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Courses » Transport Phenomena of Non-Newtonian Fluids

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# Unit 4 - Week 2: Rheology Measuring Instruments

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## Course outline

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Week 00

Week 1: Introduction of Non-Newtonian Fluids

Week 2: Rheology Measuring Instruments

Lecture 1: Capillary Viscometers

Lecture 2: Capillary Viscometers: Sources of Errors and Correction Methods

Lecture 3: Rotational Viscometers

Quiz : Week 02 Assignment 01

Week 3: Equations of

## Week 02 Assignment 01

The due date for submitting this assignment has passed.

As per our records you have not submitted this assignment. **Due on 2019-02-13, 23:59 IST.**

1) If the nominal (or apparent) shear rate of a power-law fluid flowing through a capillary is  $8V_{avg}/D$ , what is the correction factor to get true shear rate: **4 points**

- $4n'/(3n'+1)$
- $(3n'+1)/(4n')$
- $4n'+(3n'+1)$
- None of the above

No, the answer is incorrect.

Score: 0

Accepted Answers:

$(3n'+1)/(4n')$

2) If the pressure gradient for flow of a fluid through a capillary (of radius R and Length L) is  $\Delta p/L$ , then what is wall shear stress,  $\tau_w$ : **4 points**

- $(-\Delta p/L) \times (R/2)$
- $(-\Delta p/L) + (R/2)$
- $(-\Delta p/L) - (R/2)$
- $(-\Delta p/L) \div (R/2)$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$(-\Delta p/L) \times (R/2)$

3) For flow of a fluid through a capillary, the wall shear stress is proportional to: **4 points**

- Specific surface of capillary

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Week 5:  
Momentum  
Transfer of  
Non-Newtonian  
Fluids

Week 6: Flow of  
Non-Newtonian  
Fluids through  
Porous Media

Week 7: Heat  
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Phenomena of  
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Week 10:  
Simultaneous  
Heat and Mass  
Transfer with  
Chemical  
Reactions

Week 11: Mass  
Transfer  
Combined with  
Heat Transfer

Week 12:  
Boundary Layer  
Flows of  
Non-Newtonian  
Fluids

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**Accepted Answers:**

*Radius of capillary*

4) Which mode of capillary viscometer is more appropriate: **4 points**

- Constant flow rate device
- Constant pressure device
- Both constant flow and constant pressure devices
- None of the constant flow and constant pressure devices

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Constant flow rate device*

5) What are the sources of errors in capillary viscometers? **4 points**

- End effects and wall slip effects
- Kinetic energy losses and variable head in barrel
- Viscous heating and departure from laminar flow conditions
- All above a), b) and c) points are true

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*All above a), b) and c) points are true*

6) For a time-independent type of non-Newtonian fluid flowing through a capillary, what is the minimum value of  $L/D$  in order to avoid entry effects: **4 points**

- 100
- 50
- 20
- 10

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*100*

7) Because of entry effects in the case of capillary viscometers, the pressure drop: **4 points**

- Decreases
- Increases
- Remains constant
- Fluctuates

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Increases*

8) The wall slip in the case of capillary viscometers is: **4 points**

- Dependent on shear stress
- Independent of shear stress
- Dependent on rotational velocity

None of the above a), b) and c) points

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Dependent on shear stress*

9) In concentric cylinder viscometers, the shear stress of the test fluid is?

**4 points**

- Independent of torque
- Inversely proportional to torque
- Directly proportional to torque
- All above a), b) and c) points are true



**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Directly proportional to torque*

10) In concentric cylinder viscometers, the shear rate of the test fluid is

**4 points**

- Directly proportional to rotational velocity
- Independent of rotational velocity
- Inversely proportional to rotational velocity
- None of the above a), b) and c) points

**No, the answer is incorrect.**

**Score: 0**

**Accepted Answers:**

*Directly proportional to rotational velocity*

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