



PRODUCT CATALOGUE

CHEMPELL DRY POWDER

Organic Chemical Solutions, L.L.C.

CHEMPELL

TECHNICAL BULLETINS

PROCESSING OF AQUATIC FEEDS

ADVANTAGES OF USING CHEMPELL PELLET BINDER
COMBINED WITH VEGETABLE STARCHES

CHEMPELL PELLET BINDER FOR FISH FEED OR
FEED MANUFACTURING PURPOSES

CHEMPELL PELLET BINDER FOR
FISH & SHRIMP FEEDS

FORMALDEHYDE RESIDUALS IN SHRIMP TISSUE

SAFETY INFORMATION

MATERIAL SAFETY DATA SHEET

PROCEDURE FOR DETERMINATION OF
POLYMETHYLOLCARBOMIDE CONTENT IN CHEMPELL
PRODUCT SPECIFICATION

Organic Chemical Solutions L.L.C.
P.O. Box 1869
Gainesville, GA 30506, U.S.A.
Phone 770-536-8885; Fax 770-536-8725
E mail us at info@oscllc.net; visit us at www.oscllc.net

PROCESSING OF AQUATIC FEEDS

OBJECTIVE

To discuss various processing requirements or conditions to obtain optimum performance with CHEMIPELL, a hydro stability agent for pelleted shrimp feeds.

PRODUCT MODE OF ACTION

CHEMIPELL reacts under the conditions of heat and moisture in the pelleting of extrusion process. During processing, CHEMIPELL, liquefies and forms a vapor-phase action. Upon cooling, the vapors dissipate, leaving a water-resistant film around the pellets.

INGREDIENT PARTICLE SIZE AND MIXING

The feed ingredients selected in the formulation should be checked to determine if they are fine enough for the ingredient mixing stage. The desired ingredient particle size should be ground to a uniform 16 to 20 mesh (1.00 to .850 mm). This grinding stage can be done on a high efficiency hammer mill utilizing a 1/8" (3.00 mm) size screen.

Once the feed ingredients are reground, they are now ready for blending in a horizontal ribbon or paddle mixer. At this point the micro-ingredients are blended with the major ingredients.

Typically the addition of ingredients that are high in starch are utilized to further improve pellet quality and stability. Normal additions of wheat flour or tapioca flour range from 5% to 20%. The addition of other starch bearing ingredients is also beneficial.

Once the feed ingredients and micro-ingredients are blended in the horizontal or vertical mixer, another grinding stage is required. This grinding systems needs to reduce the mixed ingredient particle size to 40 to 60 mesh (.425 mm to .250 mm). In order to achieve this, a multiple impact high efficiency hammer mill with an air-assist system is recommended, or a micropulverizer grinder. If possible, it is desirable to have a mixing stage post-grinding where vitamins can be added to avoid grinding and subsequent destruction. If this second grinding phase is not performed, additional starch ingredients will be required; even then, the pellet stability in water will be less than feeds made with double ground ingredients.

Finely ground ingredients have a very high density, and have a tendency to bridge, or hang-up in bins.

MOISTURE AND HEAT

In order to obtain high quality, water stable shrimp feeds, good pellet mill conditioning is very important. For best results, a double feed conditioner system is preferred. The first conditioner is usually an additional chamber, or elongation of the original; and is a steam jacketed conditioner (with or without live steam) used to preheat the feed. The objective of this first conditioner is to heat up the ingredients and initiate gelatinization of starches by providing more heat treatment time, and moisture optionally. Temperatures of the feed in the first conditioning chamber typically range from 65°C to 75°C (149°C to 167°F). Feed ingredients entering into the second conditioner should be a minimum of 12% in moisture. If the ingredients are lower in moisture, adding water into the first conditioner is recommended. Live steam is injected into the second steam conditioning chamber, directly onto the feed particles. This conditioner consists of the normal pelleting unit supplied with the pellet mill. Pelletting temperatures in the second conditioner range from 90°F to 100°C (194° to 212°F).

Organic Chemical Solutions L.L.C.

P.O. Box 1869

Gainesville, GA 30506, U.S.A.

Phone 770-536-8885; Fax 770-536-8725

E mail us at info@oscllc.net; visit us at www.oscllc.net

The steam pressure typically ranges from 1.4 to 3.1 Bar (20 to 45 psi). It is important that all steam controls, temperature gauges, dry feeder controllers, and amperage meters be in working order, readily accessible by the pellet mill operator. These factors allow the operator the greatest control during the start-up, and obtaining the highest efficiency and the best operating conditions for each particular formulation.

PELLET DIE AND ROLLERS

It is important to have the pellet die and rollers adjusted properly. Also check to make sure the pellet die is not partially plugged. This can cause major production problems. Also a worn-out pellet die or roller will produce poor quality pellets and low production rates.

COOLING

Processed pellets should be cooled properly. Any excessive handling of hot pellets will cause severe breakage prior to cooling. Pellets should be cooled to 5°C (10°F) above ambient temperature. The cooling process removes excess moisture and heat, reducing mold problems and increasing the toughness of the pellet. It is important to make sure the cooler is operating properly. The fan, air inlets and outlets, and trays should be free of fines buildup. Check to insure the pellet retention time in the cooler is adjusted to bring hot pellet temperature down to 5° C above ambient temperature.

