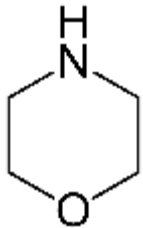


# **The occurrence of amino alcohols – background information**

**Relana®-Meeting, 30 June 2015**

Dipl.-Ing.(FH) Albrecht Friedle  
Dipl.-Ing.(FH) Athanasios Nitsopoulos  
Labor Friedle GmbH

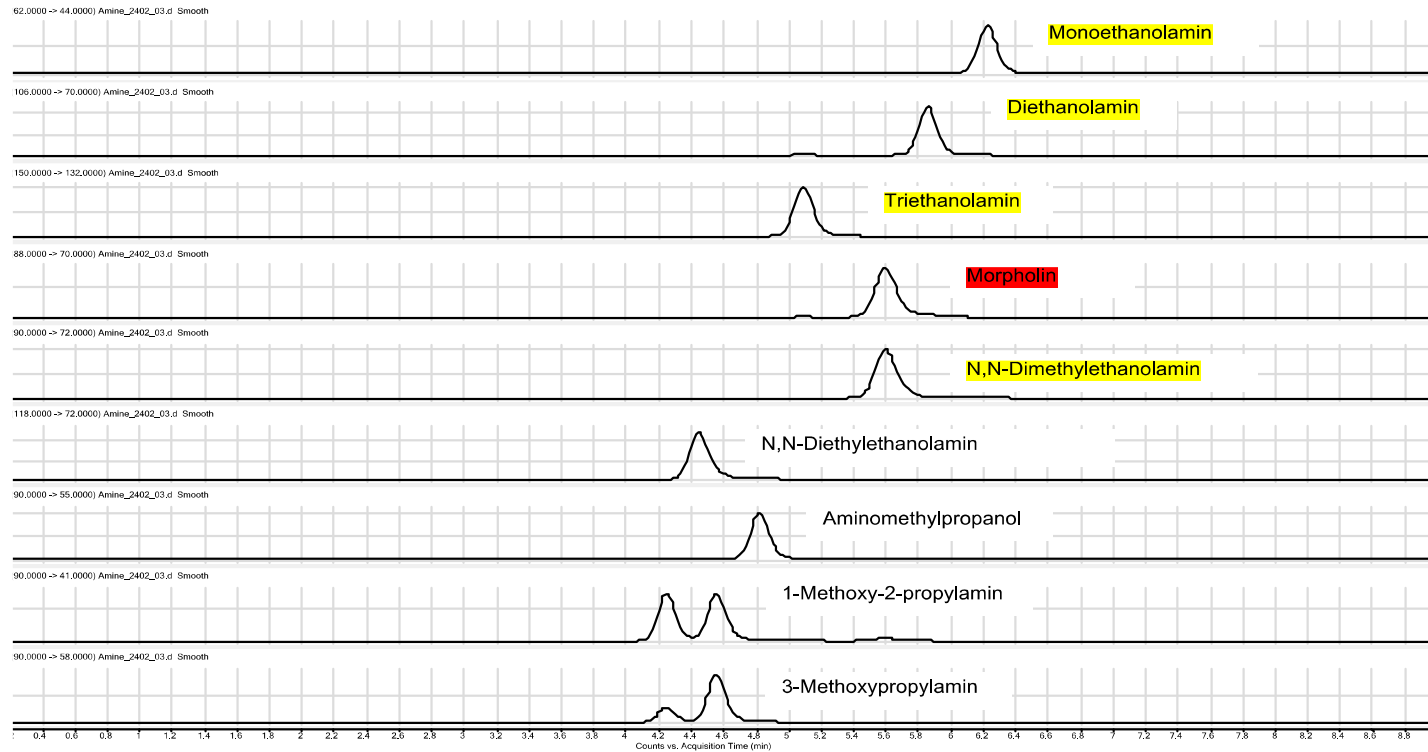
14 September 2010, RASFF alert from UK Food Standards Agency:



- Results of Morpholin in citrus and pomes imported from Chile
- Use of Morpholin as carrier, emulsifier in waxes, glazing purposes of fruits
- Not authorised in the EU as food additive according to Regulation (EC) 1333/2008



