PALM-BASED CORROSION INHIBITOR: Palm16B MetPro

NOOR KHAIRIN MOHD; YEONG SHOOT KIAN and ZAINAB IDRIS

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The technology highlights the potential of oleochemical derivatives Palm 16B MetPro as corrosion inhibitor. We convert palm fatty acid into new fatty nitrogen compound. In general, corrosion inhibitor is used to control or reduce corrosion rate of metals. Corrosion inhibitors are widely used in industrial processes such as acid pickling, cooling system, acid descaling and acidising process for oil and gas wells. In addition, it is also incorporated in coolants, paints, fuels, hydraulic fluids, engine oils and various fluids for vehicles and machines.

The inhibitor performs through a simple concept of coordination chemistry. These compounds possessed a polar head group and a hydrophobic tail. The polar head group of the inhibitor molecule adsorb onto a metal surface and displaces water molecule. As a result, with the hydrophobic tail of the inhibitor molecules sticking out away from the metal surfaces form a protective layer on the metallic surface (Keles *et al.*, 2015; Mohd *et al.*, 2017).

POTENTIAL APPLICATION

Palm 16B MetPro is suitable for corrosion inhibitor in acidic environment.

METHODOLOGY

Generally, the technical process for preparing Palm 16B MetPro involves three main steps as illustrated in *Figure 1*.

NOVELTY

The process is a non-catalytic reaction producing >95% pure Palm 16B MetPro within 2 hr. The process has been filed for patent (PI 2014003629).

ADVANTAGES

- Cheaper production cost
- Uses renewable resources
- Comparable with other product in market

POTENTIAL MARKET

The global corrosion inhibiting agent market was worth USD 5.2 billion in 2012 and the market was predicted to reach USD 7.14 billion in 2019. The demand for organic inhibitors has gradually increased from 3.0 million tonnes since 2012 and projected to grow to 4.5 million tonnes in 2020 (Transparency Market Research, 2015).

ECONOMIC ANALYSIS

An investment of RM 1.19 million for a production capacity of 480 t yr^{-1} shall provide the following economic benefits:

NPV @ 10%	:	RM 4.0 million.
IRR	:	55.08%.
Discounted payback period	:	2.9 yr.
Discounted BC ratio	:	1.16.

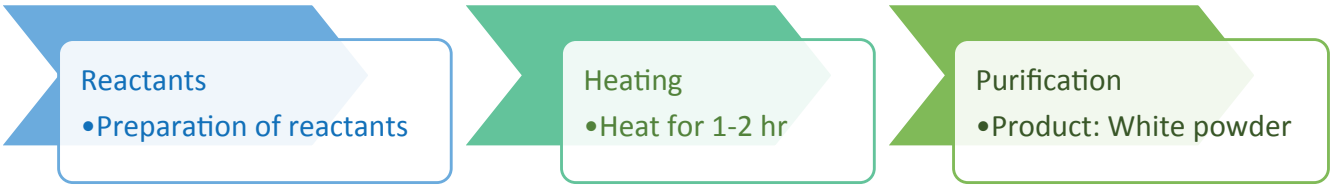

Figure 1. General process of preparing Palm 16B MetPro.

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Head of Corporate Implementation and Consultancy Unit, Malaysian Palm Oil Board. 6, Persiaran Institusi, Bandar Baru Bangi, 43000 Kajang, Selangor, Malaysia.
Tel: 03-8769 4574 Fax: 03-8926 1337 E-mail: tot@mpob.gov.my Website: www.mpob.gov.my

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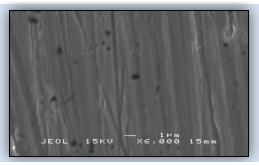
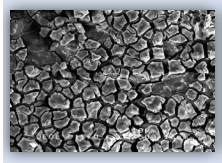
PERFORMANCE



Caption:
Finely polished mild steel.

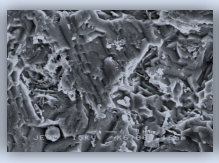
Remark:
Visible of vertical scratch lines that was due to polishing.

The MS coupons were subjected to 30-day immersion test



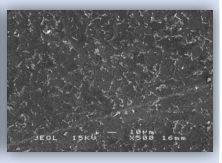
Caption:
Mild steel in HCl **without inhibitor (Blank)**.

Remark:
- Rough surface.
- The surface suffers from severe corrosion.
- Uniform flake-type corrosion products formed on the mild steel surface.



Caption:
Mild steel in HCl **with commercial inhibitor**.

Remark:
- Rough surface.
- The mild steel surface suffers from pit corrosion.



Caption:
Mild steel in HCl with **Palm 16B MetPro**.

Remark:
- Smooth surface.
- Invisible of scratch lines associates with formation of protective layer.
- No corrosion products are observed.

CONCLUSION

This new oleo derivative offers an opportunity for industry members to develop new product from renewable resources.

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For more information, kindly contact:

Head of Corporate Implementation and Consultancy Unit, MPOB
6, Persiaran Institusi,
Bandar Baru Bangi,
43000 Kajang, Selangor, Malaysia
Tel: 03-8769 4574
Fax: 03-8926 1337
E-mail: tot@mpob.gov.my
www.mpob.gov.my