SHEPROS®

Safety, Heath & Environment Product Solutions

The Biodegradable and Environmentally Friendly Household Utensil Cleaner

SCOURING CREAM

Shepros Sdn. Bhd.

What is Household Utensil Cleaner?

Household Utensil Cleaners are inevitable part of our bathroom and kitchen hygiene. We use Household Utensil Cleaners to clean our utensils, but are they really doing their job? Have we ever thought about the ingredients of these Household Utensil Cleaners? Are there any side effects by using them? Now, with increased awareness about the health hazards presented by house-hold articles, doubts are being raised about its toxicity.

When kitchen utensils are washed with Household Utensil Cleaners, some of them leave residues on the surface of the utensils, which is consumed when it is used the next time. Some of these cleaners have strong disinfectants, which are harmful to the skin. Some others emit gases that cause allergies and respiratory problems.

The Household Utensil Cleaners we use to clean our utensils flow down the drain after its purported use. They undergo chemical treatment in sewage treatment plants, before being released into waterways. During this treatment, most of the toxic chemicals are neutralized and made harmless. But some of them still remain, causing environmental pollution.

To analyze the effects of Household Utensil Cleaners, we need to know more about the common ingredients of commercial Household Utensil Cleaners in the market. Typical non-environment friendly conventional Household Utensil Cleaners formulations generally contain several items in the list below.

- **Phosphates**

  It dissolves calcium and magnesium ions to prevent 'hard-water' type lime scale deposits. They can cause ecological damage, so their use is starting to be phased out.

- **Bleaching agents**

  Powders and liquids bleaching agents contain either oxygen or chlorine based bleaching agents. It breaks up and bleaches organic deposits.

- **Synthetic surfactants**

  Lowers the surface tension of the water, emulsifies oil, lipid and fat food deposits. It also prevents droplet spotting on drying.

- **Alkaline salts**

  These are a primary component, in older & original-style dishwasher detergent powders. Highly alkaline salts attack & dissolve grease, but are extremely corrosive (fatal) if swallowed. Salts used may include meta-silicates, alkali metal hydroxides and sodium carbonate.

- **Enzymes**

  Breaks up and dissolves protein-based food deposits, and possibly oil, lipid and fat deposits. Proteases do this by breaking down the proteins into smaller peptides that are more easily washed away.

- **Ammonia**

  It is a very volatile chemical. It is very damaging to your eyes, respiratory tract, and skin. Found in polishing agents for bathroom fixtures, sinks and jewelry; also in glass cleaner.

- **Anti-corrosion agent(s)**

  Often sodium silicate, this prevents corrosion of metal utensils.

- **Triclosan**

  Triclosan is an aggressive antibacterial agent that can promote the growth of drug-resistant bacteria. The American Medical Association has found no evidence that these antimicrobials make us healthier or safer, and they're particularly concerned because they don't want us overusing antibacterial chemicals — that's how microbes develop resistance, and not just to these [household antibacterials], but also to real antibiotics that we need. Other studies have now found dangerous concentrations of triclosan in rivers and streams, where it is toxic to algae. The EPA is currently investigating whether triclosan may also disrupt endocrine (hormonal) function. It is a probable carcinogen.

- **Sodium Hydroxide (Lye)**

  Caustic, strong irritant, burns to both skin and eyes. Inhibits reflexes, will cause severe tissue damage if swallowed.

- **Additives**

  It is used to slow down the removal of glaze and patterns from glazed ceramics utensils.

- **Perfumes**

  Petrochemical solvent base perfumes as fragrance.

- **Chemical Gelling agents**

  Use as thickening agent in both liquid and gel based household cleaners.

Environmental Concerns

Household Utensil Cleaners can have poisonous effects in all types of aquatic life if they are present in sufficient quantities. There are many Household Utensil Cleaners which claim to be biodegradable; but take months to achieve the biodegradability.