FAT APPLICATION

When fat or oil is required in the formulation, special care should be used in its application. The addition of fat or oil added to the feed mixer prior to pelleting should not exceed 2% in order to make a pellet. Ideally the fat level should be limited to not more than 1%. This level will aid in the production of the pellets, while not dramatically destroy the pellet quality. If additional fat or oil is required, it is best to apply it in a fat coat after pelleting. Low levels of fat added prior to the second stage of grinding may cause plugging of the grinder screen. Additional fat or oil may either be applied onto the hot pellets at the die, or applied to the cooled pellets after the shaker table (fines separation).

Organic Chemical Solutions L.L.C.
P.O. Box 1869
Gainesville, GA 30506, U.S.A.
Phone 770-536-8885; Fax 770-536-8725
E mail us at info@oscllc.net; visit us at www.oscllc.net

DEMONSTRATION REPORT

PELLET MILL TESTS

DATE:

ACCOUNT

LOCATION

PELLET MILL: Type & Size

Condition (of die & rolls)

Die Specifications

Cooler Specifications

Steam Pressure

FORMULA: Type No. Molasses Amt FAT mt.....

TIME: Start Start

Stop Stop

Total Time Total Time

OBSERVATIONS TEST 1 TEST

2_____

Binder - lbs/ton_____

Test Size/Tons_____

Steam Chamber Temp._____

Hot Pellet Temp._____

Friction Heat_____

Amperage Range_____

Average Amperage_____

Feeder Speed_____

Prod. Tons/Hour_____

Prod.% Improvement_____

Pellet Durability_____

Fines _____

PDI & Improvement_____

COMMENTS:_____

Organic Chemical Solutions L.L.C.

P.O. Box 1869

Gainesville, GA 30506, U.S.A.

Phone 770-536-8885; Fax 770-536-8725

E mail us at info@oscllc.net; visit us at www.oscllc.net

ADVANTAGES OF USING CHEMIPPELL PELLET BINDER COMBINED WITH VEGETABLE STARCHES

A. Large quantity of starch in the formulation limits space for other ingredients.

When CHEMIPPELL pellet binder is added to the formulation, smaller amounts of starch can be used, therefore higher levels of protein can be added to the formulation. Normally 25% protein is added but there is a tendency to increase protein levels.

B. There is a synergism between use of the starch mixed with CHEMIPPELL pellet binder.

Starches are always needed in the formulation. It is beneficial to add CHEMIPPELL pellet binder thereby increasing the longevity of the pellets.

C. Mixing starches with other natural or mineral pellet binders will not give you the longevity that CHEMIPPELL can give you.

With time pellets in the water will swell. With CHEMIPPELL the swelling process will take place but the pellet mass will be held together in a spongy type of formation so that it can be consumed. With other binders, pellets will swell and then disintegrate, therefore lowering the feed conversion.

D. CHEMIPPELL should be used at .65% combined with an adequate amount of starch.

At this rate pellet longevity will be enhanced. You can expect between 6 to 8 hours of pellet life.

Organic Chemical Solutions L.L.C.
P.O. Box 1869
Gainesville, GA 30506, U.S.A.
Phone 770-536-8885; Fax 770-536-8725
E mail us at info@oscllc.net; visit us at www.oscllc.net

E. CHEMPELL will reduce your overall pellet binding cost.

By improving conversion through less waste and better pellet quality and using a more effective binding active ingredient at a lower dose and cost.

F. CHEMPELL affords the advantage of a low inclusion rate.

ADVANTAGES OF USING CHEMPELL WITH STARCHES

Low inclusion rates mean less freight cost, less warehouse space required, less handling to incorporate the binder into the feed formula.

G. CHEMPELL affords you better quality consistency and superior technical results.

Problems related with varying grades of ingredient quality are difficult to overcome with conventional pellet binders. CHEMPELL is able to overcome many of the ingredients inconsistencies, quality variation, and many times variation of particle size which greatly hinder the pelleting process.

PELLET BINDER FOR FISH FEED OR FEED MANUFACTURING PURPOSES

INGREDIENTS: Polymethylcarbamide, and silicon dioxide

GUARANTEE:

FREE FORMALDEHYDE	0.3-0.5% (MAXIMUM)
MOISTURE	2.0% (MAXIMUM)

USE DIRECTIONS: For the manufacture of fish feed add CHEMPELL at the rate of 2 to 3 kilograms per metric tone of feed to be pelleted. This product is for use as a pelleting aid in amounts not exceeding 0.4 percent of the finished pellets. Consult the Compendium of Medicating Ingredient Brochure for acceptable drug compatibilities with this product.

CAUTION: Avoid contact with skin and eyes. Avoid breathing dust. Close bag after each use. Material safety data sheet available upon request.

STORE IN COOL DRY PLACE

"CHEMPELL"

**PELLET BINDER FOR FISH & SHRIMP FEEDS
FOR MANUFACTURING USE**

INGREDIENTS:

Polymethylcarbamide sodium sulfate Vegetable oil and silicon dioxide

ANALYSIS:

Polymethylcarbamide 98.5%

TRACE INGREDIENTS:

Silicon dioxide..... 1.5%

GUARANTEE:

FREE FORMALDEHYDE 0.3-0.5% (MAXIMUM)

Organic Chemical Solutions L.L.C.

P.O. Box 1869

Gainesville, GA 30506, U.S.A.

Phone 770-536-8885; Fax 770-536-8725

E mail us at info@oscllc.net; visit us at www.oscllc.net

MOISTURE 2.0% (MAXIMUM)

DIRECTIONS:

Add CHEMIPPELL at a rate of 2 to 7.5 kilograms per ton of feed to be pelleted.

Add CHEMIPPELL in a mixer or other appropriate mixing equipment; then mix thoroughly, and follow normal pelleting procedures.

