

THE OCCURRENCE OF MCD 1018 AND THE
INCIDENCE OF DILI AND HEPATITIS
ASSOCIATED WITH
LIVER OIL

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**THE CORROSION BEHAVIOR OF AISI 1018 MILD STEEL IN PRESENCE
OF PALM OLEIN AND LUBRICATING MINERAL OIL**

By

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of the requirements for the degree of
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PROJEK PENYELIDIKAN I DAN II**

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LIST OF ABBREVIATIONS

Abbreviation

AISI	-	American Iron and Steel Institute
C	-	Carbon
CuO ₂	-	Copper Oxide
EDAX	-	Energy Dispersive Analysis of <i>X</i> -rays
Fe	-	Iron
Fe ²⁺	-	Ferrous Ions
Fe ³⁺	-	Ferric Ions
FeO ₂	-	Ferrous Oxide [Iron (II) Oxide]
Fe ₂ O ₃	-	Ferric Oxide [Iron (III) Oxide]
Fe(OH) ₂	-	Iron Hydroxide
g	-	Gram
H ₂ O	-	Water
HCl	-	Hydrochloric Acid
KOH	-	Potassium Hydroxides
mg KOH/g	-	Milligram Potassium Hydroxides per gram
Mn	-	Manganese
ml	-	Milliliter
O ₂	-	Oxygen

Abbreviation

P	-	Phosphorus
PORIM	-	Palm Oil Research Institute of Malaysia
R	-	The Corrosion Rate of Reaction
RH	-	High Relative Humilities
S	-	Sulfur
SEM	-	Scanning Electron Microscope
SiO ₂	-	Silica
t	-	Time of the Exposure in Hour
TAN	-	Total Acid Number
TI	-	Total Immersion
WA	-	Immersion with Aeration
WB	-	Immersion with Water Containing Aeration
wt%	-	Weight of water
°C	-	Celsius
ΔG	-	Free Energy Changes
ΔH	-	Enthalpy
%	-	Percentage

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PRESTASI PENHAKISAN KELULI LEMBUT SISI 1018 DENGAN KEHADIRAN MINYAK SAYURAN DAN MINYAK PELINCIR GALIAN

ABSTRAK

Minyak berasaskan kelapa sawit dan minyak pelincir telah digunakan untuk menyelidik kelakuan pengaratan logam 'mild steel' berjenis AISI 1018 dalam keadaan yang berlainan pada suhu 150°C (misalnya i. rendaman dalam minyak sahaja, ii. rendaman dengan memperanginkan dan rendaman dengan kehadiran air dan memperanginkan) dan dengan kehadiran air dalam minyak pada suhu 60°C. Logam berkarat itu diselidik dengan menggunakan kaedah penentuan kehilangan jisim kepingan logam. Dengan penggunaan kaedah ini didapati berat susut semua logam sampel bertambah adalah bergantung kepada masa pendedahan. 'Polarized Microscope' dan 'Scanning Electron Microscope' (SEM) telah digunakan untuk menentukan benda morfologi yang hadir pada permukaan logam 'mild steel' berjenis AISI 1018. Manakala energy dispersive X-rays (EDAX) digunakan untuk mengesahkan kehadiran bahan yang mendap daripada larutan yang telah dilekatkan pada permukaan logam. Pada suhu 60°C, mendapan pada permukaan logam adalah mudah disingkirkan daripada permukaan logam. Sebaliknya, ia adalah kekal pada permukaan logam pada suhu 150°C. Keputusan EDAX menunjukkan pengoksidaan logam berlaku pada kedua-dua suhu dengan kehadiran minyak kelapa sawit dan minyak pelincir. Manakala bawah SEM lubang kecil dapat diperhatikan pada logam yang rendam dalam 'Used Mineral Oil'.

ABSTRACT

The corrosion behavior of AISI 1018 mild steel in presence of palm olein, synthetic palm oil, mineral oil and used mineral oil was investigated. Metal coupons were subjected to different environment conditions such as i. total immersion, ii. immersion with aeration and iii. immersion with water containing aeration. The test temperatures were 60°C and 150°C. The weight change measurement was used to determine the corrosion rate. Polarized microscope and scanning electron microscope (SEM) were used to determine scale morphologies of mild steel surface. Precipitate formed on the mild steel surface were detected using energy dispersive X-rays (EDAX). The weight lost of all coupons increased with exposure period. At the temperature of 60°C, the deposits formed on the mild steel were easily removed from metal surface, while the deposits film was much more adherent for 150°C case. Referring to EDAX results, it was found that the deposits film of mild steel in presence of used mineral lubricating oil and palm olein were consist largely of oxidized metal at both temperatures. From SEM microphotograph, severe pitting was observed for metals immersed in used mineral oil.