Non-biodegradable synthetic surfactant such as nonyl phenol ethoxylate (NPE) is a general group of synthetic surfactants in Household Utensil Cleaners. This chemical biodegrades slowly and leaves trace amounts in the soil and water. Researchers have found that NPE in water can cause feminization of male fish. It is also thought to increase the risk of breast cancer as it mimics female hormone activity in mammals.

Slow degrading Household Utensil Cleaners also have higher probability of destroying the external mucus layers and damage the gills which expose to the fish to bacterial and parasitic attack. Besides that, it also kills fish eggs. Household Utensil Cleaners also create problems for aquatic life by lowering the surface tension of the water. Organic chemicals such as pesticides and phenols are then much more easily absorbed by the fish. It causes fish to absorb double the amount of chemicals they would normally absorb, although that concentration itself is not high enough to affect fish directly.

Phosphates in Household Utensil Cleaners can lead to freshwater algal blooms that release toxins and deplete oxygen in waterways. The pollution of phosphates can generate algal blooms on the excess phosphorus and consumed most of the oxygen in the waters, killing fish and plants. Phosphates can also combine with other plant nutrients such as nitrogen and contribute to eutrophication. This results in excessive phytoplankton growth that kills off fish and other aquatic plant life.

Pollution and environmental problems from synthetic detergents

Ban on Phosphates Household Cleaners

Canada

New Canadian federal regulations came into force on July 1, 2010 that will effectively ban phosphorus in household dishwashing detergents, laundry detergents, and other cleaning products. The new rules mirror regulations enacted by Manitoba in 2008 and Minnesota in 2005. Removing phosphorus from dishwasher detergents alone is estimated to reduce the phosphorus loads to lakes from human sources by about 10%. The new regulations will impose a phosphorus limit of 0.5% by weight for household cleaners, dish washing detergents (hand and automatic), and laundry detergents.

European Union

European Parliament's Environment Committee proposed to ban all but trace amounts of phosphates in household cleaners sold within the EU beginning in 2015. The parliamentary committee approved the dishwasher recommendation on 15th June 2011 as part of a wider proposal that also calls for restricting phosphates in household detergents beginning in 2013. Specifically, the committee recommended that phosphorus compounds in detergents not exceed 0.5 gram per standard load.

Most western European nations, including the UK, France, Germany, Italy, Belgium and the Netherlands, have already either banned or restricted the use of phosphates in household detergents. France will ban dishwasher detergent phosphates beginning in 2012, while Sweden and Finland are considering dishwasher bans.

United States of America

On 1st July 2010, 16 states banned the sale of dishwasher detergents that contain high levels of phosphates, a source of pollution in lakes and streams. Stores will not be allowed to sell detergent with more than 0.5 percent phosphorous. States instituting the rule include Illinois, Indiana, Maryland, Massachusetts, Michigan, Minnesota, Montana, New Hampshire, Ohio, Oregon, Pennsylvania, Utah, Vermont, Virginia, Washington and Wisconsin.

Contact Dermatitis

Contact dermatitis is characterized by inflammation of the skin due to external skin contact with an irritating substance such as Household Cleaners. Contact dermatitis is divided into two types: irritant contact dermatitis and allergic contact dermatitis. If you experience mouth swelling, in addition to other allergy symptoms, when exposed to Household Cleaners, you are likely experiencing allergic contact dermatitis.

Allergic contact dermatitis, which occurs in two phases, develops as a result of a hypersensitivity reaction elicited through your immune system. The first phase of allergic contact dermatitis is called the sensitization phase. During this phase, the allergen in Household Cleaners penetrates the skin and attaches to specific immune cells, called Langerhan's cells, which carry the allergen to the lymph nodes. At this point, another type of immune cell, called T-lymphocytes, produce cells that develop a memory

for the allergen. The sensitization phase occurs only once and generally does not produce any physical symptoms.

The next phase is called the elicitation phase. Next time you are exposed to the chemical in the Household Cleaners, T-lymphocytes begin to multiply and the inflammatory process begins. The inflammatory process pulls T-lymphocytes to the skin surface. The elicitation phase is when a visible allergic reaction occurs.