NOTE:

CHEMIPPELL use levels above 7.5 kg/tonne may reduce palatability of feed.

CAUTION:

Avoid contact with skin and eyes. Avoid breathing dust. Close bag after each use.

STORE IN COOL, DRY PLACE

**FORMALDEHYDE RESIDUALS
IN SHRIMP TISSUE**

The following summary addresses the issue of formaldehyde found in shrimp tissue as reported by several experts in the field that have conducted extensive studies.

Concerns about formaldehyde residues in the tissues of shrimp grown on feeds containing CHEMIPPELL are unsubstantiated. Formaldehyde is present in low quantities in many foods, including shrimp, lobster, and fish.

It has long been accepted that formaldehyde is produced biologically during normal postmortem changes in shrimp and marine fish tissue (Sundsvold et al, 1969). This means that formaldehyde is found in shrimp tissue, even when not fed any feed containing formaldehyde binders. Formaldehyde production as a result of deterioration during processing and storage is probably due to an enzymatic reduction of trimethylamine oxide, trimethylamine, diethylamine and methylamine (Amado and Yamada, 1964, Sundsvold et al, 1971, Castell and Smith, 1973).

Results of two studies by Sills and Allen (1979) and Hose and Lightener (1980), indicate that no free formaldehyde residues were detected in penaeid shrimp tails following therapeutic amounts of formalin (24 hours at 150 ppm formalin). Formalin (an aqueous 37% to 50% solution of formaldehyde containing 15% methyl alcohol) has a long history as a chemotherapeutic in ornamental and food fish culture (Schnick & Meyer, 1979). In the culture of penaeid shrimp, formalin is gaining importance as a chemotherapeutic (Johnson et al, 1974, Schnick et al, 1979). Lightener (1977) has given a review of therapeutic uses of formalin in the treatment of various diseases of cultured penaeid shrimp. Treatment is usually very short, but frequently repetitive.

Predicted levels of formaldehyde residues in shrimp fed feeds containing 0.5% CHEMIPPELL would be only 0.11 mg/kg on a wet weight basis. Compare this level with levels found on the following chart, which lists different levels of formaldehyde found in shrimp and fish, all fed with feed containing formaldehyde binder such as

CHEMIPPELL. Note the wide range and high levels.

Organic Chemical Solutions L.L.C.
P.O. Box 1869
Gainesville, GA 30506, U.S.A.
Phone 770-536-8885; Fax 770-536-8725
E mail us at info@oscllc.net; visit us at www.oscllc.net

PALATABILITY

We recommend that CHEMIPELL be used at an inclusion level of no higher than 0.75% to prevent palatability problems, and thereby cause growth reduction.

As CHEMIPELL has a very high molecular weight, and the digestive system of the shrimp is very short, the material is not digested very thoroughly. Thus the formaldehyde does not partially convert in the body (as it does in ruminants) to form formic acid, which acts as a source of energy.

PRAWN (PERULLUS ANGULATUS)

FORMALDEHYDE

RESIDUE IN TISSUE

0 to 4 mg/kg body weight
1976, 27 (5-6), 145-8.

SOURCE OF INFORMATION

Cantoni, C.; Bianchi, M. A.; Beretta, G., Arch. Vet. Ital.

SPECIES: SQUID (TODARODES SAGITTATUS)

FORMALDEHYDE

RESIDUE IN TISSUE

11 to 30 mg/kg

SOURCE OF INFORMATION

Cantoni, C.; Bianchi, M. A.; Beretta, G., Arch. Vet. Ital.
1976, 27 (5-6), 145-8.

SPECIES: SHRIMP (PENAEUS SETIFERUS)

FORMALDEHYDE

RESIDUE IN TISSUE

0.39 mg/kg market 1
1.44 mg/kg market 2
1.33 mg/kg market 3
0.59 mg/kg market 4
0.99 mg/kg live shrimp

SOURCE OF INFORMATION

Coca-Cola Co., Corp. Research Devel. J. Agri.
Food Chem., Vol. 30, No. 3, 1981 Markets 1 thru 4
were shrimp obtained from commercial outlets.

SPECIES: COD (GADUS MACROCEPHALUS)

FORMALDEHYDE

RESIDUE IN TISSUE

20 mg/kg

SOURCE OF INFORMATION

Amano & Yamada, 1964, Bull. of Japan Society
Scientific Fisheries 30 (5): 430-435. Levels found

in stored fish.

SPECIES: ALASKA POLLOCK (THERAGRA CHALCOGRAMMA)

FORMALDEHYDE

RESIDUE IN TISSUE

30 mg/kg

SOURCE OF INFORMATION

Amano & Yamada, 1964, Bull. of Japan Society
Scientific Fisheries 30 (5): 430-435. Levels found
in stored fish.

SPECIES: JAPANESE HAKE (HEXAGRAMMOS STELLERI)

FORMALDEHYDE

RESIDUE IN TISSUE

50 mg/kg

SOURCE OF INFORMATION

Amano & Yamada, 1964, Bull. of Japan Society

Organic Chemical Solutions L.L.C.

P.O. Box 1869

Gainesville, GA 30506, U.S.A.

Phone 770-536-8885; Fax 770-536-8725

E mail us at info@oscllc.net; visit us at www.oscllc.net

Scientific Fisheries 30 (5): 430-435. Levels found in stored fish.

SPECIES: BLUE SHRIMP (PENAEUS STYLIROSTRIS)

FORMALDEHYDE

RESIDUE IN TISSUE

0 to 8.4 ppm

SOURCE OF INFORMATION

Hose & Lightmer, 1980, Aquaculture 21:197-201

BLACK COD MUSCLE

FORMALDEHYDE

RESIDUE IN TISSUE

1 to 150 mg/kg

SOURCE OF INFORMATION

Amano & Yamado, 1965. Technology of Fish utilization, Fishing News Ltd., London 73-78.

