해상용 폐윤활유의 열화특성 연구

안수현*† · 이영호** · 송인철** · 여영화** · 김대일**
*, ** 해양경비안전교육원 해양경비안전연구센터

A study on Deterioration Characteristics of used marine lubcricating oils

Su Hyun Ahn*† · Young Ho Lee** · In Chul Song** · Young Hwa Yeo** · Dae il Kim**
*, ** Korea Coast Guard Academy and Korea Coast Guard Research Center

Key Words : Lubricating oil, deterioration, oxidation, Brookfield Viscometer, Thermogravimetric Analyzer, absolute viscosity, thermal stability

Ⅰ. Introduction

Objective of the study

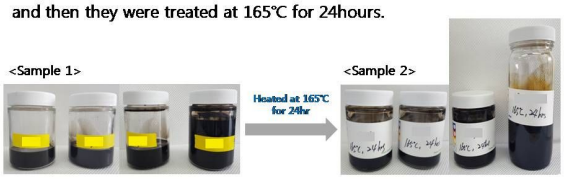
- This study describes deterioration characteristics that lubricating oil can have as it is used at a harsh condition like high temperature in an engine.
  - Thermal behavior and viscosity change of the lubricants were evaluated using TGA and Brookfield Viscometer.

⇒ Oil thermal monitoring was conducted for prevention from malfunction, improvement of durability and effective management of vessel engines.

Ⅱ. Experiments

Test Apparatus

- Reference is a new lubricating oil, and test samples are provided from KCG vessels; 4 samples(100T 1, 500T 1, 3000T 2)
  - The oils are marine diesel engine oils with SAE 30 (Single-grade oil)
  - The first samples are what have been used in main vessel engines, and then they were treated at 165℃ for 24hours.

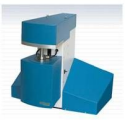


Ⅱ. Experiments

Test Procedures

- Brookfield Viscometer, a rotary viscometer was used to measure absolute viscosity and shear stress of the oils according to shear rate.
  - With temperature range from 0℃ to 80℃

- Thermal stability of oils was evaluated by Thermogravimetric Analyzer.
  - SCINCO TGA-N1000 with high sensitivity(micro balance, 0.1ug) and water cooling system
  - Materials were heated from 25℃ to 500℃ at a rate of 15℃/min in an inert atmosphere(N2, 20mL/min), and weighted 15-20mg.
  - The tests were repeated for three times to improve their accuracy.



Ⅳ. Conclusion

Conclusion

- As the lubricating oil is deteriorated, its thermal stability and absolute viscosity can be gradually decreased.
  - TGA curve can shift to the right side after fuel is dilluted to the oil on a heating condition.
  - Absolute viscosity of the lubricating oil can be lower than new one and changed after heat treat or oxidation.
- A study on oil deterioration monitoring according to operation time of vessel engine will be needed.

† Corresponding Author : ahnsh7@korea.kr, 041-640-2671