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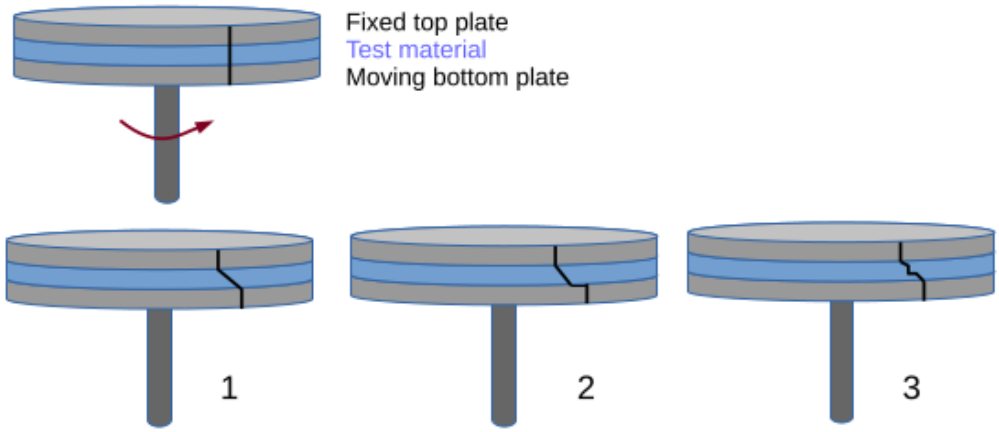
Unit 10 - Week 8

Assignment 8

The due date for submitting this assignment has passed. **Due on 2018-03-21, 23:59 IST.**

Submitted assignment

1) The following figure shows a parallel plate geometry with a test material. A mark is made in the plates/geometry. The next three snapshots show status of the mark when the bottom geometry is moved. ***1 point***



Match the following description with the snapshot shown above.

Snapshot	Description
1	a. Test with wall slip
2	b. Good test
3	c. Test with secondary flows and edge fracture

- 1-b,2-c,3-a
- 1-a,2-c,3-b
- 1-a,2-b,3-c
- 1-b,2-a,3-c

No, the answer is incorrect.
Score: 0

Accepted Answers:
1-b,2-a,3-c

Based on the data given in question 2, answer the following up to question13

2) The following graph shows storage and loss moduli for a mango jam (main components: pectin, sucrose and water) [Basu et al, Journal of Food Engineering, 2011]: ***1 point***

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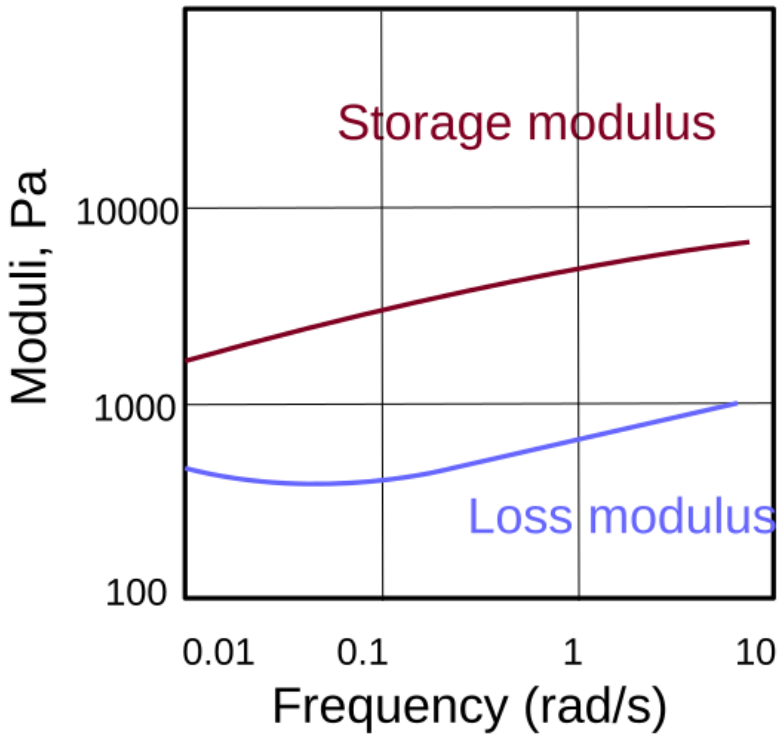


Following is the extract from the paper:
Dynamic rheological tests were carried out for selected mango jam samples(mango pulp, pH 3.4, pectin concentration = 1%) manufactured in all sucrose levels. The storage and loss moduli were strain independent up to a critical strain value (0.1), therefore all the frequency sweep experiments were carried out at strain level of 0.01. Gelation is the phenomenon responsible for the formation of the mango jam.The gelation process during jam manufacturing is attributed to alignment and stretching of the pectin polymer chains in sucrose and fruit pulp mix, resulting in more sites that become available for the formation of intermolecular hydrogen bonding. In this process, the polymeric pectin chains hydrogen bond to each other to form an interconnected three-dimensional gel network. Sucrose and water molecules are held within these three dimensional structure of pectin gel network. Due to this network, a strong elastic characteristic developed in mango jam.

Pick the correct statement/s. The reason for storage modulus being greater than the loss modulus is the network formed by

- sucrose and water molecules.
- sucrose molecules.
- pectin molecules.
- pectin and water molecules.

No, the answer is incorrect.
Score: 0

Accepted Answers:
pectin molecules.