SPECIES: SHRIMP FORMED WHEN BLEACHED BY 4.5% SULFITE SOLTN

FORMALDEHYDE

RESIDUE IN TISSUE

300 ppm

SOURCE OF INFORMATION

Yoshida, Ayako; Imaida, Masami, Shokuhin Eisegaku Zasshi 1980, 21 (4), 288-93

CARCINOGENIC (Cancer-Causing) Properties

Humans are exposed to formaldehyde in minute quantities in many ways in everyday situations, such as inhalation of cigarette or wood fire smoke. Formaldehyde is classified as a probable carcinogen to humans, on the basis of animal evidence, but human data is inadequate.

Thus the U.S. government has established a threshold that workers can be exposed to formaldehyde (1 ppm in the air over an 8 hour workday, TWA, as opposed to the original 3 ppm ruling). This regulation was primarily brought about through concern for the workers at polymethylolcarbamide manufacturing sites, or workers at plywood (pressed wood factories).

The danger to pellet mill operators is exposure during processing, as heat and pressure release formaldehyde. This danger is minimal if ventilation is provided. In the south, where warmer climates prevail, it is common practice to process feeds in an open-air environment. If open windows or doors are not present, mechanical ventilation should be provided.

REFERENCE SHEET

Amano, K; Yamada, K., 1965. The biological formation of formaldehyde in cod flesh. Fishing news (Books), Ltd.; London, p 73-78.

Amano, K. and Yamada, K. 1964. A biological formation of formaldehyde in the muscle tissue and gadoid fish. Bulletin of the Japanese Society of Scientific Fisheries 30(5):430-435.

Hose, J.E., and Lightener, D.V., 1980. Aquaculture, 21:197-201.

Organic Chemical Solutions L.L.C.
P.O. Box 1869
Gainesville, GA 30506, U.S.A.
Phone 770-536-8885; Fax 770-536-8725
E mail us at info@oscllc.net; visit us at www.oscllc.net

Johnson, S.K. Parker, J.C., and Holcomb, H.W., 1974. Control of Zoothamnium on penaeid shrimp. Proc. World Maricult. Soc., 4:321-331.

Lightener, D.V., 1977. Disease Diagnosis and Control in North American Marine Aquaculture, Elsevier Scientific Publishing Co., N.Y. pp 10-77.

Schnick, R.A. and Meyer, F.P., 1978. Investigations in Fish Control, Bi, 86, U.S. Department Interior, Fish and Wildlife Service, Washington, DC, 19 pp.

Schnick, R.A., Meyer, P.P. Marking, L.L. and Bills, T.D., 1979. Proceedings Second Crustacean H. Workshop, Galveston, Texas, Texas A & M University Press, CollegeStation, Texas, pp. 245-294 TAMU-SG-79-114.

Sills, J.B. and Allen, J.L. 1979. Residues of formaldehyde undetected in fish exposed to formalin. Prog. Fish Cult., 41:67-68.

Sundsvold, O.C.: Uppstad, B.: Ferguson, G.W.; Feeley, McLachlan, T.J., Assoc. Public Anal. 1971, 9, 86.

Sundsvold, O.C.; Uppstad, B.; Ferguson, G.W.; McLachlan, T; Feeley, D. Tidsskr. Hermetikind. 1969, 55, 94.

Organic Chemical Solutions L.L.C.
P.O. Box 1869
Gainesville, GA 30506, U.S.A.
Phone 770-536-8885; Fax 770-536-8725
E mail us at info@oscllc.net; visit us at www.oscllc.net

CHEMIPPELL

MATERIAL SAFETY DATA SHEET SAFETY INFORMATION

UNITED STATES-REGULATORY STATUS

All ingredients found in CHEMIPPELL are approved for use in animal feeds by the Association of American Feed Control Officials, Inc. (AAFCO) and/or the Federal Drug Administration (FDA).

The active ingredient in CHEMIPPELL, is allowed as a pelleting aid in animal feeds. AAFCO approves the use of this ingredient as a pelleting aid in ruminant and swine feeds, at a maximum level of 1%. Please note that the species shrimp and fish are not specifically listed.

CANADA-REGULATORY STATUS

CHEMIPPELL has been registered in Canada for use in fish feeds. In addition, CHEMIPPELL is approved for use in ruminant and meat-producing poultry feeds as a pelleting aid. Maximum use level is 0.3%.

PALATABILITY

Using levels higher than 0.75% may cause palatability problems of feed. Reduced palatability may cause reduced consumption and growth.

TOXICITY - LD

SKIN RABBIT: 270 mg/kg (Formaldehyde)

ORAL RAT: 7000 mg/kg, practically non-toxic

EMISSION DATA

The U.S. government regulates the amount of exposure to formaldehyde in the air by inhalation to 1 ppm TWA over an eight hour period.

Any danger to pellet mill operators is exposure during processing, as heat and pressure release formaldehyde. This danger is minimal if ventilation is provided. In the South, where warmer climates prevail, it is common practice to process feeds in an open-air environment. If open windows or doors are not present, mechanical ventilation should be provided.

We have conducted the following safety tests to evaluate how many ppm of formaldehyde are released during processing:

PELLETING:

A shrimp feed was pelleted through a 5/32" die, at 100° C, with steam pressure at 30 psi. The feed mill used was a 100 h.p. Sprout-Waldron, producing 4 tone/hour. The feed contained 5 kg/tonne of CHEMIPPELL.

