БУРЯТСКИЙ ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ

Shear visco-elastic properties of fluids

Bair B. Damdinov

Buryat State University, Ulan-Ude, Russia, dababa@mail.ru

Introduction

There is a wide class of fluids and multiphase media that are able to change their viscosity under the action of an external load, displaying visco-elastic relaxation properties .

Aim

Measurement of shear properties of different visco-elastic fluids.

Materials & Methods

Dynamic tests allow the elastic and viscous components of mechanical response to be distinguished and the results to be presented in the form of complex moduli of elasticity [1-3].

1. Damdinov B. et al (2010). Acoustical Physics. 56:640-643.

2. Damdinov B. et al (2011). Colloids and Surfaces A. 383:90-94.

3. Badmaev B.B, Damdinov B.B, Dembelova T.S. (2015). Bulletin of the Russian Academy of Sciences. Physics 79:1301-1305.

Results & Discussion

The paper discusses rheological method for the determination of the shear modulus and loss modulus of the liquids (Fig). Real and imaginary shear modulus and effective viscosity of the liquids and nanoparticle suspensions are measured by the method at frequency 40 kHz (Table).

Fluid	G, 10^5, Pa	tanθ	η_M, Pa s	η_T, Pa s
Ethylene glycol	0.40	0.76	0.32	0.02
Diethylene glycol	0.51	0.65	0.54	0.03
Triethylene glycol	0.74	0.44	0.64	0.03
Dibutyl phthalate	0.65	0.29	0.96	0.02
Butyl alcohol	0.94	0.22	1.77	0.03
Oleinic acid	0.76	0.23	1.38	0.03
Butyl acetic acid	0.64	0.43	0.69	0.03

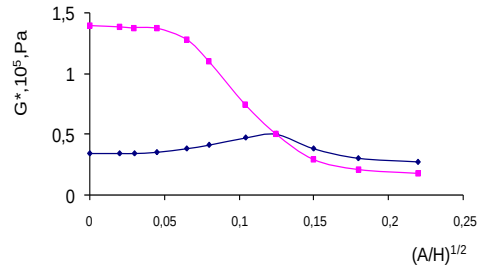

Fig. Real (red) and imaginary (blue) shear modulus of diethylene glycol

Conclusion

Tested liquids possess the constant shear modulus at small angles of shear deformation. The low-frequency relaxation process in liquids concerns to low energy processes and explained by interactions of large molecule groups (clusters)

Acknowledgements

Supported by Russian Foundation for Basic Research (grant №15-02- 08204) and Buryat State University (grant №3822).