

Accepted Manuscript

Title: Surface tension measurement of oil/refrigerant mixture by maximum bubble pressure method

Author: Mitsuhiro Fukuta, Junki Sumiyama, Masaaki Motozawa, Tadashi Yanagisawa

PII: S0140-7007(16)30284-5

DOI: <http://dx.doi.org/doi: 10.1016/j.ijrefrig.2016.09.004>

Reference: IJIR 3418

To appear in: *International Journal of Refrigeration*

Received date: 22-5-2016

Revised date: 24-8-2016

Accepted date: 5-9-2016

Please cite this article as: Mitsuhiro Fukuta, Junki Sumiyama, Masaaki Motozawa, Tadashi Yanagisawa, Surface tension measurement of oil/refrigerant mixture by maximum bubble pressure method, *International Journal of Refrigeration* (2016), <http://dx.doi.org/doi: 10.1016/j.ijrefrig.2016.09.004>.

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



Surface tension measurement of oil/refrigerant mixture

by maximum bubble pressure method

Mitsuhiro FUKUTA*, Junki SUMIYAMA**, Masaaki MOTOZAWA*, Tadashi YANAGISAWA*

*Department of Mechanical Engineering, Shizuoka University, Hamamatsu, Shizuoka, 432-8561, Japan

TEL/FAX +81-53-478-1054

E-mail: fukuta.mitsuhiro@shizuoka.ac.jp

**Graduate school of Engineering, Shizuoka University, Hamamatsu, Shizuoka, 432-8561, Japan

Highlights

- The surface tension of oil/refrigerant mixture was measured at pressurized condition.
- The density of the PAG/CO₂ mixture shows little change with CO₂ concentration.
- The surface tension of the PAG/CO₂ mixture sharply decreases with CO₂ dissolution.
- The correlation equation of the surface tension of the PAG/CO₂ mixture was proposed.
- The surface tension of the mixture at 100 °C and 10 MPa is estimated as 14.6 mN m⁻¹.

Lubrication oil used in refrigerant compressors forms oil mist in the compressor shell. Some of the oil mist is discharged into a refrigeration cycle with refrigerant and causes degradation of heat transfer in heat exchangers. Since the generation of the oil mist is related to the Weber number, it is necessary to measure the surface tension of the oil/refrigerant mixture before discussing the oil mist generation in the compressor. In this study, the maximum bubble pressure method was adapted to measure the surface tension of PAG (polyalkylene glycol) oil/CO₂ mixture. The density of the mixture needed for the measurement was also carried out. It was found that the surface tension of PAG/CO₂ mixture sharply decreases with an increase in the concentration of the refrigerant in the mixture. The surface tension of the mixture under 10 MPa and 100 °C is estimated to be 14.6 mN m⁻¹ by an extrapolation.

Keywords: Oil mist, Weber number, Surface tension, Oil/refrigerant mixture, Maximum bubble pressure method

Download English Version:

<https://daneshyari.com/en/article/5017210>

Download Persian Version:

<https://daneshyari.com/article/5017210>

[Daneshyari.com](https://daneshyari.com)