Formaldehyde in the air was monitored using a National Dräger Detector Tube System, which

Organic Chemical Solutions L.L.C.

P.O. Box 1869

Gainesville, GA 30506, U.S.A.

Phone 770-536-8885; Fax 770-536-8725

E mail us at info@oscllc.net; visit us at www.oscllc.net

utilizes a bellow pump with stroke counter and calibrated detector tubes.

PELLETING AREA DESCRIPTION:

The pellet mill was located on a second floor scaffolding, directly below 6 open windows (0.5 x 1 meter each), in a 400 m² warehouse, with one open side. Ambient temperature was 29° C.

RESULTS:

During processing, the ppm in the air varied depending on the location of the monitor. In the area measuring from the pellet mill die directly out horizontally, approximately 0.5 meter, the ppm maintained an equilibrium measurement of 1 ppm over an 8 hour period. The formaldehyde measurement was substantially less in the atmosphere away from the pellet die, ranging down to 0.2 ppm at the furthest point.

EXTRUSION:

When this same shrimp feed formula containing 5 kg/ton of CHEMIPPELL was extruded through a Wenger model X130, 4 ton an hour, at temperatures of 100° C to 120° C, formaldehyde release was much higher than on the pellet mill. Measurements of 1.5 to 2.0 ppm were recorded at the pellet discharge area of the extruder, with lower levels again recorded away from the extruder. The ventilation conditions in this test were similar to the pelleting test conditions. A sharp burning sensation in the eyes was noticed.

We then installed a 1000 cfm portable fan near the extruder, in front of a window, to put out more air. The ppm near the discharge area was measured, and the ppm had dropped to 1 ppm. Only a slight odor was present.

SECTION 1: NAME & PRODUCT

Chemical name, Trade Name & Synonyms: CHEMIPPELL™

SECTION 2: INGREDIENTS

Proprietary blend containing urea-formaldehyde resin.

HAZARDOUS INGREDIENT: OSHA PEL
Formaldehyde .75 ppm (8 hr TWA)
2 ppm (15 min STEL)

Skin-rabbit LD50:270 mg/kg

Oral-rat LD50:over 7000 mg/kg

SECTION 3: PHYSICAL DATA

Melting Range: Gradual Decomposition begins 25-

Vapor Pressure (mmHg at 20° C):Not applicable

Vapor Density: Not applicable

Solubility in water: Soluble

Specific gravity: Not applicable

Organic Chemical Solutions L.L.C.

P.O. Box 1869

Gainesville, GA 30506, U.S.A.

Phone 770-536-8885; Fax 770-536-8725

E mail us at info@oscllc.net; visit us at www.oscllc.net

Odor: Pungent

Appearance: White Powder

SECTION 4: FIRE AND EXPLOSION DATA

Flash point: N/A Flammable Limits: N/A

Extinguishing media: Carbon Dioxide, dry chemical powder.

Fire fighting protective equipment/procedure:

When thermal decomposition of material is likely, wear full protective clothing and a positive-pressure self-contained breathing apparatus.

Fire and Explosion Hazards: Dust can explode.

SECTION 5: REACTIVITY DATA

Stability (conditions to avoid): Unstable. Avoid heat.

Incompatibility (materials to avoid): Incompatible with acids.

Hazardous decomposition products: Formaldehyde.

Hazardous polymerization: May occur.

SECTION 6: HEALTH HAZARD DATA

Eye Contact: Inflammation of eyelids, eye irritation. May cause chronic sensitization of eyes.

Skin Contact: Excessive contact may cause cracking of the skin and ulceration. With prolonged contact dermatitis & chronic sensitization of skin are possible.

Inhalation: Irritation of respiratory tract, bronchitis, broncopneumonia. Avoid inhalation of dust, or breathing of vapor.

SECTION 7: FIRST AID

Eyes: Immediately flush with flowing water continuously for a minimum of 15 minutes. In all cases of overexposure contact medical personnel.

Skin: Immediately wash with soap and water following skin contact. If irritation develops, contact medical personnel.

Ingestion: Induce vomiting: In all cases of overexposure, contact medical personnel.

Inhalation: Remove individual to fresh air and warmth. In all cases of overexposure contact medical personnel.

SECTION 8: HANDLING PRECAUTIONS

VENTILATION: Local ventilation is recommended in processes or during material handling where dust could be released into the work environment. Provide sufficient ventilation to meet permissible exposure limits.

RESPIRATORY PROTECTION: A 3-M brand filter dust mask is recommended. Selection of respiratory protection is dependent upon the operation and the resulting quantity of material dust released into the work environment.

SKIN PROTECTION: Use protective clothing to minimize the possibility of skin contact. Following handling of the material wash potentially contacted skin areas with soap and water. Launder contaminated clothing prior to reuse. Rubber or plastic gloves.

EYE PROTECTION: Employee must wear dust-resistant goggles to prevent contact. Employer should provide eye-wash fountain within immediate work area for emergency use.

SECTION 9: ENVIRONMENTAL AND DISPOSAL INFORMATION

ACTION TO BE TAKEN FOR SPILLS: Dry methods of collection such as shoveling, sweeping, vacuuming are recommended, but avoid generating dust. Utilize the appropriate protective equipment listed in Section 8 during clean-up. Dispose of in approved land fill.

DISPOSAL METHOD:

Organic Chemical Solutions L.L.C.

P.O. Box 1869

Gainesville, GA 30506, U.S.A.

