- CC provides excellent protection at pH 6 and can widely be used at pH 3-7.

Jeecide® NAS- CC can be added into any phase of the manufacturing process including the water phase of emulsions, it can tolerate temperatures up to 60 degrees C.

Jeecide® NAS- CC requires intense mixing for uniform dispersal of the active ingredients when low amounts of emulsifiers are in the system.

Jeecide® NAS- CC is fully compatible with a wide range of formulations as well as most types of herbal extracts, proteins and anionic systems.

### Broad Spectrum Activity

Jeecide® NAS- CC provides excellent protection against various types of common organisms in a typical Facial Cream, Hand Cream, Shower Gel, and Moisturizing Lotion at pH6. The broad spectrum activity of Jeecide® NAS- CC leads to greater efficacy. It provides protection against both types of contaminants.

### Preserved By Nature

In the on-going development of new preservatives, Jeen International Corporation encountered many customers seeking natural preservatives. To satisfy the merging global demand, Jeen researched various naturally occurring essential oils commonly used around the world.

Jeecide® NAS- CC is based on two key essential oils: Cinnamon Leaf Oil (*Cinnamomum Zeylanicum*) & Curry leaf Oil (*Murraya Koenigii*)

### Curry Leaf

Botanical Name: *Murraya Koenigii*  
Part Used: Leaf  
Extraction Method: Steam Distillation

Description: The small deciduous Curry Leaf plant is native to India. It grows in abundance in jungles and farmlands almost everywhere, excluding the higher reaches of the Himalayas'. In the east, it is also found in Burma and Malaysia.

Curry leaves are extensively used in South Indian and Sri Lankan cuisine. Curry powder is a British invention conceived to imitate the exotic taste and flavors of Indian Cuisine.

Curry leaves are highly aromatic and possess anti-oxidant, anti-microbial, anti-inflammatory properties. The leaves are small and narrow often resembling the leaves of the Neem tree, and hence Curry leaves sometimes referred to as Black Neem.

### Cinnamon Leaf

Botanical Name: *Cinnamomum Zeylanicum*  
Family: Lauraceae  
Part Used: Leaf  
Extraction Method: Steam Distillation  
Origin: India

### Botanical Description:

Though highly recognized today as a culinary spice, the use of Cinnamon for medicinal and religious purposes dates as far back as 2700 BCE. It was used in ancient Egypt/Middle East for embalming and controlling bacterial and viral outbreaks. Chinese records during that period took note of its efficiency as a valuable treatment for fever, diarrhea and menstrual ailments. Cinnamon is a member of the Lauraceae family and is natively grown in Sri Lanka. Cinnamon is harvested from a particular variety of evergreen tree that can grow as high as 60 feet and thrives best in tropical forests. The bark has a reddish brown hue marked with tiny, yellow flowers and leather-textured leaves that give off a spicy aroma.

### Therapeutic Properties:

Cinnamon Leaf essential oil strengthens the immune system against diseases caused by fungi, viruses and bacteria. It has stimulating properties that help combat congestion and improve digestion, as well as sooth abdominal spasms and increase circulation. It is anti-spasmodic, and is valuable treatment for various digestive ailments such as stomach or intestinal cramps, colitis, flatulence, nausea, diarrhea and indigestion. Cinnamon Leaf Oil has long been popular as a mouthwash and breath freshener.

### Aromatherapeutic Use:

Its warm fragrance makes it excellent for calming and soothing mind and emotions.

### Constituents:

Oil from Cinnamon leaf is composed mainly of eugenol.