The presence of the T-lymphocytes at the skin surface results in itching, redness, swelling and the development of small blisters. As the allergic reaction progresses, you may develop hives and the skin can become thick and scaly.

Severe allergic contact dermatitis can cause swelling of the mouth and throat, a condition called angioedema. During the inflammation process, your body releases chemicals called histamines, which causes your blood vessels to swell. If the blood vessels swell too much, it can interfere with breathing, possibly leading to death. If you experience swelling in the mouth after exposure to Household Cleaners, seek emergency medical attention.

Allergic contact dermatitis is usually related to one specific chemical or a group of chemicals with similar characteristics. With Household Cleaners, it is often added fragrances that trigger an allergic response.

To reduce the risk of allergic contact dermatitis when using Household Cleaners, choose fragrance-free soaps. Household Cleaners listed as hypoallergenic and unscented may still contain small amounts of fragrance. It is also helpful to wear rubber gloves when using Household Cleaners.

Household Cleaners Contact Dermatitis on Hands

Our Technology in Scouring Cream

Nano Biotech Colloidal Micelles (NBCM)

SHEPROS combines the knowledge of nanotechnology and biotechnology in using the unique colloidal chemistry to generate a state of the art formulation that produces the innovative Nano Biotech Colloidal Micelles (NBCM). NBCM are mild but are amazingly powerful colloidal micelles made from non-toxic plant based extracts, plant derivatives and biodegradable surfactants.

NBCM are very fine molecules with spherical aggregate structure which remain in suspension indefinitely and are not affected by gravity when dispersed in a liquid colloid. It is surrounded by a cloud of tightly bound ions. The NBCM aggregates form in order to minimize the free energy of the solution. They are dynamic but equilibrium structures and are able to rearrange in response to changing environmental conditions. They also undergo thermal fluctuations and Brownian motion. It works well with hard, soft, cold, hot, fresh and salt water.

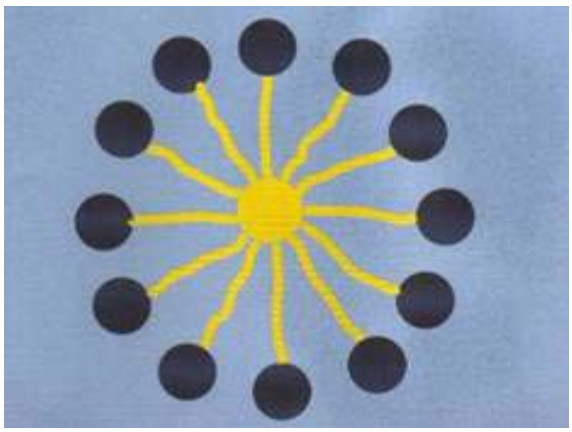


Illustration of Nano Biotech Colloidal Micelles.

The hydrophobic poles attract to each other forming interior micelles cluster and the hydrophilic poles form a powerful outer surface.

NBCM in colloidal chemistry can be explained as a sub-division of physical chemistry comprising of the phenomena of characteristic of matter when one or more of its dimensions lie in the range between 1 nanometer and 100 nanometers. In this nature of science, the dimension of NBCM is more important than the nature of the material. In the size range of nanometer, the surface area of NBCM is much greater than its volume that unusual phenomena of colloidal micelles will occur as following:

a. They do not settle out of the suspension of gravity.
b. They will be small enough to pass through the unreachable exterior areas of the plants.
c. They will move in at least one dimension randomly.
d. They will have tremendous wetting capacity.
e. They will reduce the surface tension in water or water solutions.
f. They have the velocity that will move endlessly without stopping.
g. They will have sterilizing effect by disrupting the DNA or RNA of the virus, prokaryotic cell of bacteria, and eukaryotic cell of algae, protozoa and fungi.

How do NBCM destroy bacteria?