Phone 770-536-8885; Fax 770-536-8725

E mail us at info@oscllc.net; visit us at www.oscllc.net

Incineration or disposal at sanitary landfill site. Be sure to comply with Local, Provincial, and Federal Regulations.

SECTION 10: ADDITIONAL INFORMATION

Store in a dry place. Keep container closed to avoid moisture pick-up.

Use protective equipment in handling. Avoid breathing dust emptying container. Keep workroom free of dust, since dust can explode.

The information herein is given in good faith and believed to be accurate, but, is given without warranty, either expressed or implied and, no representation is made as to truth or accuracy of the statements made.

PROCEDURE FOR DETERMINATION OF POLYMETHILOLCARBAMIDE CONTENT IN CHEMPELL

INTRODUCTION

Following are some procedures used to determine the nitrogen content of a substance. This is the typical way of determining polymethylolcarbamide content. The nitrogen in the polymethylolcarbamide is converted to ammonia which is analyzed quantitatively. Then a back calculation is made to get the polymethylolcarbamide content. I will write down these calculations later.

There are a few things that must be noted for the use of these procedures due to their hazardous nature and not knowing the type of lab that will be doing the tests.

The Kjeldahl method* has a few dangers to note. The mercuric oxide of mercury method is toxic and environmentally unsafe in the United States and other countries so it is difficult to dispose of as a chemical waste. This is why I prefer the Gunning Method (page 88) which uses copper sulfate CuSO_4 or copper wire.

Another hazard that both procedures have is the direct addition of concentrated strong acids with concentrated strong bases releasing enough heat to cause rapid hard boiling resulting in splashing of highly corrosive materials around the flask. The Sodium Hydroxide (base) must be added slowly to the sulfuric acid digest material with gentle agitation to blend. Care must be taken to see that the reaction does not become too vigorous. Even under control this reaction can produce enough heat to burn if one were to grab the flask in the base area. Overall I would say that the gunning method is the one you want to try.

A copy of an independent lab procedure is included. It gives a step by step procedure. It also has a health and safety section.

As for the calculations I think these steps would be most useful. Once you know the amount of the 0.1 normal (N) acid used to react out the generated ammonia determine the amount of ammonia (NH_3) by multiplying the ml (milliliters) of acid with the ammonia factor listed on Pag. 94 of the "Technical Methods of Analysis" copies. Then multiply the grams of ammonia by 1.76, divide by samples weight in grams and multiply by 100 to get percentage polymethylolcarbamide content.

1. $\text{ml } 0.1 \text{ N acid} \times .001703 = \text{grams NH}_3$

2. $\frac{\text{grams NH}_3 \times 1.76 \times 100}{\text{grams sample}} = \% \text{ polymethylolcarbamide}$

Organic Chemical Solutions L.L.C.

P.O. Box 1869

Gainesville, GA 30506, U.S.A.

Phone 770-536-8885; Fax 770-536-8725

E mail us at info@oscllc.net; visit us at www.oscllc.net

NITROGEN METHOD

GENERAL ORGANIC ANALYSES

The principle of the determination of nitrogen in organic materials is its conversion into NH_3 and a determination of the amount of NH_3 so formed. The method to be employed depends upon whether or not nitrates are present. In every case a blank should be carried out to correct for the presence of small amounts of nitrogen in the reagents employed. In running the blank, employ the same amount of each reagent as is used in the determination.

In this laboratory we have found the Gunning method preferable to the Kjeldahl for most substances.

GUNNING METHOD

The apparatus used is the same as that employed in the Kjeldahl method. Place the substance to be analyzed in a 500 cc digestion flask, using 0.7- 3.5 grams according to the proportion of N. Add 10 grams of powdered K_2SO_4 or anhydrous Na_2SO_4 (use Baker's c.p. special, free from nitrogen) and 25cc. of conc. H_2SO_4 .

Add also about 0.2 gram of crystallized CuSO_4 or 0.1 gram of copper wire. Conduct the digestion exactly as in the Kjeldahl process, starting with a temperature below the boiling point and increasing the heat gradually until frothing ceases. Digest for 4 hours after the mixture is colorless, or nearly so. Do not add K_2S . Cool, dilute, add an excess of NaOH , distill and titrate as in the Kjeldahl method. In neutralizing, it is advisable to add a few drops of methyl orange or litmus indicator by which one can tell when an excess of NaOH has been added.

* A solution of 40 grams of sodium sulfide or 80 grams of sodium thiosulfate in a liter of water may be used in place of the K_2S solution.

KJELDAHL GUNNING ARNOLD METHOD

Place 0.7 - 3.5 grams of the material (according to the N content) in the digestion flask. Add 15-18 grams of powdered K_2SO_4 or anhydrous Na_2SO_4 , 1 grams of CuSO_4 or approximately 0.7 gram of HgO (or its equivalent of metallic Hg), and 25cc of conc. H_2SO_4 . Heat gently until frothing ceases, then boil briskly and continue digestion for at least 2 hours after the liquid is colorless or nearly so. Cool, dilute with about 200cc of water, add 50 cc. of K_2S solution, * make strongly alkaline with NaOH solution and complete the distillation as under the Kjeldahl method.