Formulating with JEECIDE<sup>®</sup> Products:  
**Featuring: JEECIDE<sup>®</sup> NAS-CC**



Face Wash Preserved with 0.75% Jeecide<sup>®</sup> NAS- CC

Test Organism	Inoculum Density / 0.1 ml	Weight of Sample	Expected count per gm of Sample
Staphylococcus aureus	3.2 x 10 <sup>7</sup> cfu/ml	20.09 g	1.6 x 10 <sup>6</sup> cfu/g
Escherichia coli	3.3 X 10 <sup>7</sup> cfu/ml	20.42 g	1.6 x 10 <sup>6</sup> cfu/g
Pseudomonas aeruginosa	4.1 x 10 <sup>7</sup> cfu/ml	20.13 g	2 X 10 <sup>6</sup> cfu/g
Aspergillus niger	3.8 x 10 <sup>6</sup> cfu/ml	20.30 g	1.8 x 10 <sup>5</sup> cfu/g
Candida albicans	1.8 x 10 <sup>7</sup> cfu/ml	20.00 g	9 x 10 <sup>5</sup> cfu/g

Test Organism	Count at Zero Hour	Count at 7 <sup>th</sup> Day	Count at 14 <sup>th</sup> Day	Count at 21 <sup>st</sup> Day	Count at 28 <sup>th</sup> Day
Staphylococcus aureus	1.3 x 10 <sup>6</sup> cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g
Escherichia coli	1.2 X 10 <sup>6</sup> cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g
Pseudomonas aeruginosa	1.8 x 10 <sup>6</sup> cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g
Aspergillus niger	1.1 x 10 <sup>5</sup> cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g
Candida albicans	7.2 x 10 <sup>5</sup> cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g

Toxicity Information:

Mainly due to impending legislation in Europe, which will soon impose various marketing restrictions, Jeecide<sup>®</sup> NAS- CC preservative has not been tested on animals. Therefore, toxicity testing information regarding the blended material will not be generated. However, each of the Jeecide<sup>®</sup> NAS- CC ingredients has been tested extensively over the years. Overall, the ingredients in Jeecide<sup>®</sup> NAS- CC have been carefully chosen due to their global acceptance as well as excellent toxicity profiles

Formulating with JEECIDE<sup>®</sup> Products:  
**Featuring: JEECIDE<sup>®</sup> NAS-CC**



Cream Base Preserved with 0.75% Jeecide<sup>®</sup> NAS- CC

Test Organism	Inoculum Density / 0.1 ml	Weight of Sample	Expected count per gm of Sample
Staphylococcus aureus	3.2 x 10 <sup>7</sup> cfu/ml	20.09 g	1.6 x 10 <sup>6</sup> cfu/g
Escherichia coli	3.3 X 10 <sup>7</sup> cfu/ml	20.13 g	1.6 x 10 <sup>6</sup> cfu/g
Pseudomonas aeruginosa	4.1 x 10 <sup>7</sup> cfu/ml	20.08 g	2 X 10 <sup>6</sup> cfu/g
Aspergillus niger	3.8 x 10 <sup>6</sup> cfu/ml	20.02 g	1.9 x 10 <sup>5</sup> cfu/g
Candida albicans	1.8 x 10 <sup>7</sup> cfu/ml	20.14 g	8.9 x 10 <sup>5</sup> cfu/g

Test Organism	Count at Zero Hour	Count at 7 <sup>th</sup> Day	Count at 14 <sup>th</sup> Day	Count at 21 <sup>st</sup> Day	Count at 28 <sup>th</sup> Day
Staphylococcus aureus	1.2 x 10 <sup>6</sup> cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g
Escherichia coli	1.3 X 10 <sup>6</sup> cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g
Pseudomonas aeruginosa	1.5 x 10 <sup>6</sup> cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g
Aspergillus niger	1.2 x 10 <sup>5</sup> cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g
Candida albicans	5.1 x 10 <sup>5</sup> cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g	< 10 cfu/g

## Safety and Regulatory Profile

Jeecide<sup>®</sup> NAS- CC has an excellent safety and toxicological profile and is safe to use in a wide range of personal care applications.

(The information given in this brochure is based on our current knowledge and experience, and may be used at your discretion and risk. We do not assume any liability in connection with your product or its use. You must comply with all applicable laws and regulations and observe all third party rights.)

