

ABSTRACT

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Title of diploma thesis: **Rheological properties of agar-based gels for ultrasound brain phantom**

The diploma thesis deals with the evaluation of the rheological properties of agar gels on a rotational rheometer. The theoretical section contains the characterization of gels, their distribution, properties and use in pharmacy, describes agar and its characteristic properties. It also provides brief information on phantoms and describes the agar-based phantom in more detail. The principles of oscillation tests and their evaluation are described. Twelve gels with different agar concentrations were tested: a series of gels without glycerol and a series of gels with glycerol. The structure of the gels was characterized by the test Evaluating product texture using oscillatory testing and temperature stability in the range of 20 ° C to 40 ° C by the Single frequency strain controlled temperature ramp test. The viscoelastic properties of pig brain tissue were characterized by the same tests. The gel structure was confirmed in all samples tested. The stiffness expressed by the value of the complex modulus G^* increases with the agar concentration. The yield point σ' , which characterizes the stress required to disrupt the three-dimensional structure of the gel, increases with agar concentration. The reduction of the agar gel yield point by the addition of glycerol confirms the plasticizing effect of glycerol. The thermal stability of the structure of agar gels was tested in the temperature range of 20 ° C to 40 ° C at a constant frequency of 1 Hz. Gels with higher agar concentrations and gels plasticized with glycerol have higher stability. Based on the results of oscillation tests, gels of optimal composition and properties for the formulation of the phantom of the brain will be chosen.

Key words: brain phantom, agar, sol-gel transition, oscillation tests, complex modulus, yield point