

## Unit 10 - Week 8

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## Assignment 8

The due date for submitting this assignment has passed.  
As per our records you have not submitted this assignment.

Due on 2019-09-25, 23:59 IST.

1) Which of the following does not happen, if a fluid introduced with tangential velocity into a separating conical vessel induces centrifugal separation? 1 point

- Larger and heavier particles near the walls
- Smaller and lighter particles are thrown towards the walls
- Smaller and lighter particles escape through an outlet near the axis
- Tangential velocity varies inversely with the radius

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: b.

2) Which of the following will happen, if a rapidly accelerated centrifuge is the source of the centrifugal separation? 1 point

- Tangential velocity directly proportional to the radius
- Insignificant rotational slip or relative motion between fluid and wall
- Both (a) and (b)
- None of the above

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: c.

3) For separating particles of size 1 µm or below, which of the following will be the most efficient? 1 point

- Cyclone separator
- Electrostatic separator
- Wet separators
- Filters

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: d.

4) Why do the solids exit through the bottom of a cyclone separator? 1 point

- Majorly due to the reversal of vortex at the bottom of the separator
- Majorly due to outer vortex at the wall
- Majorly due to gravity
- Majorly due to inner vortex near the axis of the separator

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: b.

5) Which of the following is theoretically true for the range of operation of a gas cyclone? 1 point

- efficiency decreases with increasing gas flow rate
- efficiency is independent of the gas flow rate
- efficiency increases with increasing gas flow rate

- a.  
 b.  
 c.

No, the answer is incorrect.  
Score: 0

Accepted Answers: c.

6) Which of the following ratio defines the Euler number? 1 point

- $\frac{\text{inertial force}}{\text{pressure force}}$
- $\frac{\text{pressure force}}{\text{inertial force}}$
- $\frac{\text{inertial force}}{\text{viscous force}}$
- $\frac{\text{pressure force}}{\text{viscous force}}$

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: b.

7) For a gas-particle separation device, the total efficiency is defined by 1 point

- $\frac{\text{mass flow of coarse product collected}}{\text{mass flow of fine product collected}}$
- $\frac{\text{mass flow of coarse product collected}}{\text{total solids mass flow}}$
- $\frac{\text{mass flow of fine product collected}}{\text{total solids mass flow}}$
- $\frac{\text{mass flow of fine product collected}}{\text{mass flow of coarse product collected}}$

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: b.

8) For a given cyclone geometry, to which of the following the Euler number is independent of? 1 point

- Characteristic velocity
- Cyclone body diameter
- Pressure drop
- Fluid density

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: b.

9) Estimation of critical particle diameter for gas cyclone separation depends on \_\_\_\_\_. 1 point

- Cyclone diameter
- Gas viscosity
- Gas flow rate
- All of the above

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: d.

10) For what limit of the solids concentration (in g/m<sup>3</sup>) in the suspensions is the Stokes number constant for a given family of cyclone geometry. 1 point

- < 5
- 5 – 10
- > 5
- < 10

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: a.

11) Which of the following is not true for a hydrocyclone? 1 point

- Separates miscible liquids of different densities
- Removes gas dissolved from a liquid
- Separates particles suspended in a liquid
- Breaks down emulsions and colloidal suspensions

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: a.

12) Which of the following ratio implies the Stokes number in a cyclone separator? 1 point

- $\frac{\text{centrifugal force}}{\text{inertial force}}$
- $\frac{\text{inertial force}}{\text{centrifugal force}}$
- $\frac{\text{Drag force}}{\text{centrifugal force}}$
- $\frac{\text{centrifugal force}}{\text{Drag force}}$

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: d.

13) Which of the following is not an output of designing a high-rate separator? 1 point

- Lower total efficiencies
- Lower resistance to flow
- High recovery
- None of the above

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: c.

14) The retention time is higher for which of the following condition during sedimentation in a centrifugal field. 1 point

- Higher liquid thickness
- Higher particle diameter
- Higher particle density
- Higher radius of the vessel

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: a.

15) During sedimentation in a centrifuge, 1 point

- a particle attains an equilibrium velocity near the vessel wall
- a particle gradually decelerates as it approaches the vessel wall
- a particle never attains an equilibrium velocity

- a.  
 b.  
 c.

No, the answer is incorrect.  
Score: 0

Accepted Answers: c.

16) Which of the following parameter does not influence the capacity factor for sedimentation in a centrifugal field? 1 point

- Radius of the centrifuge
- Fluid viscosity
- Overflow weir location
- Rotational speed of the centrifuge

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: b.

17) What is the expression of the diameter of a proposed scheme of *n* gas cyclones (*Eu* = 86) to be run in parallel, with a pressure drop of 1500 Pa, to treat 4 m<sup>3</sup>/s of gas (density = 0.95 kg/m<sup>3</sup>, and viscosity = 1 × 10<sup>-5</sup> Pa.s) carrying a dust of density 1758 kg/m<sup>3</sup>? 2 points

- $D = 0.804/\sqrt{n}$
- $D = 0.141/\sqrt{n}$
- $D = 0.917/\sqrt{n}$
- $D = 0.376/\sqrt{n}$

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: c.

18) What is the centrifuge capacity factor (*Σ*) for the separation of a solid having density 2250 kg/m<sup>3</sup> and of size 8 µm suspended in a liquid (density = 950 kg/m<sup>3</sup> and viscosity = 0.001 Pa.s), and the feed volumetric throughput rate of 0.5 m<sup>3</sup>/s. Assume Stokes' law is applicable. 2 points

- $1.1 \times 10^4 \text{ m}^2$
- $7.1 \times 10^5 \text{ m}^2$
- $2.5 \times 10^4 \text{ m}^2$
- $9.4 \times 10^5 \text{ m}^2$

- a.  
 b.  
 c.  
 d.

No, the answer is incorrect.  
Score: 0

Accepted Answers: a.