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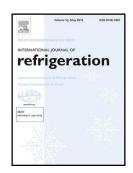
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Surface tension measurement of oil/refrigerant mixture

by maximum bubble pressure method

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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

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