A cell wall protects bacteria cell from the effects of osmotic pressure. NBCM destroy the peptidogylan layer of the bacteria cell walls, but not to human beings and animals which do not have cell wall. In the absence of unstable formed peptidogylan, growing bacteria cells will be weaken and destroy through to the following exposures:

1. **Inhibition of cell wall synthesis**

   Generally, a bacterium is in a hypotonic solution and water tries to move in to the bacterium from a higher water concentration to the lower water concentration. When the cells are less resistant to the effect of osmotic pressure; the underlying cytoplasmic membrane bulges through the weakened portions of cell wall as water moves into the cell, and eventually the cell lyses.

2. **Inhibition of metabolic pathways**

   Generally, a bacterium is in a hypotonic solution and water tries to move in to the bacterium from a higher water concentration to the lower water concentration. When the cells are less resistant to the effect of osmotic pressure; the underlying cytoplasmic membrane bulges through the weakened portions of cell wall as water moves into the cell, and eventually the cell lyses.

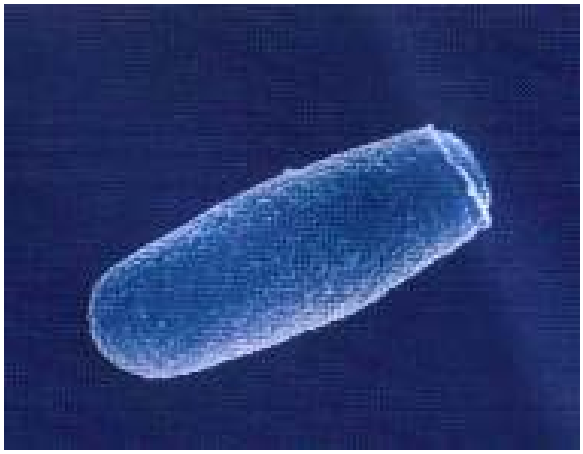
3. **Inhibition of metabolic pathways**

   A damaged cell wall will affect all the chemical reactions in metabolism of the bacterium. The unstable metabolic pathways will result in unstable enzyme activity, temperature and pH in the cell.

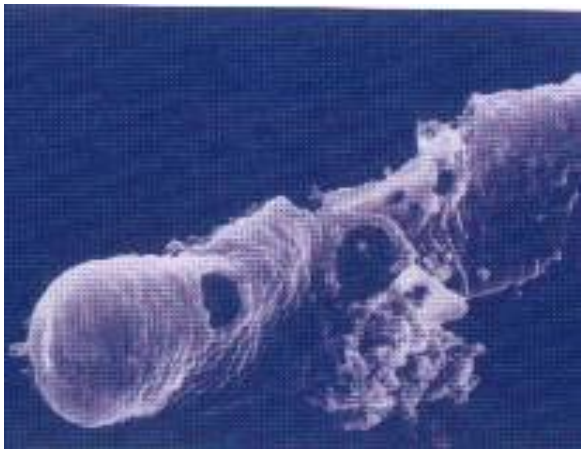
4. **Disruption of cytoplasmic membranes**

   The disruption of cytoplasmic membranes will severely damage the cytoplasm which is composed with primary 90% of water and proteins. The contents of cytoplasm such as nucleoid and ribosomes will be destroyed.

NBCM Aspects of Disinfectants in Bacteria



A scanning electron micrograph of bacteria cell before the inhibition of cell wall synthesis; inhibition of protein synthesis; and disruption of cytoplasmic membrane.



A scanning electron micrograph of bacteria cell bursts from osmotic pressure due to the integrity of peptidoglycan is not maintained. This is due to the inhibition of cell wall synthesis; inhibition of protein synthesis; and disruption of cytoplasmic membrane.

How do NBCM work in Cleaning and Degreasing?

