



*Bringing New Value To Chemicals*



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# Kao's fatty amines **FARMIN**

Kao's quality FARMIN products are made from natural fats and oils using state-of-the-art technology throughout the entire manufacturing processes.

Kao Corporation carries out the entire production process of the fatty amine FARMIN. The raw materials for this amine are fatty acids and alcohols derived from natural fats and oils. FARMIN forms the nucleus of Kao's fat and oil products along with the high grade fatty acid LUNAC and fatty alcohol KALCOL. FARMIN is being produced using the latest technology in Japan and also at Kao group companies in Germany, Mexico and the Philippines.

### Natural fats and oils



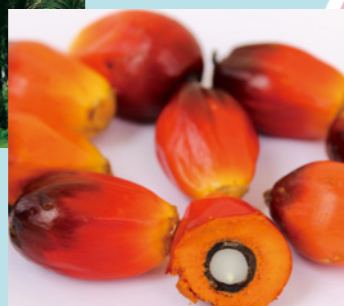
Coconut trees



Coconuts  
(About 25 to 30cm in size)



Palm trees



Palm nuts  
(About 4 to 5cm in size)

### Our innovative plants



Pilipinas Kao Incorporated (Philippines)



Kao Corporation, Wakayama Plant (Japan)



Quimi-Kao S. A. de C. V. (Mexico)

Kao's FARMIN series consists of a variety of quality products ranging from primary amines to tertiary amines, which have a variety of alkyl compositions. The FARMIN products are used as the main raw materials for cationic and amphoteric surfactants, and their derivatives are widely used as softener base, hair conditioning components, foam boosters to formulate various household products and so on.

FARMIN products are also found in a wide range of industrial-use products including textile dyeing auxiliaries, asphalt emulsifiers, germicides and bactericides.

## Kao's fatty amines **FARMIN**

#### Direct Applications

Field	Intended use
Construction	Asphalt emulsifiers
Mining	Flotation agents
Agrochemicals	Anti-caking agents for fertilizers
Metal coating	Corrosion inhibitors

#### Applications as a raw material of synthesis

Compounds to be synthesized	Intended use
Cationic surfactants	Textile softeners, dyeing auxiliaries, hair conditioner bases, germicides and bactericides, and wood preservatives.
Amphoteric surfactants	Foam boosters for liquid detergent, antistatic agents, textile scouring and shampoo ingredients.
Amine oxide	Foam boosters for liquid detergents.

### CONTENTS

<b>1. List of products</b>	
1-1 Primary amines .....	3
1-2 Tertiary amines (1) .....	5
1-3 Tertiary amines (2) .....	7
1-4 Diamines .....	7
1-5 Alkyl amine acetates .....	7
<b>2. Analytical procedures for FARMIN products</b> .....	9
<b>3. Handling</b> .....	11
<b>4. Storage</b> .....	12

# 1. List of products

## 1-1 Primary amines

Product name	Description	Appearance (at 25°C)	Specifications		
			Color (APHA)	Iodine value	Total amine value
FARMIN CS	Coconut amine	Clear liquid	50 max.	12 max.	275~295
FARMIN 08D	Octyl amine	Clear liquid	50 max.	—	425~445
FARMIN 20D	Lauryl amine	White solid	50 max.	—	295~305
FARMIN 80S	Stearyl amine	White solid	80 max.	—	205~212
FARMIN 86V	Stearyl amine	White solid	50 max.	—	211~220
FARMIN O-V	Oleyl amine	Light yellow liquid	150 max.	75min.	205~215

Typical applications :

Raw materials for cationic and amphoteric surfactants.

( Cationic surfactants : Textile softeners, dyeing assistants, anti-static agents, germicides and bactericides, pigment grinding aids, color flushing agents, etc.  
Amphoteric surfactants : Anti-static agents, textile scouring agents, shampoo ingredients, etc. )

Raw materials for emulsifier for asphalt and mold release agents for rubber, flotation agents, anti-caking agents for fertilizers, grease thickener, fuel oil additives, sludge inhibitors, etc.