TECHNICAL METHODS OF ANALYSIS

1 cc. 0.1 N acid = 0.001401 gram N
 = 0.001703 gram NH_3
 = 0.01011 gram KNO_3
= 0.002604 gram $(\text{NH}_4)_2\text{O}$
= 0.008937 gram casein (N X 6.38)
= 0.007844 gram glue (N X 5.6)
= 0.008755 gram protein (N X 6.25)
= 0.007985 gram protein (N X 5.7)

Organic Chemical Solutions L.L.C.
P.O. Box 1869
Gainesville, GA 30506, U.S.A.
Phone 770-536-8885; Fax 770-536-8725
E mail us at info@oscllc.net; visit us at www.oscllc.net

NITROGEN DETERMINATION OF POLYMETHILOLCARBAMIDE

CODE: TKN,TKN DRYK, TKN MGKG\TKN, MTH

DATE: 2\21\89

REFERENCES: SMA - 16, 420B, 417E\F
(REPLACES EPA 351.2)

STORAGE: Preserve with H₂SO₄ to pH <2, refrigerate at 4°C. Store preserved up to 28 days.

RANGE: 0.2 to 400 mg\L. dilution of higher samples.

PRINCIPLE:

Organic nitrogen is converted to NH₄⁺ during digestion in the presence of sulfuric acid, potassium sulfate, and mercuric sulfate catalyst. The digestate, containing converted organic nitrogen and ammonia nitrogen is distilled from alkaline solution. Sodium thiosulfate is added with sodium hydroxide to decompose mercury-ammonia complex. Total Kjeldahl nitrogen (ammonia + organic nitrogen is determined in the distillate by ammonia electrode.

INTERFERENCES

Nitrate can cause positive or negative interference depending on the sample characteristics.

Samples high in dissolved solids or high in organics may require additional acid for proper digestion. Consult the reference if one of these conditions exists.

APPARATUS

1. Semi-micro digestion apparatus suitable for 100 ml. digestion flasks with variable heat control to 380°C.
2. Semi-micro steam distillation equipment.
3. 100 ml Kjeldahl digestion flasks.

REAGENTS

1. 6N H₂SO₄. Dilute 16.7 ml conc. H₂SO₄ to 100 ml with DI water.
2. Mercuric sulfate solution: Dissolve 8 g red mercuric oxide, HgO, in 100 ml 6N H₂SO₄.
3. Digestion reagent: Dissolve 134 g H₂SO₄ in 650 ml DI water and 200 ml conc. H₂SO₄.
Add with stirring 25 ml mercuric sulfate solution. Dilute to 1 L. Store above 20°C to avoid crystallization.
4. Sodium hydroxide-sodium thiosulfate reagent. Dissolve 500g NaOH and 25 g Na₂S₂O₃ 5H₂O in DI water and dilute to 1 L.
5. Sulfuric acid, 0.04 N. Dilute 1.1 ml conc. H₂SO₄ to 1 L with DI water.

Organic Chemical Solutions L.L.C.
P.O. Box 1869
Gainesville, GA 30506, U.S.A.
Phone 770-536-8885; Fax 770-536-8725
E mail us at info@oscllc.net; visit us at www.oscllc.net

PROCEDURE

1. Select sample volume from the following table:

EXPECTED TKN mg/L	SAMPLE VOL. ml
4-20	50
8-40	25
20-100	10
40-200	5
100-1000	1

For solid samples select a weight based on experience or best estimate. Rerun if the initial test suggests a better sample size.

2. Add sample to a 100 ml digestion flask.
3. Carefully add 10 ml digestion reagent to the sample.
4. Add 5-6 small glass beads or boiling stones to prevent bumping. Selenized granules are NOT to be used.
5. Place flask on the digestion rack with the aspirator on to eject fumes. Turn on the heat control to a setting of 3, heat to boiling and continue until the solution clears (becomes colorless or pale yellow) and copious fumes are observed. Increase heat setting to 8 and continue to digest for an additional 30 minutes.
6. Cool the sample and transfer quantitatively to a distillation flask. Use sufficient but minimal rinsing to keep the sample volume as low as possible prior to distillation. If appropriate digestion flasks are available a transfer is not required.
7. Add fresh DI water to the steam distillation reservoir and turn on the power control to a setting of 100. Steam our distillation apparatus with a distillation flask containing alkaline DI water in place for 5 minutes then vent steam.
8. Attached a 125 ml Erlenmeyer receiving flasks containing 10 ml of 0.04 N H₂SO₄ to the condenser outlet tube with the tip of the tube below the surface of the acid.
9. Attach the sample distillation flask to the preheated steam distillation apparatus. Add 10 ml of hydroxidethiosulfate reagent and rinse the entry tube with a small amount of DI water. Close the stopcock before all water drains to prevent loss of NH₃.
10. Turn on steam and control distillation rate to approx. 8 ml/min and so the contents of the receiving flasks do not bubble and the condenser remains cool to the touch. Collect 40 ml of distillate below the surface of the absorber solution. Lower the receiving flask and continue distillation 1-2 minutes to cleanse the condenser.
11. Dilute the distillate to 100 ml with DI water and determine TKN by the ammonia electrode method found in 417E/F (JHL 5330.1)

NOTE: The pH at the end of distillation must be acidic on a low TKN value will result. If the electrode response indicates an ammonia response, as evidenced by a negative mv reading prior to addition of base, the nitrogen content of the sample has exceeded the capacity of the absorbing solution. Rerun the sample at a smaller volume.

CALCULATION

1. Determine digestate N (mg/L NH₃-N) from the mv reading and the calibration curve or the standard addition result. Also determine the TKN blank in the same manner.
2. mg/L TKN = (mg N/L - blank) (100 sample ml).

Organic Chemical Solutions L.L.C.
P.O. Box 1869
Gainesville, GA 30506, U.S.A.
Phone 770-536-8885; Fax 770-536-8725
E mail us at info@oscllc.net; visit us at www.oscllc.net

3. mg/kg or mg/dry kg TKN = (mg N/L blank) (100 samples g)

QUALITY CONTROL

1. Run a blank with each set of samples.
2. Run a control sample with each set of samples.
3. Run a duplicate for every 10 samples.
4. Record QC data on appropriate sheets.