NBCM cleaning are different from traditional cleaning technology which use the molecular attraction of cationic (positive ions) and anionic (negative ions). NBCM do not have any ionic groups and do not react with hard water ions. They have hydrophilic poles and hydrophobic poles. In a colloidal solution, if the amount of NBCM is increased, there will come to a point where they can no longer accumulate at the surface. The NBCM molecules will find other ways of shielding their hydrophobic tails from water. The NBCM molecules will aggregate into a cluster in which the tails point inwards. The head groups will form a water soluble shell in the outer surface.

When NBCM are in contact with oil (hydrocarbon) molecules, the center of NBCM bonds to a similar hydrophobic oil (hydrocarbon). They surround and separate (emulsify) oil (hydrocarbon) molecules from each other and/or the surface to which they cling. Once the oil (hydrocarbon) is surrounded and separated through the disruption in the attraction to the other oil (hydrocarbon) molecules and/or to the surface, the oil (hydrocarbon) can be uplifted from the surface and rinsed or wiped away easily.

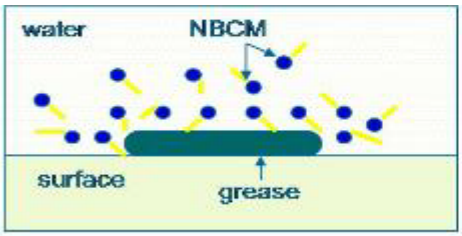


Figure 1.

NBCM attack the particle of grease.

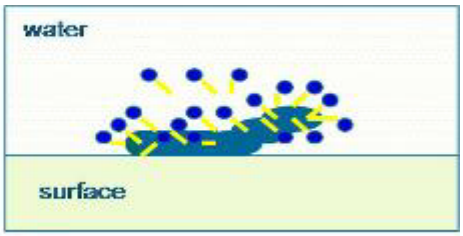


Figure 2.

NBCM surround the particle of grease.

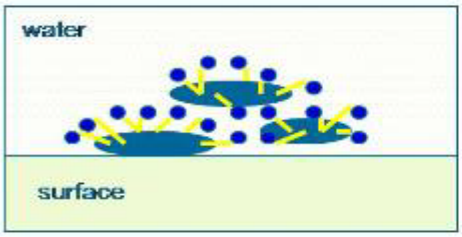


Figure 3.

NBCM break the particle of grease.

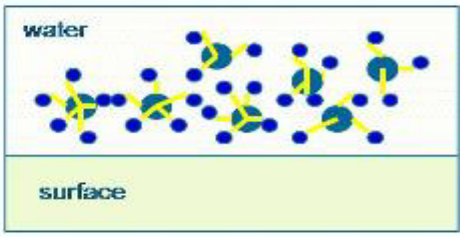
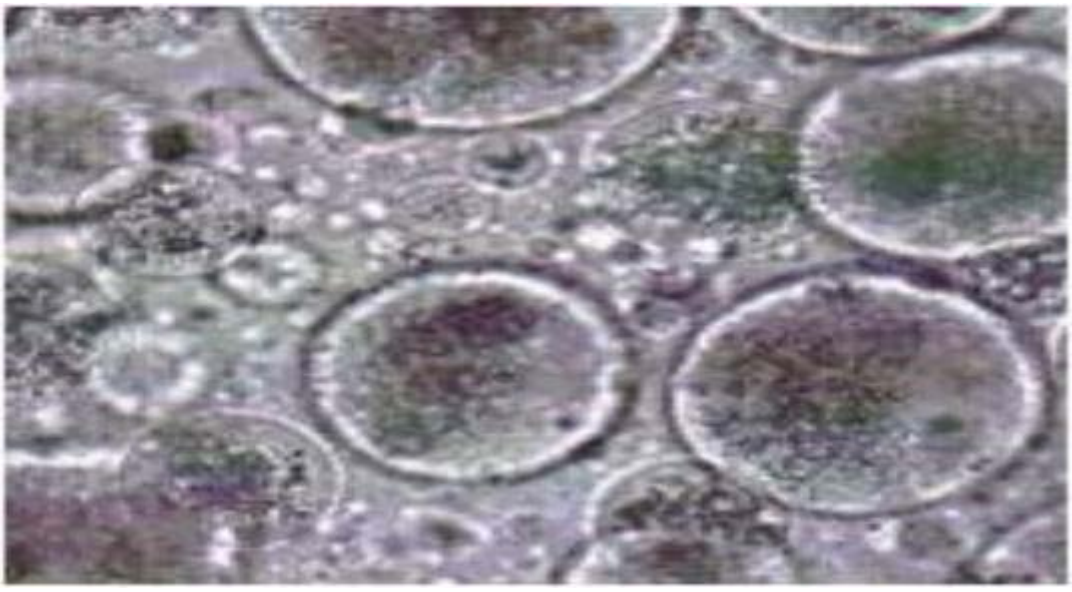


