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NPTEL

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Courses » Rheology of Complex Materials

Announcements Course Ask a Question Progress Mentor

Unit 3 - Week 1

Course outline

Week 0 - Pre-requisites

Week 1

- Flow phenomena in complex materials and Microstructure 1
- Flow phenomena in complex materials and Microstructure 2
- Applications of rheology : mechanisms at the molecular and microscopic scales 1
- Applications of rheology : mechanisms at the molecular and microscopic scales 2
- Applications of rheology : some example material systems 1
- Quiz : Assignment 1
- Week 1 Feedback

Week 2

Week 3

Week 4

Week 5

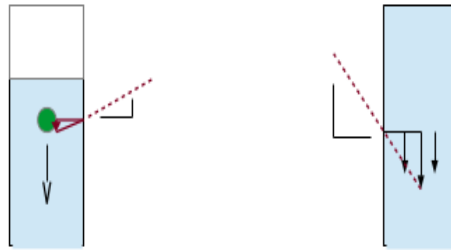
Week 6

Assignment 1

The due date for submitting this assignment has passed. **Due on 2018-02-05, 23:59 IST.**

Submitted assignment

1) Consider the flow situations of a particle falling in a fluid; and a fluid emptying out from a tube. In the figure below, which of the quantities are being depicted using the slope of dashed lines? **1 point**



- Velocity
- Shear rate
- Stress
- Strain

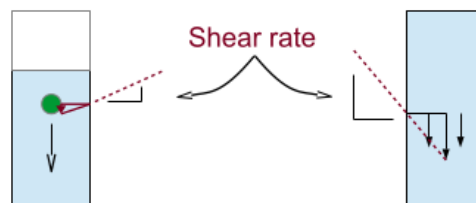
No, the answer is incorrect.

Score: 0

Accepted Answers:

Shear rate

2) Shear rate, as the figure below indicates, is **1 point**



- Relative change in velocity with respect to change in position
- Relative change in velocity with respect to change in time
- Relative change in strain with respect to change in position
- Relative change in displacement with respect to change in position

No, the answer is incorrect.

Score: 0

Accepted Answers:

Week 7

Week 8

Week 9

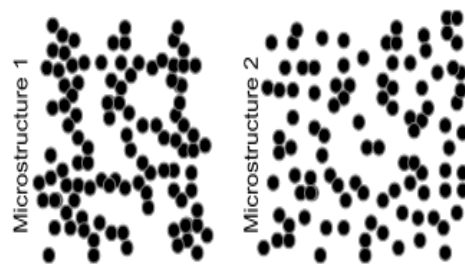
Week 10

Week 11

Week 12

DOWNLOAD
VIDEOSInteraction
SessionMATLAB:
IntroductionMATLAB: Vector
and Matrix
OperationsMATLAB:
Advanced Topics*Relative change in velocity with respect to change in position*

3) Microstructure 1 of collidal system is expected to have high viscosity due to ----- arrangement of particles.



No, the answer is incorrect.

Score: 0

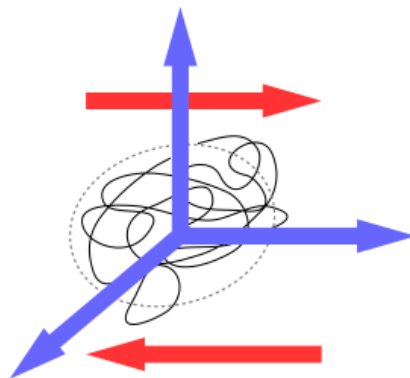
Accepted Answers:

(Type: String) Percolated
(Type: String) percolating
(Type: String) network
(Type: String) networked
(Type: String) networking
(Type: String) cluster
(Type: String) clustered
(Type: String) crosslink
(Type: String) crosslinked

2 points

4) For a macromolecule under shear, the red arrows and blue arrows in the graph below indicate:

1 point



- Directions of flow
- normal stresses and shear stresses, respectively
- Directions of deformation
- shear stresses and normal stresses, respectively

No, the answer is incorrect.

Score: 0

Accepted Answers:

shear stresses and normal stresses, respectively

5) Normal stresses in complex fluids are responsible for effects such as

1 point

- The rod climbing effect
- Quicker emptying of a tube
- The die swell
- Equivalent terminal velocity of a small spherical particle

No, the answer is incorrect.

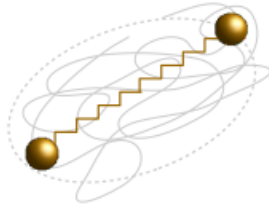
Score: 0

Accepted Answers:

The rod climbing effect

The die swell

6) We can represent a macromolecule under shear using beads and spring as shown below. Similar to the macromolecule, this bead/spring model can a) ----- and b) ----- .



Hint

No, the answer is incorrect.