**Development of an analytical method**



**QuPPE, (+ESI)LC-MS/MS, Obelisc R**  
**LOQ in F&V: 0.01 – 0.05 mg/kg**



LABOR  
FRIEDLE  
GMBH

## Morpholine

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Use in agriculture as:

1. chemical emulsifier in the process of waxing fruit
  - problem in 2010 with citrus and pomes imported from Chile (RASFF alert)
2. corrosion inhibitor in water steam systems
  - peeling of potatoes or pomes with hot steam and under pressure
3. component in the synthesis of morpholine fungicides
  - e.g. *Forum*<sup>®</sup> (a.i. dimethomorph) contains 50mg/kg morpholin

 **Residues of morpholine in (processed) food !**

Use in agriculture as:

1. ingredient of fertilizers

- Haifa *Bor-feed*<sup>®</sup> contains Boric acid ( $H_3BO_3$ ), reaction products with ethanolamine
- Manna Dünger *Wuxal*<sup>®</sup> *Boron* (1.1% Monoethanolamine)
- BVL (Federal Office of Consumer Protection and Food Safety) admisson as additive in Germany

Natural occurrence as:

2. metabolite of amino acid Serin
3. constituent part of cell membrans - phospholipids

➡ No need for testing in food !

# Diethanolamine (1)



## MATERIAL SAFETY DATA SHEET

### Soften-It T™

Date of Issue: January 01, 2011

#### 1. IDENTIFICATION OF THE SUBSTANCE / MIXTURE AND SUPPLIER

**Product Name:** Soften-It T™

**Recommended Use:** Spray Adjuvant for Use with Calcium Chloride

**Supplier:** Campbells Fertilisers Australasia

**Address:** 18 Raymond Road, Laverton North, Victoria, 3026

**Telephone:** (03) 9931 2211

**Facsimile:** (03) 9931 2201

**Website:** [www.campbellsfert.com.au](http://www.campbellsfert.com.au)

**Emergency Telephone Number:** (03) 9931 2211 (business hours only 8.30 am to 5.00 pm)

#### 2. HAZARDS IDENTIFICATION

##### NON-HAZARDOUS SUBSTANCE - NON-DANGEROUS GOOD

**Hazard Designation:** Not classified as a hazardous substance according to the criteria of NOHSC

**Risk Phrases:** None allocated

**Safety Phrases:** None allocated

**ADG Classification:** Not classified as a dangerous good according to the Australian Dangerous Goods Code

**SUSDP Classification:** Schedule 5

#### 3. COMPOSITION / INFORMATION ON INGREDIENTS

Classification and Type:		
Material:	CAS Number:	Proportion (%w/w):
Alkyl Glucosides	Mixture	< 22%
Tri- and Di- Ethanolamine	102-71-6 / 111-42-2	< 30%
Other Non-Hazardous Ingredients	-	To 100%

Use in agricultural products as:

- emulsifier
- wetting agent for Ca application  
(*Stippe*: Calcium deficiency disease)

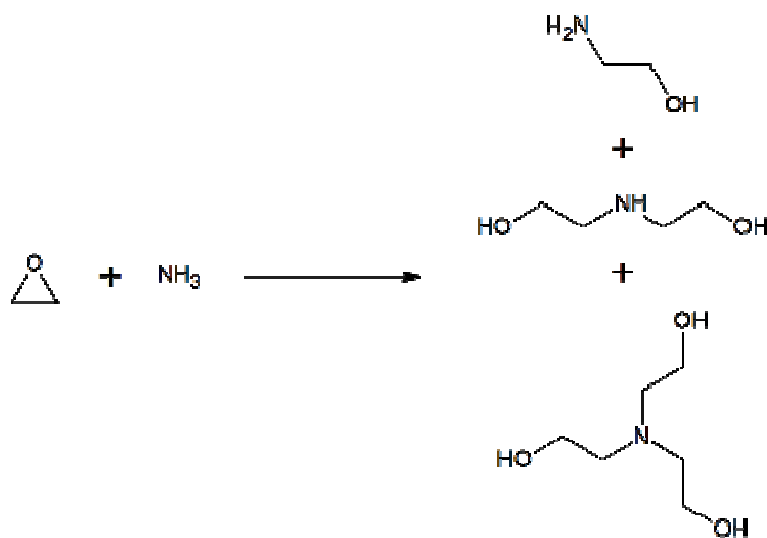


Not allowed in Germany

## Diethanolamine (2)

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But: Diethanolamine is a byproduct of the sythesis of triethanolamine