Figure 4.

The particles of grease come off to the surface & remain suspended in the water.



Optical microscopy image of nano and micro emulsions of oil and NBCM cleaner after rinsing with water.

SCOURING CREAM - H-SC 028

Product Description:

Scouring Cream is a highly concentrated cream cleaner that cleans and brightens hard surfaces.

Scouring Cream does not contain acids, abrasive materials, petroleum distillates, soaps, chemical thickening agents, nitrates, enzymes, phosphates, alcohol, animal fatty acids, hydrocarbon toxic solvents, non-biodegradable surfactants and ozone depleting substances. It is odorless and doesn't irritate sensitive skin.

Application:

Scouring Cream effectively removes germs, dirt, contaminants, oil, grease, tar and carbon burned mark. It is specially formulated for deep cleansing on all kind of hard surfaces. It also prevents grime build up to make future cleaning easier.

Scouring Cream is ideal for cleaning kitchen appliances and bathroom accessories. It is safe to use on surfaces made of enamel, porcelain, ceramic, aluminum, stainless steel, chrome, plastic and glass.

Directions:

Apply Scouring Cream to surface with a clean sponge or cloth. Leave for 15 minutes before rinsing with water or wipe it clean.

Use brush, rough sponge or steel wool for stubborn grease, tar and carbon burned mark. Rinse with water and repeat if necessary.

Acute Toxicity Test of Nano Alpha 10

Test Method: OECD Guideline for Testing of Chemicals Method 203 Fish

Result: Not hazardous to the aquatic environment.

Pusat Teknologi Alam Sekitar dan Bioproses
Environment and Bioprocess Technology Centre
Bangunan 15, SIRIM Berhad, Shah Alam, Selangor Darul Ehsan.
Tel : 60-3-5544 6550 / 6598 Faks : 60-3-5544 6590

RESULTS SUMMARY

Company Name : Shemical International Sdn Bhd

Address : Lot 109A, Jalan Gebeng 1/6, Kaw. Perindustrian Gebeng 26080 Kuantan, Pahang (Attn : Mr. Ng)

Your Ref No.	
SIRIM Ref. No.	237/16/712
Job No.	J026/08
Report No.	R054/08
Date of Issue	17/03/08
No. of pages	11

Request : 96-hour Fish (Tilapia), Acute Toxicity Test of Nano Alpha 10

SAMPLE DESCRIPTION
One liquid sample coded as "Nano Alpha 10 " was received on 01 Feb 2008.

TEST METHOD
(1) *Fish acute toxicity test according to OECD Guidelines for Testing of Chemicals - Method 203 Fish, Acute Toxicity Test

RESULT:

Sample Code	Appearance	LC_{50} (96 hour) (v/v)
Nano Alpha 10	Brownish	880 mg/L (0.088%)

Note: Refer to Appendix A – R054-1/08 for details.

INFERENCE
The classification system for substances hazardous to the aquatic environment according to The Globally Harmonised System (GHS) of Classification and Labeling of Chemicals (2005) is shown below.