Score: 0

Accepted Answers:

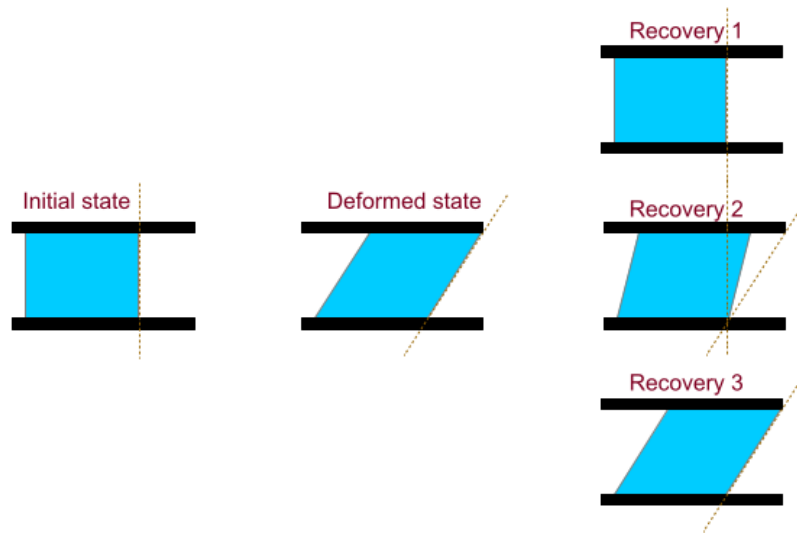
(Type: String) stretch and orient

(Type: String) orient and stretch

2 points

7) In the figure below, what is the likely type of fluid for a given recovery

2 points



- Recovery 1 - elastic; Recovery 2 - viscous; Recovery 3 - vis-coelastic
- Recovery 1 - viscous; Recovery 2 - viscous; Recovery 3 - elastic
- Recovery 1 - elastic; Recovery 2 - viscoelastic; Recovery 3 -viscous
- Recovery 1 - viscoelastic; Recovery 2 - elastic; Recovery 3 -viscous

No, the answer is incorrect.

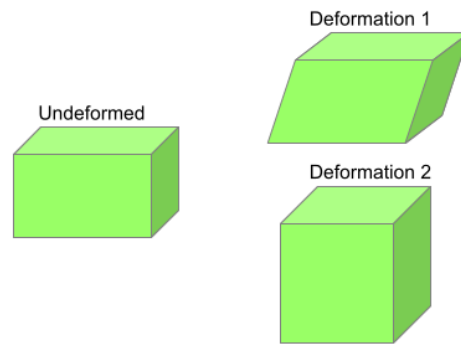
Score: 0

Accepted Answers:

Recovery 1 - elastic; Recovery 2 - viscoelastic; Recovery 3 -viscous

Based on the diagram given in question 8 , answer the question 9

8) What is the type of deformation being shown in the figure below?



Deformation 1 -----

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: String) Shear

(Type: String) shearing

(Type: String) simple shear

1 point

9) Deformation 2 -----

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: String) Extension

(Type: String) elongation

(Type: String) extensional

(Type: String) uniaxial extension

(Type: String) elongational

(Type: String) stretching

(Type: String) stretch

1 point

10) Following are the expected types of behaviour for different classes of materials

1 point

- polymer melt, polymer gel → solid-like ; polymer solution, colloidal gel → fluid-like
- colloidal glass, polymer gel → solid-like ; polymer solution, colloidal dispersion → fluid-like
- polymer melt, polymer glass → solid-like ; colloidal dispersion, colloidal gel → fluid-like
- colloidal gel, colloidal glass → solid-like ; polymer solution, polymer gel → fluid-like

No, the answer is incorrect.

Score: 0

Accepted Answers:

colloidal glass, polymer gel → solid-like ; polymer solution, colloidal dispersion → fluid-like

11) The concentration below which a polymer solution can be considered dilute is called ----- concentration.

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: String) overlap

1 point

12) Match the type of interaction with the interaction.

2 points

T1 - Inter-particle interaction T2 - Solvent interaction T3 - Inter-molecular interaction T4 - Bonded interaction

I1 - Brownian force I2 - Bending rigidity I3 - Entanglement I4 - Depletion

- T1-I1, T2-I3, T3-I4, T4-I2
- T1-I4, T2-I3, T3-I1, T4-I2
- T1-I2, T2-I4, T3-I1, T4-I3
- T1-I4, T2-I1, T3-I3, T4-I2

No, the answer is incorrect.

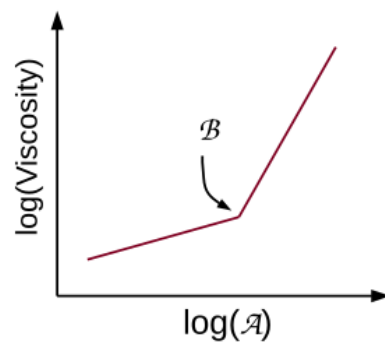
Score: 0

Accepted Answers:

T1-I4, T2-I1, T3-I3, T4-I2

13) In the following graph variable \mathcal{A} and transition point \mathcal{B} stand for

2 points



- \mathcal{A} Molecular weight of polymer; \mathcal{B} Entanglement
- \mathcal{A} Molecular weight of polymer; \mathcal{B} Branching
- \mathcal{A} Polymer concentration; \mathcal{B} Molecular weight
- \mathcal{A} Polymer concentration; \mathcal{B} Entanglement

No, the answer is incorrect.

Score: 0

Accepted Answers:

\mathcal{A} Molecular weight of polymer; \mathcal{B} Entanglement

\mathcal{A} Polymer concentration; \mathcal{B} Entanglement

14) Pick the True statement/s from the following

2 points

- Brownian force results in drag/friction between macro-molecule/particle and solvent.
- The Brownian force is a random force, and results due to interactions between macromolecule and solvent molecules.
- The Brownian force is a short-range interaction force.
- The Brownian force is experienced by a microscopic colloidal particle

No, the answer is incorrect.

Score: 0

Accepted Answers:

The Brownian force is a random force, and results due to interactions between macromolecule and solvent molecules.

The Brownian force is a short-range interaction force.

The Brownian force is experienced by a microscopic colloidal particle

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