

# ABSTRACT

CHARLES UNIVERSITY IN PRAGUE

FACULTY OF PHARMACY IN HRADEC KRALOVE

DEPARTMENT OF PHARMACEUTICAL TECHNOLOGY

Author: Terezia Marianna Bojnanska

Supervisor: PharmDr. Eva Snejdrova, Ph.D.

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

The diploma thesis deals with the evaluation of the viscoelastic properties of gelatin gels modified by addition of glutaraldehyde and glycerol using a rheometer with goal to verify the suitability of tested materials for their intended use as ultrasound brain phantoms. The theoretical part deals with gels in general and is focused on gelatin gels as a possible basic component of ultrasound phantoms, and the possibilities of characterizing gels as viscoelastic systems using methods of oscillatory rheometry. Gelatin gels of different concentrations (5; 7,5 and 10%) with the addition of glutaraldehyde and glycerol were characterized by complex modulus, complex viscosity, yield stress, phase angle. Temperature stability of the samples in the range from 20 to 50°C was tested. All tested gels were viscoelastic solids with a clearly defined linear-viscoelastic region, which is confirmed by phase angle values close to 0°. With the increasing concentration of gelatin the values of the complex modulus increased, increasing temperature had the opposite effect. The addition of glutaraldehyde caused an increase in the thermal stability of the gels. Gels with a gelatin content of 7.5% appeared to be the most suitable in terms of possible intended use.

**Key words:** gelatin gel, oscillation tests, elastic modulus, gel point, brain phantom