3) Pick the correct statement/s. ***2 points***

- The mangojam sample does not show terminal viscous response.
- Since storage modulus is greater, the sample is viscous
- The mangojam is not viscoleastic, as storage and loss moduli both increase.
- The mangojam sample shows terminal elastic response.

No, the answer is incorrect.
Score: 0

Accepted Answers:
The mangojam sample does not show terminal viscous response.
The mangojam sample shows terminal elastic response.

4) Pick the correct statement/s. Based on the variation, of G' and G'', $\tan\delta$, as a function of frequency, will **2 points**

- [ ] increase and then be somewhat constant for frequencies higher than 0.1 rad/s
- [ ] decrease and then be somewhat constant for frequencies higher than 0.1 rad/s
- [ ] be in the range 0.05-0.5
- [ ] be in the range 2-20

No, the answer is incorrect.
Score: 0

Accepted Answers:
decrease and then be somewhat constant for frequencies higher than 0.1 rad/s
be in the range 0.05-0.5

5) The non-linear response of mangojam samples will be observed if strain amplitude is more than _____. (to nearest 1 decimal place) **2 points**

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 0.1

6) Based on discussion in class, and searching other resources, which of the following model may be appropriate for describing the response of mangojam? **2 points**

- Maxwell
- Standard linear solid
- Giesekus
- Weak gel

No, the answer is incorrect.
Score: 0

Accepted Answers:
Weak gel

7) At the frequency of 1 rad/s,

Complex compliance _____ $\times 10^{-4}$ Pa^{-1}. (to nearest 2 decimal place) **1 point**

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 0.50,5.00

8) At the frequency of 1 rad/s,

Storage compliance _____ $\times 10^{-4}$ Pa^{-1} (to nearest 2 decimal place)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 0.50,5.00

1 point

9) At the frequency of 1 rad/s,

Loss compliance _____ $\times 10^{-4}$ Pa^{-1} (to nearest 2 decimal place)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 0.05,0.50

1 point

10) At the frequency of 1 rad/s,

Phase angle _____ ^{o} (to nearest integer)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 1,10

1 point

11) For the data shown in above figure,

The minimum strain rate _____rad/s. (to nearest 4 decimal place)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Numeric) 0.0001

1 point

12) For the data shown in above figure,

The maximum strain rate _____rad/s. (to nearest 2 decimal place)

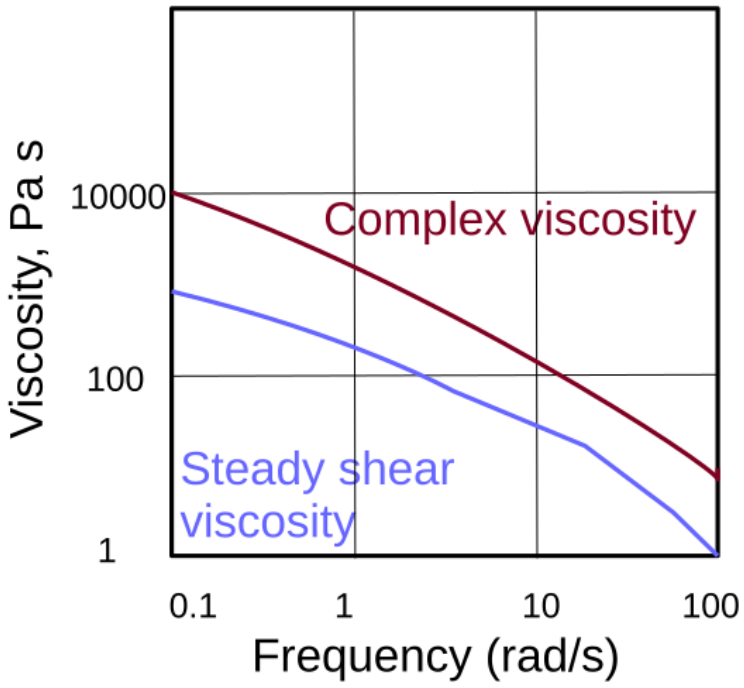
No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: Range) 0.06,0.09

1 point

13) Looking at the following graph, one can conclude that Cox-Merz rule is ***2 points***

applicable for mangojam.



- True
- False

No, the answer is incorrect.
Score: 0

Accepted Answers:
False

14) Steady shear, or rheological characterization at constant strain rate can be used for the measurement of following material function/s **2 points**

- Viscosity
- Normal stress differences
- Stress growth viscosity
- Creep

No, the answer is incorrect.
Score: 0

Accepted Answers:
Viscosity
Normal stress differences
Stress growth viscosity

15) Governing equation for the standard linear solid model for creep (τ_{yx}^0) is **2 points**

-
- $\tau_{yx}^0 = (G_1 + G_2)\lambda\dot{\gamma}_{yx}$
- $\tau_{yx}^0 = G_2\gamma_{yx} + (G_1 + G_2)\lambda\dot{\gamma}_{yx}$
- $\tau_{yx}^0 = G_2\gamma_{yx} + (G_1 + G_2)\lambda\dot{\gamma}_{yx} + (G_1 + G_2)\lambda^2\frac{\partial\dot{\gamma}_{yx}}{\partial t}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$\tau_{yx}^0 = G_2\gamma_{yx} + (G_1 + G_2)\lambda\dot{\gamma}_{yx}$

16) **2 points**

Time strain separability implies that the stress relaxation modulus $G_{\mathrm{nl}}(t, \gamma_{yx}^0)$ can be written as $G(t)h_\gamma(\gamma_{yx}^0)$

- True
- False

No, the answer is incorrect.
Score: 0

Accepted Answers:
True

Previous Page End