CORRECTIVE ACTION

If control results fall outside established limits, determine and correct the problem before proceeding.

Report any positive blanks to department head.

HEALTH AND SAFETY

Mercuric Sulfate May be fatal if swallowed, very toxic by inhalation, may cause irritation or burns. Avoid contact with skin, eyes, clothing. Do not breathe dust. Wash thoroughly after handling. Required protection: eye protection, lab coat or apron. Recommended protection: goggles, lab coat or apron, gloves. Contact: flush with water, remove contaminated clothing, Ingestion: induce vomiting, get medical assistance, store in secure poison area away from sun and heat. Incompatibles: strong acids.

Potassium Sulfate Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Required protection: eye protection, lab coat or apron. Contact: flush with water. Inhalation: remove to fresh air. Ingestion: give water, get medical assistance. Keep container tightly closed, store in general lab storage.

Sodium Hydroxide Corrosive. Avoid contact with eyes, skin, and clothing, Will cause severe burns. Irritating to respiratory passages. Do not breathe dust. May produce adverse mutagenic effects. Wash thoroughly after handling. Required protection eye protection, lab coat or apron.

when making solutions, add water slowly to prevent violent splattering. Extreme exothermic reaction. Prepare concentrated solutions in a hood. Contact with moisture may generate enough heat to cause surrounding material to ignite. Contact: flush with water. Ingestion: do not induce vomiting. Give large amounts of water, get medical assistance. Inhalation: remove to fresh air. Keep containers tightly closed, avoid metals, acids and moisture. Incompatibles: water, acids, chlorinated hydrocarbons, metals, organic materials.

Sodium Thiosulfate Avoid contact with skin, eyes, clothing, may cause irritation. Do not breathe dust. Wash thoroughly after handling. Required protection: eye protection, lab coat or apron. Contact: flush with water. Ingestion: give large amounts of water. Inhalation: remove to fresh air. Keep container tightly closed, store in general storage area. Incompatibles: strong acids, iodine, mercury.

Sulfuric Acid Causes severe burns. Avoid contact with eyes, skin and clothing. Do not breathe, causes damage to respiratory system. Intense exothermic reaction with water. Wash thoroughly

Organic Chemical Solutions L.L.C.
P.O. Box 1869
Gainesville, GA 30506, U.S.A.
Phone 770-536-8885; Fax 770-536-8725
E mail us at info@oscllc.net; visit us at www.oscllc.net

after handling. Required protection: eye protection, lab coat or apron. Recommended protection: goggles, lab coat or apron gloves. Contact: flush with copious amounts of water. Inhalation: remove to fresh air, Ingestion: do not induce vomiting: give water, milk or milk of magnesia. Get medical assistance. Store tightly closed container in corrosive proof lab storage, avoid heat, moisture. Incompatibles: water, strong bases.

CHEMIPPELL

PRODUCT SPECIFICATION

CHEMIPPELL is a binding and waterproofing agent developed specifically for use in fish and shrimp feeds. Supplied as a free flowing powder.

CHEMIPPELL consists of suitable mineral components and mineral oil for dust control.

CHEMIPPELL liquefies in the pelleting or extrusion process and upon cooling produces a hard water resistant feed.

SPECIFICATIONS:

Appearance	White free flowing powder
Moisture content	2% max.
Bulk density	0.5 - 04.6
Retention in 200 mesh	10% max.
Solubility - Dilutable to	20% N.W.
Viscosity (50% in water)	100 - 300 cps.
pH	5.5 - 8.0

PACKING: 25 kg multiwall paper bag or 50 Kg/ hard cardboard drum with polyethylene liner.

STORAGE: Store in a cool dry place. Excessive heat and moisture can cause caking.

INGREDIENTS: Polymethylolcarbamide and other absorbents, reservatives and dust controlling agents.

GUARANTEE:

NITROGEN	25%
FREE FORMALDEHYDE	0.3-0.5% (MAX)
MOISTURE	2.0% (MAX)

USE & DIRECTIONS:

Fish Feed----- 2 to 5 kgs./t

Shrimp feed----- 5 to 7.5 kgs./to

Animal feed-----1 to 2 kgs./ton

For the manufacture of shrimp feed, add CHEMIPPELL at the rate of 5 to 7.5 Kilograms per metric ton of feed to be pelleted. Use level above 7.5 kgs. per metric ton may reduce palatability.

CAUTION AVOID CONTACT WITH SKIN AND EYES. AVOID BREATHING DUST. CLOSE BAG AFTER EACH USE.

Thank you for your interest in CHEMIPPELL.

For further information please contact your authorized area dealer, or Organic Chemical Solutions L.L.C. Inc.

Organic Chemical Solutions L.L.C.

P.O. Box 1869

Gainesville, GA 30506, U.S.A.

Phone 770-536-8885; Fax 770-536-8725

E mail us at info@oscllc.net; visit us at www.oscllc.net

Diversified Nutri-Agri Technologies
130-C John Morrow Parkway 220
Gainesville, Ga. 30501, U.S.A.
Tel # 770-531-1309 ext 131, Fax# 770-234-6283

We look forward to be of service.

Organic Chemical Solutions L.L.C.
P.O. Box 1869
Gainesville, GA 30506, U.S.A.
Phone 770-536-8885; Fax 770-536-8725
E mail us at info@oscllc.net; visit us at www.oscllc.net