Toxicity Category (Acute toxicity for 96 hr LC50 for crustacea)	**Classification Limit**
Acute I	≤ 1 mg/l
Acute II	> 1 - ≤ 10 mg/l
Acute III	> 10 - ≤ 100 mg/l

Based on the criteria for the harmonized classification system for substances, the "Alpha Nano 10 " is classified as "Not hazardous to the aquatic environment" as the LC_{50} value is above 100 mg/l.
(The inferences expressed herein are outside the scope of accreditation)

Name: **Tan Yong Nee**
Designation: **Researcher**
Fax No: **03-55446590**
Tel. No: **03-55446591**

SIRIM Berhad
(No. Syarikat 367474 - V)
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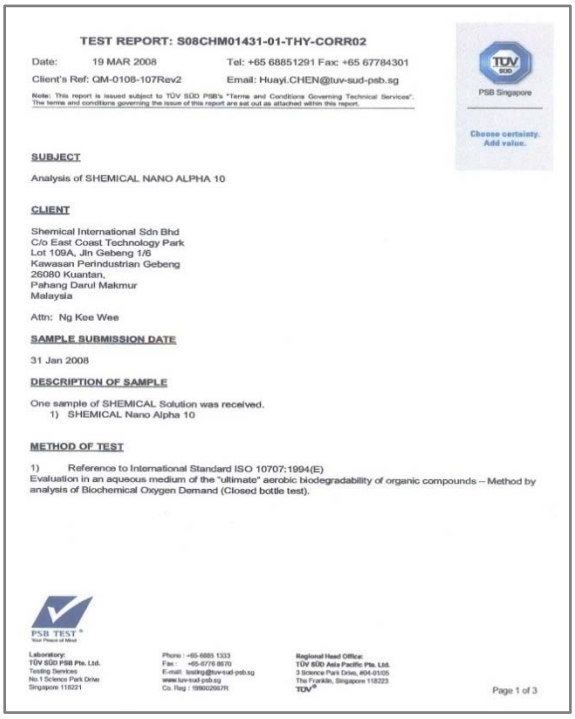
MALAYSIA
Tel: 60-3-5544 6000
Hotline: 60-3-5510 3535
Faks: 60-3-5510 8095
Website: www.sirim.my

Biodegradability Test of Nano Alpha 10

Test Method: Reference to International Standard ISO 10707:1994(E)

Result: Reached 96% of degradation at day 28 and it is readily biodegradable.



TEST REPORT: S08CHM01431-01-THY-CORR02

Date: 19 MAR 2008 Tel: +65 68851291 Fax: +65 67784301

Client's Ref: QM-0108-107Rev2 Email: Huayi.CHEN@tuv-sud-psb.sg

Note: This report is issued subject to TÜV SÜD PSB's "Terms and Conditions Governing Technical Services". The terms and conditions governing the issue of this report are set out as attached within this report.

PSB Singapore

Choose certainty. Add value.

SUBJECT

Analysis of SHEMICAL NANO ALPHA 10

CLIENT

Shemical International Sdn Bhd
C/o East Coast Technology Park
Lot 109A, Jln Gebeng 1/6
Kawasan Perindustrian Gebeng
26080 Kuantan,
Pahang Darul Makmur
Malaysia

Attn: Ng Kee Wee

SAMPLE SUBMISSION DATE

31 Jan 2008

DESCRIPTION OF SAMPLE

One sample of SHEMICAL Solution was received.
1) SHEMICAL Nano Alpha 10

METHOD OF TEST

1) Reference to International Standard ISO 10707:1994(E)
Evaluation in an aqueous medium of the "ultimate" aerobic biodegradability of organic compounds – Method by analysis of Biochemical Oxygen Demand (Closed bottle test).