Corrosion inhibitors, etc.

Product name	Specifications		Typical carbon chain composition (%)							
	Moisture(%)	Freezing point(°C)	C <sub>8</sub>	C <sub>10</sub>	C <sub>12</sub>	C <sub>14</sub>	C <sub>16</sub>	C <sub>18</sub>	C <sub>18'</sub>	C <sub>20</sub>
FARMIN CS	0.5 max.	13~19	7	7	51	19	8	2	6	
FARMIN 08D	1.0 max.	-3~1	98	2						
FARMIN 20D	0.5 max.	24.5~28.5		1	96	3				
FARMIN 80S	0.5 max.	49~53					4	95		1
FARMIN 86V	0.5 max.	43~50					30	70		
FARMIN O-V	0.3 max.	12~21				1	6	6	87	

(1) C<sub>16</sub> : 8%、C<sub>16'</sub> : 6%

## 1-2 Tertiary amines (1)

Product name	Description	Appearance (at 25°C)	Specifications		
			Color (APHA)	Total amine value	Tertiary amine (%)
FARMIN DM24C	Di-methyl coconut amine	Clear liquid	30 max.	241~251	98 min.
FARMIN DM0898	Di-methyl octyl amine	Clear liquid	30 max.	344~358	98 min.
FARMIN DM1098	Di-methyl decyl amine	Clear liquid	30 max.	291~305	98 min.
FARMIN DM2098	Di-methyl lauryl amine	Clear liquid	30 max.	254~265	98 min.
FARMIN DM2463	Di-methyl lauryl amine	Clear liquid	30 max.	241~252	98 min.
FARMIN DM2458	Di-methyl lauryl amine	Clear liquid	30 max.	239~251	98 min.
FARMIN DM4098	Di-methyl myristyl amine	Clear liquid	30 max.	224~234	98 min.
FARMIN DM6098	Di-methyl myristyl amine	Clear liquid	30 max.	202~209	98 min.
FARMIN DM6875	Di-methyl myristyl amine	Clear liquid	30 max.	198~210	98 min.
FARMIN DM8680	Di-methyl stearyl amine	Clear liquid	30 max.	186~197	98 min.
FARMIN DM8098	Di-methyl stearyl amine	Clear liquid	30 max.	183~190	98 min.
FARMIN DM2285	Di-methyl behenyl amine	White solid	30 max.	154~160	98 min.

We can meet your request to make any proportion of amines in the range of C8 to C18.

Typical applications

Raw materials for Cationic and Amphoteric surfactants.

( Cationic surfactants : Germicides and bactericides, leveling agents in fabric dyeing, hair conditioners,  
wood preservatives, etc. )  
( Amphoteric surfactants : Anti-static agents, textile scouring agents, shampoo ingredients, etc. )

Raw materials for amine oxide (foam boosters for dish washing detergents) and oil recovery agents, etc.

Product name	Specifications		Typical carbon chain composition (%)							
	1 <sup>ry</sup> and 2 <sup>ry</sup> amines (%)	Moisture (%)	C <sub>8</sub>	C <sub>10</sub>	C <sub>12</sub>	C <sub>14</sub>	C <sub>16</sub>	C <sub>18</sub>	C <sub>18'</sub>	C <sub>20</sub>
FARMIN DM24C	0.3 max.	0.20 max.	6	4	48	21	11	10		
FARMIN DM0898	0.3 max.	0.30 max.	98	1	1					
FARMIN DM1098	0.3 max.	0.30 max.	1	97	2					
FARMIN DM2098	0.3 max.	0.20 max.		1	98	1				
FARMIN DM2463	0.3 max.	0.20 max.			63	30	7			
FARMIN DM2458	0.3 max.	0.20 max.			58	35	7			
FARMIN DM4098	0.3 max.	0.20 max.			2	97	1			
FARMIN DM6098	0.3 max.	0.20 max.				1	98	1		
FARMIN DM6875	0.3 max.	0.20 max.				6	74	20		
FARMIN DM8680	0.3 max.	0.20 max.			1	2	17	80		
FARMIN DM8098	0.3 max.	0.20 max.					2	98		
FARMIN DM2285	0.3 max.	0.20 max.						3	12	85

