Heat transfer fluids for optimal year-round operation of solar thermal systems in Central Europe

Šimonová, L.; Hylský, J.; Frk, M.; Šubarda, J.

Department of Electrical and Electronic Technology,
Faculty of electrical engineering and communication, Brno University of Technology, Czech Republic

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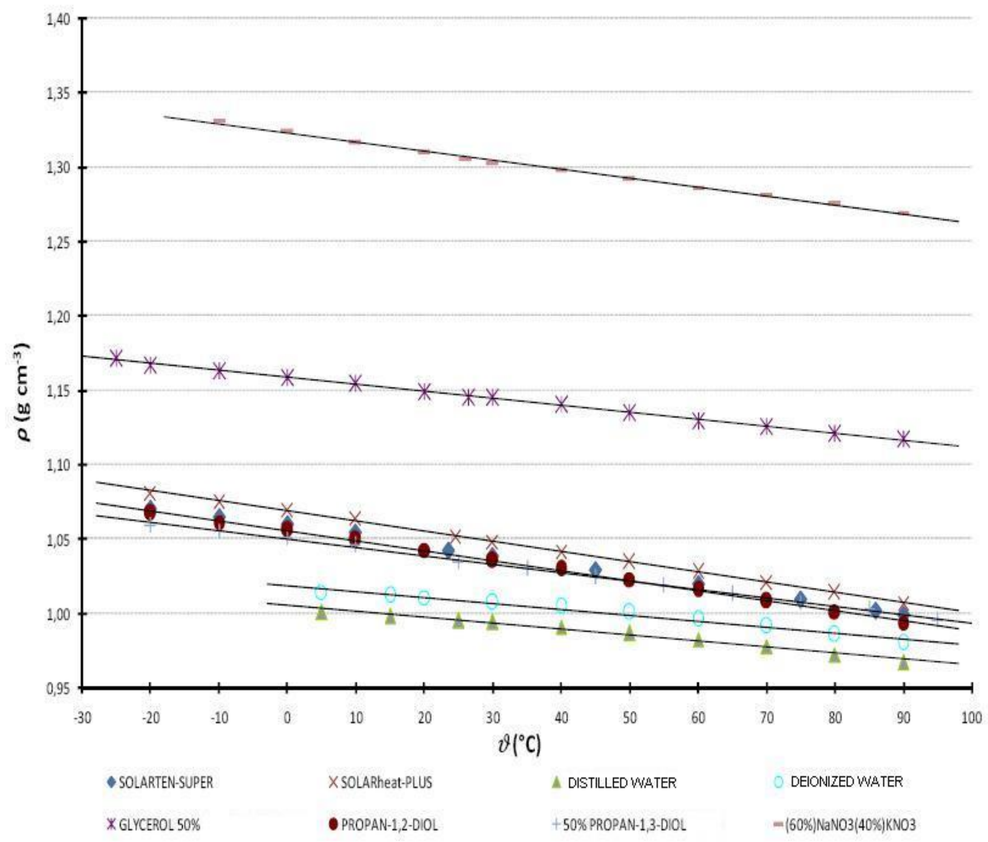
Abstract

In our work, we focused on the problems of heat transfer fluids, these systems are used commercially, and also to alternative heat transfer fluids, which could have the potential to succeed in solar thermal systems for optimal year-round operation.