➡ approx. 10% of agricultural products (n=300) contain DEA

## Triethanolamine (1)

In Germany allowed as additive in agricultural products

Example: Spiess Urania *Adhäsit*®

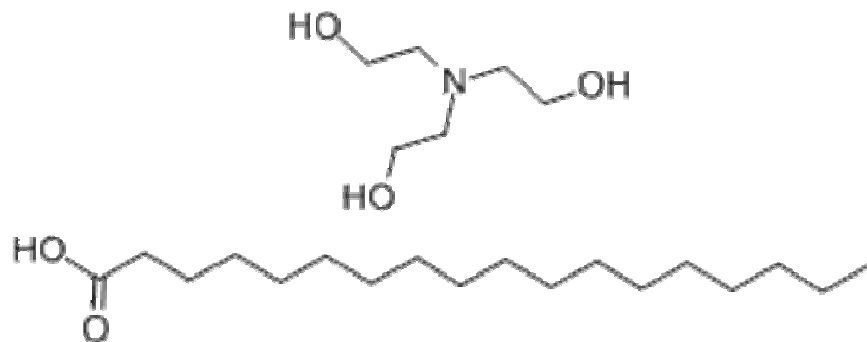
### 3.) Zusammensetzung/Angaben zu Bestandteilen

**Gefährliche  
Inhaltsstoff  
e Ethanol**

EG-Nr.	200-578-6	Index-Nr.	603-002-00-5	CAS-Nr.	64-17-5
Konzentration	> 10	<	25	Gew%	
Einstufung	F; R11				
Gefahrensymbole	F	R-Sätze	11		

**Benzolsulfonsäure, C10-13-Alkylderivate, Verbindungen mit Triethanolamin**

EG-Nr.	270-116-6	Index-Nr.	-	CAS-Nr.	68411-31-4
Konzentration	> 2,5	<	10	Gew%	
Einstufung	Xi; R38	Xi; R41	Gefahrensymbole	Xi	
R-Sätze	38-41				



cationic part of surfactant



## Triethanolamine (2)

Often no declaration in Material Safety Data Sheets (MSDS)

Example: Dow AgroSciences Limited, Herbicide *Blaster*<sup>®</sup>

Product Name: **BLASTER\* HERBICIDE: MAPP 13267**

LV70: 104806 Issue Date: Oct. 06 Ref: PSO44  
Revised: Jan. 07 (Section(s) 1)

### 2. COMPOSITION/INFORMATION ON INGREDIENTS

Dangerous components (see section 16 for complete R-phrases):

			CAS	EC No
Clopyralid	5.8 %	Xi; R41, N; R51/53	001702-17-6	216-935-4
Triclopyr-2-butoxyethyl ester	32.3 %	Xn,N; R22-43-50/53	064700-56-7	265-024-8
N-Methyl-2-pyrrolidone	<5 %	Xi; R36/38	000872-50-4	212-828-1
Calcium dodecylbenzenesulphonate	<5 %	C; R34	26264-06-2	247-557-8
Solvent naphtha (petroleum), heavy aromatic	<5%	Xn,N; R51/53-65-66	64742-94-5	265-198-5
Solvent naphtha (petroleum), light aromatic	40-50%	Xn,N; R10-37-51/53-65-66-67	64742-95-6	265-199-0



TEA ≈ 5%  
DEA ≈ 0.5%



Examination of agricultural products is necessary

Use in agriculture as:

1. unknown

Natural occurrence as:

2. catabolite of Choline metabolism  
- results in untreated apples (0.03 – 0.05mg/kg)

 **No findings in fertilizers and plant protection products!**

## Conclusion

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- ✓ Morpholin: Attention!  
There may be other sources than waxing agents
- ✓ Monoethanolamine and N,N-Dimethylethanolamine have endogene origins too, therefore determination in fruit and vegetables is questionable
- ✓ Be careful in the evaluation of Diethanolamine – it's a technical byproduct of Triethanolamine
- ✓ Triethanolamine has permission as additive – no MRL is known
- ✓ Investigation of agricultural products is of urgent necessity

**Thanks for your attention!**