## 1-3 Tertiary amines (2)

Product name	Description	Appearance (at 25°C)	Specifications			
			Color (APHA)	Total amine value	Tertiary amine value	1 <sup>ry</sup> and 2 <sup>ry</sup> amines(%)
FARMIN M2-1095	Di-decyl mono-methyl amine	Light yellow liquid	30 max.	172~182	—	1 max.
FARMIN T-08	Tri-octyl amine	Light yellow liquid	100 max.	149~159	148~158	—

Typical applications :

FARMIN M2-1095 ; Intermediate for cationic surfactants.

FARMIN T-08 ; Metal ion exchanger.

## 1-4 Diamines

Product name	Description	Appearance (at 25°C)	Specifications		
			Color (Gardner)	Iodine value	Tertiary amine value
DIAMIN R86	Hydrogenated tallow propylene diamine	Light yellow flakes	10 max.	5 max.	325 min.
DIAMIN RRT	Tallow propylene diamine	Yellowish brown solid	5 max.	35 max.	325 min.

Typical applications :

Road construction (asphalt emulsifier), corrosion inhibitors, etc.

## 1-5 Alkyl amine acetates

Product name	Description	Appearance (at 25°C)	Specifications	
			Total amine value	Dropping point
ACETAMIN 24	Coconut amine acetate	White solid	205~225	40~60
ACETAMIN 86	Stearyl amine acetate	Light yellow flakes	155~175	61~75

Typical applications :

Flotation agents, color flushing agents and pigment dispersants, anti-caking agents for fertilizer, textile softeners, etc.

Product name	Specifications		Typical carbon chain composition(%)						
	Tertiary amine(%)	Moisture(%)	C <sub>8</sub>	C <sub>10</sub>	C <sub>12</sub>	C <sub>14</sub>	C <sub>16</sub>	C <sub>18</sub>	C <sub>18'</sub>
FARMIN M2-1095	95 min.	0.2 max.		98 <sup>(1)</sup>					
FARMIN T-08	—	0.3 max.	97 <sup>(2)</sup>	2 <sup>(2)</sup>	1 <sup>(2)</sup>				

(1) Di · decyl methyl amine content

(2) Tri amine content

Product name	Specifications		Typical carbon chain composition(%)						
	Moisture(%)		C <sub>8</sub>	C <sub>10</sub>	C <sub>12</sub>	C <sub>14</sub>	C <sub>16</sub>	C <sub>18</sub>	C <sub>18'</sub>
DIAMIN R86	1 max.					5	50	45	
DIAMIN RRT	1 max.					4	30	21	45

Product name	Specifications		Typical carbon chain composition(%)						
	Moisture(%)		C <sub>8</sub>	C <sub>10</sub>	C <sub>12</sub>	C <sub>14</sub>	C <sub>16</sub>	C <sub>18</sub>	C <sub>18'</sub>
ACETAMIN 24	2 max.		7	7	51	19	8	2	6
ACETAMIN 86	1 max.					4	30	66	

## 2. Analytical procedures for FARMIN products

The analytical values listed in this brochure are specified in the "Kao Standard Test Methods." These test methods are in accordance with the "Japanese Industrial Standards"(JIS) or the "Standard Methods for the Analysis of Fats, Oil and Related Materials" published by The Japan Oil Chemists' Society. However, as the amine values are not specified in these procedures, the following procedures are referred.