PSB TEST

Laboratory: TÜV SÜD PSB Pte. Ltd. Testing Services No.1 Science Park Drive Singapore 118221

Phone: +65-6885 1333 Fax: +65-6776 8670 E-mail: testing@tuv-sud-psb.sg www.tuv-sud-psb.sg Co. Reg: 199002557R

Regional Head Office: TÜV SÜD Asia Pacific Pte. Ltd. 3 Science Park Drive, #04-01/05 The Franklin, Singapore 118223

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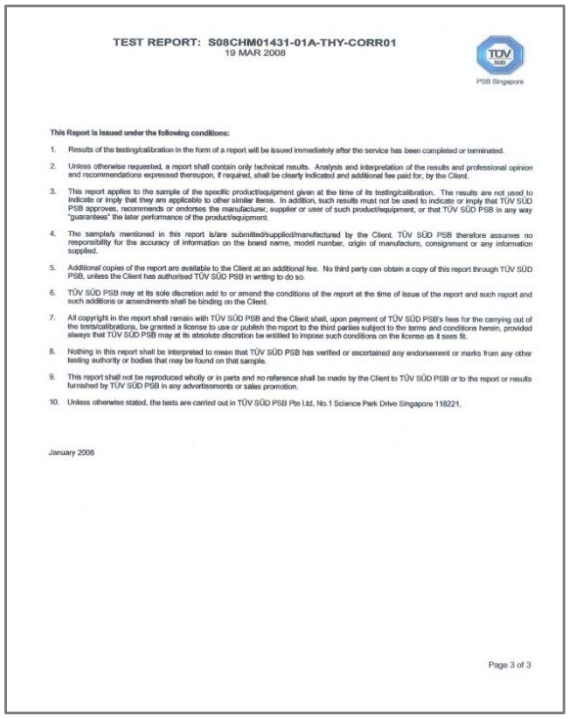

TEST REPORT: S08CHM01431-01A-THY-CORR01
19 MAR 2008

PSB Singapore

This Report is issued under the following conditions:

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2. Unless otherwise requested, a report shall contain only technical results. Analysis and interpretation of the results and professional opinion and recommendations expressed thereupon, if required, shall be clearly indicated and additional fee paid for, by the Client.
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January 2008

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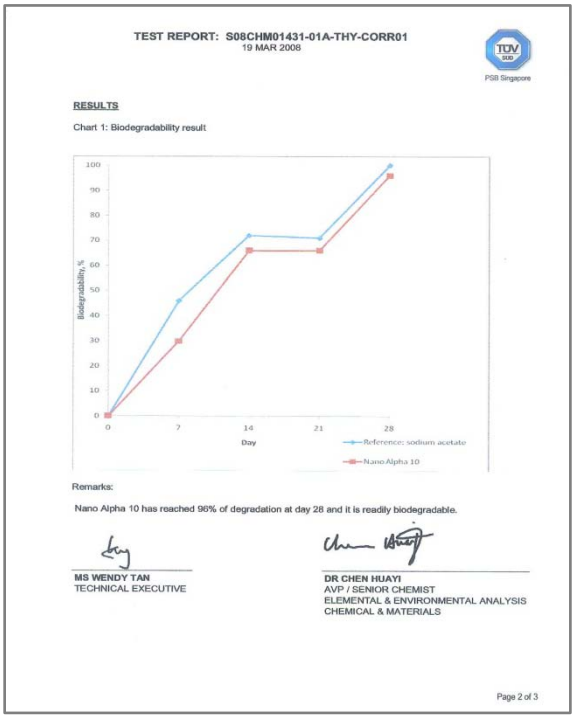

TEST REPORT: S08CHM01431-01A-THY-CORR01
19 MAR 2008

PSB Singapore

RESULTS

Chart 1: Biodegradability result

Remarks:

Nano Alpha 10 has reached 96% of degradation at day 28 and it is readily biodegradable.

MS WENDY TAN
TECHNICAL EXECUTIVE

DR CHEN HUAYI
AVP / SENIOR CHEMIST
ELEMENTAL & ENVIRONMENTAL ANALYSIS
CHEMICAL & MATERIALS

Page 2 of 3

International Standard ISO 10707:1994(E)

Evaluation in an aqueous medium of the "ultimate" aerobic biodegradability of organic compounds –

Method by analysis of

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(Closed bottle test)