A METHYL SOYA-BASED CLEANER AND CORROSION INHIBITOR SOLUTION

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GreenChem 2000
4th Annual Green Chemistry and Engineering Conference
June 27 - 29, 2000
Washington, D.C.

Background

- Increased regulations on traditional solvents lead to need for alternative solvents
- Soybean oil and methyl esters - renewable, natural resource
- Safer than solvents, non-flammable and easier / more economical to dispose of

Introduction

- Methyl soya - effective as solvent in removing oil and grease
- Excellent level of lubricity - good for formulation of lubrication oils and cutting oils
- New products: lubricating oil, cutting fluid, rust preventative, cleaner / degreaser

Methyl Soya-based Cutting Fluid

- Multi-functional water-soluble fluid with good lubricity and corrosion protection
- Based on biodegradable additives and methyl soya
- Excellent anti-wear and extreme pressure properties

Testing Results

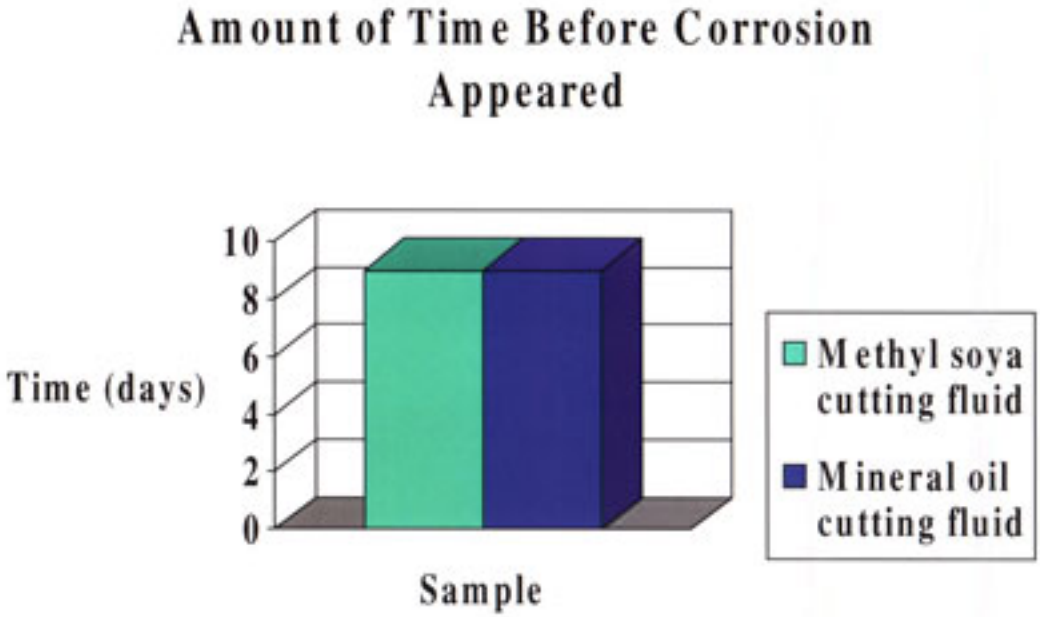
Good level of lubricity according to the Falex Test (ASTM D-3233):

Falex Pin and VEE Block Wear Test (ASTM D-2670)

Conditions:

Run in / 5 min.	350 lbs (159 kg)
Gage Load / 15 min.	900 lbs (408 kg)
Total Teeth Wear	17 (2.5% solution); 10 (5% solution)
Seizure (Yes / No)	No (2.5% solution); No (5% solution)

- Humidity Test (ASTM D-1748):2.5 % Cutting Solution



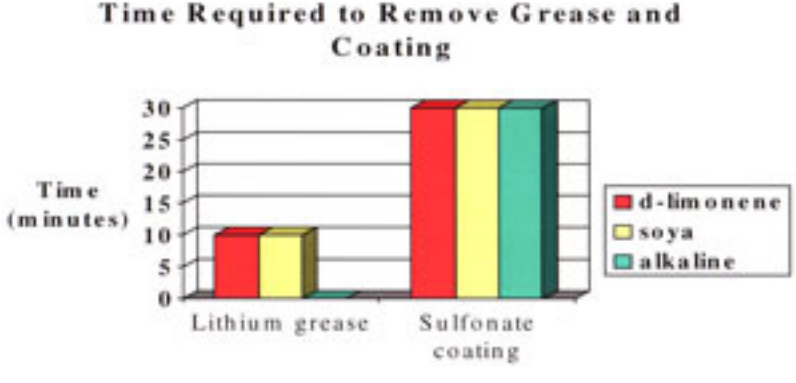
Cast Iron Chip Test (ASTM D-4627):

Soya product: passes at 2.5% and 5%

Mineral oil product: passes at 2.5% and 5%

Methyl Soya-based Cleaner / Degreaser

- Based on biodegradable raw materials
- Good corrosion protection during and after cleaning process; provides protection for steel, aluminum and copper (at 50%)
- Cleaning Properties: Immersion



- Adhesion is not affected by the cleaning process
- Splitter testing of Soya cleaner: ability of the cleaner to split oil was evaluated