Parameter	Definition	Procedure
<b>Amine value</b> (Total amine value)	The total amount of primary and secondary and tertiary amines, expressed in mg of potassium hydroxide equivalent to hydrochloric acid required for neutralizing 1g of the sample.	(1) Weigh out precisely 0.5 to 2.0 g of the sample. (2) Dissolve it in 30 ml of neutral ethanol (BCG neutral). (3) Titrate the solution with 0.2mol/L HCl in ethanol until it turns yellow.
<b>Partial amine value</b>	The total amount of secondary and tertiary amines, expressed in mg of potassium hydroxide equivalent to hydrochloric acid required for neutralizing secondary and tertiary amines in 1 g of the sample.	(1) Weigh out precisely 0.5 to 1.5 g of the sample. (2) Dissolve it in 30 ml of neutral ethanol (BCG neutral). (3) Add 5 milliliters of 25% salicylaldehyde in ethanol and allow it to stand for about 30 minutes at room temperature. (4) Titrate the solution with 0.2mol / L HCl in ethanol until it turns yellow.
<b>Tertiary amine value</b>	The amount of tertiary amine, expressed in milligrams of potassium hydroxide equivalent to hydrochloric acid required for neutralizing tertiary amines contained in 1g of the sample.	(1) Weigh out precisely 0.2 to 1.5 g of the sample. (2) Dissolve it in 20 ml of a mixture of acetic anhydride and acetic acid(9:1) and allow it to stand for 3 hours at room temperature. (3) After adding 30 ml of acetic acid, titrate the solution with 0.1 mol / L perchloric acid in acetic acid using a potentiometric titrator. (4) Titrate a blank test at the same way.
<b>Primary and secondary amine value</b>	The amount of primary and secondary amine in alkyl dimethyl amine, expressed in milligrams of potassium hydroxide corresponding to the amount of primary and secondary amines contained in 1g of the sample.	(1) Weigh out precisely 10 g of the sample. (2) Dissolve it in 60 ml of ethanol. (3) Immediately after adding 2 ml of carbon disulfide, titrate the solution with 0.1 mol / L potassium hydroxide in ethanol using a potentiometric titrator. (4) Titrate a blank in the same way.
<b>Tertiary amine content and primary/secondary amine contents</b>	Tertiary amine content is the ratio of tertiary amine value to total amine value ;primary/secondary amine content is the ratio of primary/secondary amine value to total amine value.	Use the equations shown on the next page to calculate these contents from total and primary/secondary amine values obtained by the above procedures.
<b>Non-amine content</b>	Weight percentage of substances in the sample not absorbed to cationic ion exchange resin and remaining dissolved in the solvent after passing isopropanol solution of the sample through the resin.	In accordance with ion exchange resin method.

$$\text{Calculation Total amine value.} = \frac{A_1 \times f_1 \times 0.2 \times 56.108}{S}$$

$$\text{Partial amine value.} = \frac{A_2 \times f_2 \times 0.2 \times 56.108}{S}$$

$$\text{Tertiary amine value.} = \frac{(A_3 - B_1) \times f_3 \times 0.1 \times 56.108}{S}$$

$$\text{Primary/secondary amine value.} = \frac{(A_4 - B_2) \times f_4 \times 0.1 \times 56.108}{S} - C$$

$$\text{Tertiary amine content} = \frac{(\text{Total amine value} - \text{Primary/secondary amine value})}{\text{Total amine value}} \times 100$$

$$\text{Primary/secondary amine contents} = \frac{(\text{Primary/secondary amine value})}{(\text{Total amine value})} \times 100$$

