

Abstract

Emulsions, consisting of two immiscible fluids, are thermodynamically unstable systems. Emulsions find applications in the pharmaceutical, food, and cosmetic industries. Ovalbumin (OVA) is the main glycoprotein found in chicken egg white. Due to its gelation ability and emulsifying properties, it is used to prepare stable oil in water (O/W) emulsions.

The present study focuses on understanding the influence of heating, sucrose addition, and pH on OVA stabilized soyabean oil (SBO) in water emulsion gels. This study has prepared stable gel-like O/W emulsions for SBO ϕ (0.52-0.74) using varying concentrations of OVA. We observed a decrease in the volume surface average diameter of the emulsion droplets with increasing SBO ϕ and OVA concentration in optical microscopy due to the closely packed droplets. The decrease in average diameter leads to an increase in the specific surface area of absorption at the oil-water interface, enhancing the emulsion stability.

The CLSM results showed the increased droplet deformation and OVA binding capacity with increased ϕ . The emulsions' storage modulus and loss modulus also increase with ϕ in rheological studies. The most stable emulsions are formed at SBO ϕ 0.68.

Further, we studied the emulsions prepared with OVA heated for 6 and 12 hours at 80-85°C temperature. We observed an increase in the stability and viscoelastic properties compared to the native OVA SBO-water emulsions. A characterization study on OVA is done using zeta potential, circular dichroism, and SDS-page to see the effect of pH and heating of OVA.

The experiments confirmed the heat-induced aggregation and denaturation of the OVA due to the changes in the secondary structure of OVA. The DLS and AFM

results reveal the changes in the size of OVA with heating and pH. We noticed an increase in the stability and rheological properties of the emulsions formulated using 12 hours heated OVA at pH 2.6. The sucrose conjugated native OVA emulsions show excellent stability and rheological properties due to increased OVA interactions.