  Soya cleaner is a splitter at 20% and 50%; this property allows the oil to be separated from the cleaner and the cleaning solution to be re-used

- Non-flammable; advantageous over d-limonene cleaners
- New technology: compressed air-propelled aerosol spray can
- Safer to ship and store
- Little or no environmental impact

Methyl Soya-based Lubricant

- For use in a variety of operations to reduce friction and wear on parts
- Environmentally friendly, biodegradable, non-toxic
- Replaces hazardous mineral oil
- Good lubricity

Falex testing and the 4-Ball Wear Test

4-ball Wear Test (ASTM D-4172)

Average Wear Sear Diameter, mm	0.26

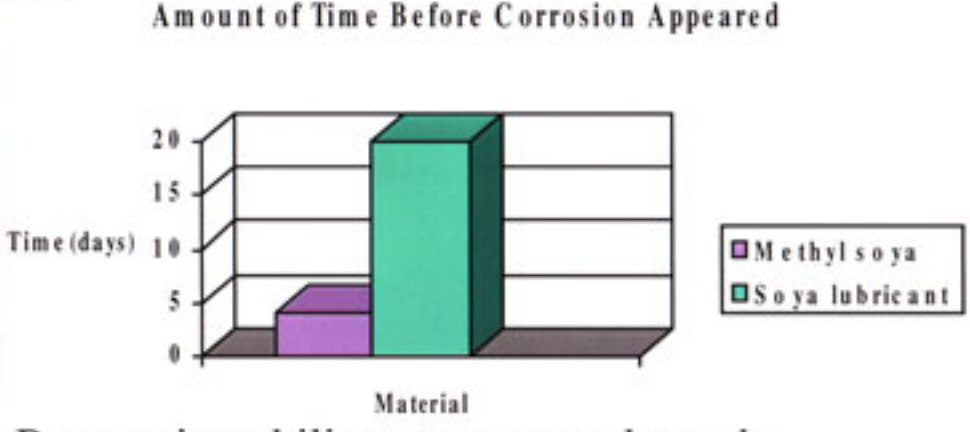
Falex Pin and VEE Block Wear Test (ASTM D-2670)

Conditions:

Run in / 5 min.	350 lbs (159 kg)
Gage Load / 15 min.	900 lbs (408 kg)
Total Teeth Wear	2
Seizure (Yes / No)	No

- Contains vapor corrosion inhibitor (VCI) which prevents corrosion in difficult-to-reach areas in casting and stamping

  Humidity Chamber (ASTM D-1748): Carbon Steel

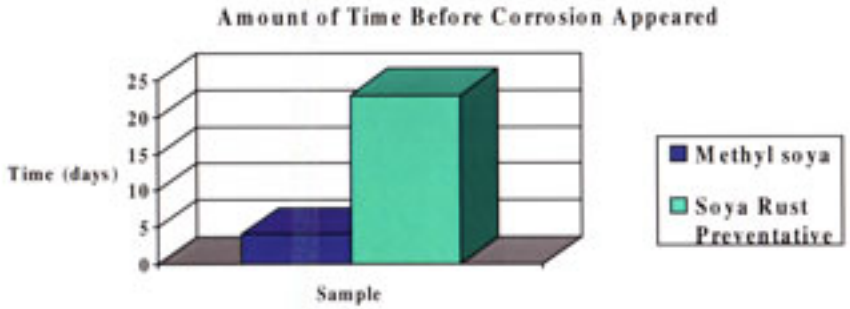


- Penetrating ability: penetrates through corrosion to loosen frozen and rusty parts

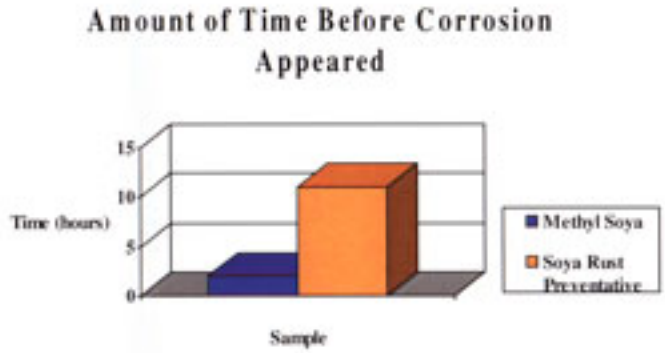
Methyl Soya-based Rust Preventative

- Universal protection for a wide variety of applications
- Replaces similar products based on mineral oil or flammable solvents
- Excellent lubricity
- Good penetrating property - loosens frozen and rusty parts
- Provides excellent anti-corrosion protection in high humidity atmosphere and in chloride-containing environments
- Not aggressive to aluminum or copper

Humidity Chamber (ASTM D-1748):Carbon Steel



Salt-Spray Chamber (ASTM B-117): Carbon Steel



Discussion

- Soybean oil / methyl esters - good lubricity and solvency
- Replacement for many solvents or oils
- Increased regulations and environmental concerns
- Proposal in fiscal budget for 2001 - more than $240 million for R&D of bio-based products
- President Clinton - set goal of tripling U.S. use of bio-based products and bio-energy by 2010

- Support from AURI and MN Soybean Research and Promotion Council