HJ Solar Energy

Storage modulus of starch

Overview

Small Amplitude Oscillatory Shear (SAOS) experiments are employed to determine the frequency-dependent storage modulus (G ′) and loss modulus (G ″) of the swollen starch suspensions in the linear response regime.

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The elastic or storage modulus (G ′), viscous or loss modulus (G ″), and loss tangent (tan δ) are the main parameters that describe the rheological behavior of starch. A tan δ value of <1 means a more elastic and solid material, whereas tan δ > 1 describes a more viscous and liquid material [12].

Yam (Dioscorea. sp.) is an edible starchy tuber with potential for being a commercial source of starch for industrial purposes, but yam starch is underutilized. The dynamic oscillatory and thermal properties of yam starches from sixteen varieties each of Dioscorea. rotundata, Dioscora. alata.

Abstract We present a methodology to predict the storage modulus (G ’) of starch paste due to granule swelling, given the physical properties of the starch granule and temperature history. This was tested on experimental measurements of granule size distribution and G ’ for 8% w/w suspensions of.

Amylose and amylopectin are the two major components of starch. Amylose is a linear polymer with small side branches, which are composed of glucan chains joined by α- (1–4) linkages. The molecular weight of amylose ranges from 10 5 to 10 6 Da (Hoover 2001). Amylopectin is a highly branched polymer. What are the structural properties of starch gels?

Textural properties of starch gels are very important criteria to evaluate the performance of starch in a food system. Upon retrogradation, non-waxy starch pastes transform into a firm gel of tree-dimensional networks, whereas waxy starch pastes form a soft gel consisting of aggregates .

What factors affect the clarity of starch paste after storage?

Moreover, according to Singh and Singh (2001) the way of starch paste preparation, i.e. temperature, time and the rate of heating of the starch suspension, is the factor that affects clarity of the starch paste after storage, because it determines the interactions between the polymer chains in starch.

Are starch granules crystalline or amorphous?

Starch granules are semi-crystalline, which consists of amorphous and crystalline lamellae. Amylopectin chains are packed in clusters, which contribute to the formation of these amorphous and crystalline lamellae (Srichuwong and Jane 2007). Figure 1.3 exhibits the semi-crystalline structure of starch described above.

Storage modulus of starch

[GELLING PROPERTIES OF ACID· MODIFIED STARCHES]

Amylose aggregated readily in barley and maize starch dispersions preheated at 90°C (Fig. l,curves NB and NM), the storage modulus (G') of barley starch gel being higher than that of ...

G? (Storage modulus) of starch mixtures during temperature ...

G? (Storage modulus) of starch mixtures during temperature sweep in dynamic oscillation. HARS, high-amylose rice starch; LARS, low-amylose rice starch; NPS, normal potato starch; WPS, ...

Influence of the type of starch and emulsifier on the ...

Starch, especially the linear amylose fraction, is able to form helical inclusion compounds or complexes with molecules like flavor compounds, fatty acids, ...

[Steady and dynamic shear rheology of starches from ...]

The starch pastes behaved like a pseudoplastic fluid and exhibited shear thinning fluid characteristics with values of flow behaviour ...

[Structure and Physicochemical Properties of Starch]

The storage modulus (G ?), loss modulus (G ?), and the loss tangent (tan d = ratio of G ? /G ?) are commonly used to represent the viscoelastic properties of starch.

Storage modulus

The storage modulus gives details about the amount of structure that has the capacity to store the input mechanical energy in a material. The storage modulus, which reflects the composite ...

Physicochemical properties of starch in sodium chloride solutions ...

The influences of sodium chloride (NaCl)/sucrose on starch properties as affected by starch structural characteristics are little understood. In this study, the effects were ...

Relationship between Structure and Rheology of Hydrogels for ...

At T = 65 °C, the G' and G" values start to slowly decrease, which is the final gelatinization temperature when the starch gelatinization is complete. Compared to potato starch, the ...

Methodology to predict the time-dependent storage modulus of ...

Abstract We present a methodology to predict the storage modulus (G ') of starch paste due to granule swelling, given the physical properties of the starch granule and temperature history.

Effects of salts on the freeze-thaw stability, gel strength and

Addition of the structure-making (salting-out) ions, such as F - and SO 4 2-, decreased freeze-thaw stability and increased gel strength, maximal storage modulus (G?) and maximal ...

?????????

G' ????< G''????:??? ???? ??????(??????,?????) ??????????????????????????,??? ...

Thermal Properties and Dynamic Rheological Characterization of

The storage modulus, loss modulus, damping factor and complex viscosity as a function of frequency (o) of the dioscorea gels, as well as the onset temperature (To), peak ...