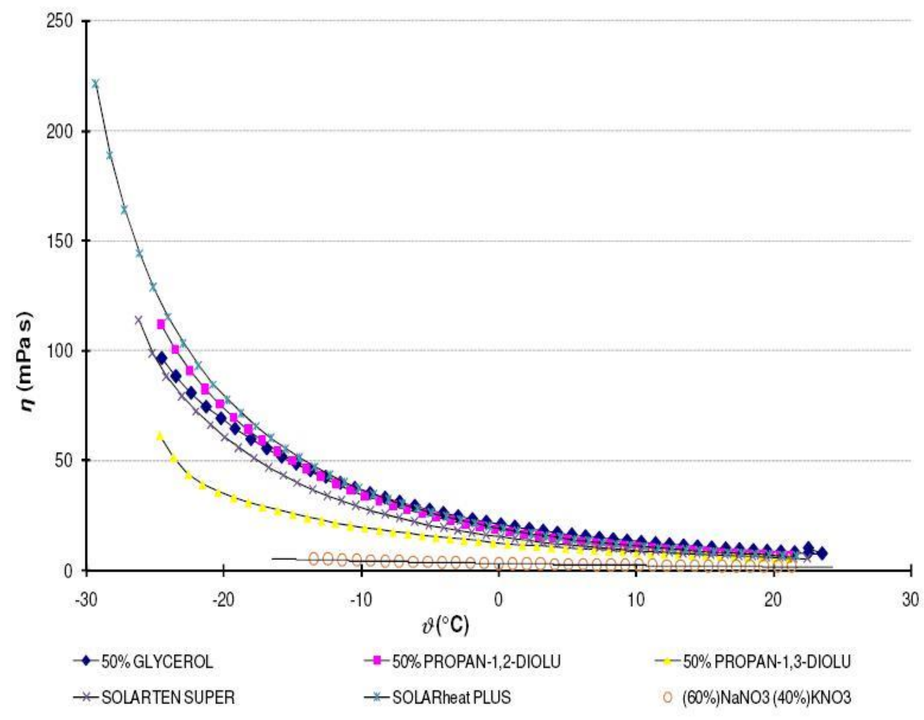
Dependence of density on temperature



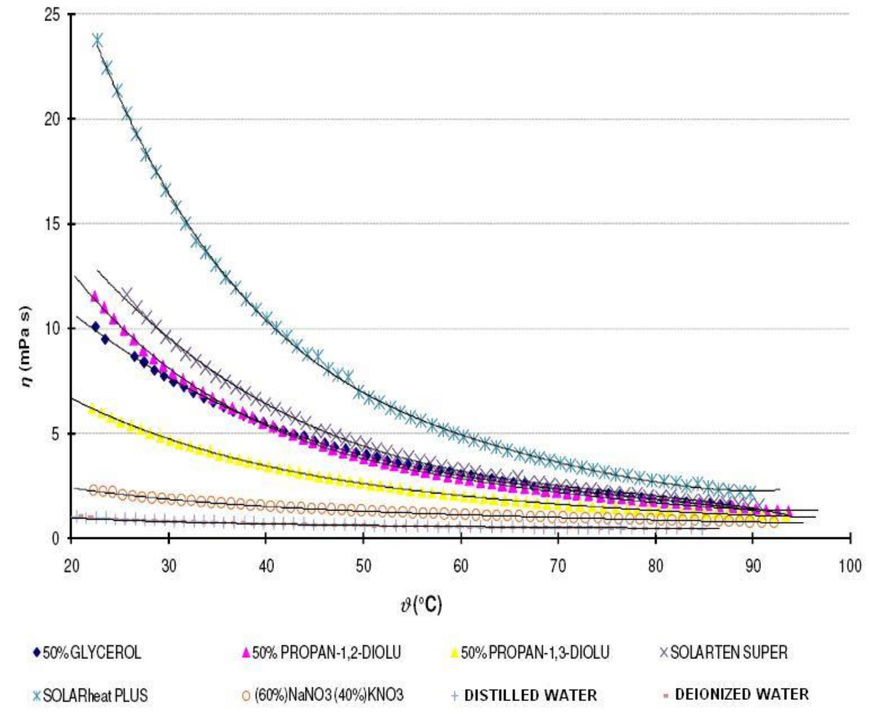
Coefficient of volume expansion

Samples	β (K^{-1})
SOLARTEN SUPER	$6{,}501*10^{-4}$
SOLARheat PLUS	$5{,}852*10^{-4}$
DEIONIZED WATER	$3{,}414*10^{-4}$
DISTILLED WATER	$3{,}504*10^{-4}$
50% GLYCEROL	$4{,}142*10^{-4}$
50% PROPAN-1,2-DIOL	$6{,}496*10^{-4}$
50% PROPAN-1,3-DIOL	$5{,}576*10^{-4}$
60%NaNO3 a 40%KNO3	$4{,}862*10^{-4}$

Dependance of dynamic viscosity at a negative temperature



Dependance of dynamic viscosity at a positive temperature



Conclusions

In these experiments, we focused on both the thermal and physical properties of these substances, and the environmental and economic aspects and all other important properties, such that the liquid should ideally have. Very interesting results were obtained in salt solution 60% $NaNO_3$ 40% KNO_3. Unfortunately, the liquid solidifies very soon. When we evaluate all requests, 50% Glycerol could be one of the most suitable liquids. All measurements and evaluation was conducted with a focus on Central Europe.

Acknowledgement

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