where : A<sub>1</sub> is the amount of 0.2mol/L hydrochloride in ethanol required to titrate the sample(ml).  
A<sub>2</sub> is the amount of 0.2mol/L hydrochloride in ethanol required to titrate the sample(ml).  
A<sub>3</sub> is the amount of 0.1mol/L perchloric acid in acetic acid required to titrate the sample(ml).  
A<sub>4</sub> is the amount of 0.1mol/L potassium hydroxide in ethanol required to titrate the sample(ml).  
B<sub>1</sub> is the amount of 0.1mol/L perchloric acid in acetic acid required to titrate a blank (ml).  
B<sub>2</sub> is the amount of 0.1mol/L potassium hydroxide in ethanol required to titrate a blank (ml).  
S is the sample weight (g).  
f<sub>1</sub> is the factor of 0.2mol/L hydrochloride in ethanol.  
f<sub>2</sub> is the factor of 0.2mol/L hydrochloride in ethanol.  
f<sub>3</sub> is the factor of 0.1mol/L perchloric acid in acetic acid  
f<sub>4</sub> is the factor of 0.1mol/L potassium hydroxide in ethanol  
C : Acid value\*

Note :

### Analyzing the iodine values of unsaturated alkyl amines.

The Wijs method is commonly used in analyzing fats and oils, however, the iodine value listed in this brochure are obtained by the modified Wijs method, in which the following pretreatment procedure is employed to acetylate the sample with acetic anhydride before adding 10 ml of the Wijs reagent:

- (1) Weigh out precisely 3 g or less of the sample to ensure that 40 to 50% of the Wijs reagent be consumed.
- (2) Dissolve it in 10 ml of cyclohexane and toluene.
- (3) After adding 5 ml of acetic anhydride, put a stopper in the container and allow it to stand for about 30 minutes.

## 3. Handling

Strict precaution are required in handling FARMIN products because they are basic and may cause irritation with skin and eyes ; especially FARMIN CS, 08D, 20D tend to be strongly irritation to skin and eyes. However, in case of dilute solution, they generally do not cause severe irritation on human skin except where is extremely sensitive to bases.

Wear protective rubber or plastic gloves, aprons, boots and safety goggles to avoid contact with skin, eyes and clothing. These protective wears should be washed whenever they are contaminated.

In the event of direct contact with skin or eyes, first aid should be given immediately as follows :

**Skin** Flush skin with 0.5% to 2% of acetic acid aqueous solution for a minimum of 15 minutes while removing all contaminated clothing. Seek medical advice.  
Dispose of contaminated clothing as hazardous material waste.

**Eyes** Flush eyes with plenty of water for a minimum of 15 minutes, and seek medical attention.

**Ingestion** If the material is swallowed, get immediate medical attention or advice.

**Inhalation** Remove person to fresh air and seek medical attention.  
If not breathing give artificial respiration. If breathing is difficult, give oxygen.

**Notes to physician** This product is only slightly soluble in water and will adhere to skin.  
The manufacturer successfully uses 0.5~2% acetic acid in water to neutralize.  
(NOTE :Neutralization will produce heat, potentially giving thermal burns in addition to chemical burns. ) Advise feasibility of use in specific situation.  
Symptoms of exposure may or may not be immediately apparent.  
They include burning sensation, coughing, laryngitis, shortness of breath, headache, nausea, vomiting.

FARMIN products can catch fire at 60°C ~200°C, but generally only in contact with flames.

So they should be stored in well-ventilated area away from heat, sparks and open flames.

Use water fog to fight large fires. Fire extinguishers for small or confined fires should be of carbon dioxide or dry chemical types.

## 4. Storage

Generally soft steel storage tanks can be used to store FARMIN products because they do not corrode during storage.

Copper, bronze and brass, however, should not be exposed to FARMIN products because they may corrode or cause changes in the color or quality of the products.

Alkyl carbamates will be formed when primary/secondary amines or diamines absorb carbon dioxide in air.

When solid amines absorb carbon dioxide in the air a white waxy layer will be formed on the surface. In the case of liquid amines, a skin or sediment will form.

FARMIN products may also form hydrates when exposed to water.

To avoid these problems, prevent FARMIN products from being exposed to carbon dioxide by, for example, putting nitrogen gas in containers.

Alkyl carbamates will release carbon dioxide and return to original fatty amines when heated to or above 100°C. However, when heating do not apply pressure because the compounds are converted into nitrogen substituted urea under pressure.