Effects of processing and additives on starch physicochemical and

Starch is an important source of energy in the human diet with a variety of taste, texture, physicochemical, and organoleptic properties which is greatly influenced by ...

Physicochemical, thermal and rheological properties ...

where: G? - storage modulus [Pa]; G? - loss modulus [Pa]; o - angular frequency [rad/s]; K?, K?, n?, n? - constants. Textural properties Textural properties of ...

Rheological Properties of Native Maize, Waxy Maize, and ...

Keywords acetylation · differential scanning calorimetry · maize starch · storage modulus · viscosity · waxy maize starch Introduction Starch, obtained mostly from plants such as ...

Characterization of storage modulus of starch suspensions during ...

This study performs Stokesian dynamics simulations of suspensions of rigid spheres to determine the conditions under which swollen starch granules can be considered rigid for rheology ...

Effects of starch properties on rheological characteristics of starch

The addition of starch resulted in a decrease in cooking loss and increase in both storage modulus (G?) and loss modulus (G??). Adding starch also reduced the leaching out from ...

(PDF) Effect of Plasticizer Type and Concentration on ...

a) - (c) shows the effect of plasticizer concentration on the storage modulus of different G-, S-, and GS-plasticized SPS films. It can be ...

Recent advances in the impact of gelatinization degree on starch

Starch gelatinization involves diffusion of water through the granules, absorption of water by amorphous regions, swelling of starch granules, loss of birefringence, reduction of ...

Insights on the structure and digestibility of sweet potato starch

To unravel changes in the structures and digestibility of sweet potato starch in the roots during postharvest storage (0 to 20 days), starches are iso...

Steady and Dynamic Shear Rheological Properties of Buckwheat Starch

The magnitudes of storage modulus (G?) and loss modulus (G?) for the starch-galactomannan mixtures increased with increasing frequency (o). The dynamic moduli (G?, G?), and complex ...

Methodology to predict the time-dependent storage modulus of starch

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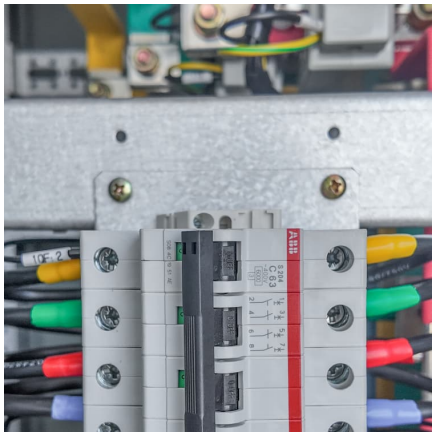

[Molecular structure in relation to swelling, ...]

PDF , On Sep 1, 2023, Chuanjie Chen and others published Molecular structure in relation to swelling, gelatinization, and rheological properties of lotus seed ...

Steady and dynamic shear rheology of sweet potato starch...

The effect of xanthan gum at different concentrations (0.2-0.6% w/w) on the rheological properties of sweet potato starch (SPS) pastes was evaluated under steady and ...

Methodology to predict the time-dependent storage modulus of starch

We present a methodology to predict the storage modulus (G') of starch paste due to granule swelling, given the physical properties of the starch granule and temperature ...

[Steady and dynamic shear rheology of starches from ...]

The starch pastes behaved like a pseudoplastic fluid and exhibited shear thinning fluid characteristics with values of flow behaviour index considerably less than 1. Both the storage and loss ...

Sol-gel transition and gelatinization kinetics of wheat starch

Rheological and optical microscopy experiments were conducted to monitor the sol-gel transition during gelatinization process of starch granules. During the gelatinization ...

[G? (Storage modulus) of starch mixtures during ...]

G? (Storage modulus) of starch mixtures during temperature sweep in dynamic oscillation. HARS, high-amylose rice starch; LARS, low-amylose rice starch; ...

[Storage modulus vs. temperature of the unreinforced ...]

Storage modulus vs. temperature of the unreinforced resin, and starch composites prepared with dry and not dry starch, and with or without asolectin.

Methodology to predict the time-dependent storage modulus of ...

We present a methodology to predict the storage modulus (G ') of starch paste due to granule swelling, given the physical properties of the starch granule and temperature ...

Suspensions of vacuum-freeze dried starch nanoparticles: Influence of

It is interesting to note that the storage modulus of the starch-only nanoparticle suspensions increased quite remarkably above 70 °C which can be explained based on the ...

Effect of natural deep eutectic solvents on thermal stability

The flow behavior index (n) of starch-NADES dispersion was closer to 1, indicated a nearly Newtonian fluid. The loss modulus (G?) value of starch-NADES dispersions ...

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