Unit 7 - Week 5

Assignment 5

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

Due on 2019-09-04, 23:59 IST.

1) Which of the following is used as a criterion to differentiate between particulate and aggregative fluidization? *1 point*

a. Mach number
b. Reynolds number
c. Froude number
d. None of these

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

2) Under which condition, normally particulate fluidization occurs? *1 point*

a. $Fr = 1$
b. $Fr < 1$
c. $Fr > 1$
d. None of these

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

3) For a bed of particles, at the onset of fluidization by a fluid to form a bed of depth H and voidage ε in a vessel, the pressure drop across the bed is ______. *1 point*

a. $\Delta p = H(1-\varepsilon)(\rho_p - \rho_f)g$
b. $\Delta p = H(1-\varepsilon)(\rho_p - \rho_f)$
c. $\Delta p = H(1-\varepsilon)^2(\rho_p - \rho_f)g$
d. None of these

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

4) Aggregative fluidization occurs at very low values of Froude number. *1 point*

a. True
b. False

a.
b.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

5) Archimedes number can be defined as: *1 point*

a. $Ar = \frac{\rho_f(\rho_p - \rho_f)g x_{sv}}{\mu^2}$
b. $Ar = \frac{\rho_f(\rho_p - \rho_f)g x_{sv}^2}{\mu^2}$
c. $Ar = \frac{\rho_f(\rho_p - \rho_f)g x_{sv}^3}{\mu^2}$
d. $Ar = \frac{\rho_f(\rho_p - \rho_f)g x_{sv}}{\mu}$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

6) Bulk density of a particle can be calculated as: *1 point*

a. $\rho_B = (1-\varepsilon)^2\rho_p$
b. $\rho_B = (1-\varepsilon)\rho_p$
c. $\rho_B = \varepsilon\rho_p$
d. None of these

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

7) According to Geldart, large particles, which produce deep spouting beds, falls under which powder category? *1 point*

a. Group A
b. Group B
c. Group C
d. Group D

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

8) According to Richardson and Zaki, the bed voidage in a liquid-fluidized bed vary with fluidizing velocity at $Re_p \leq 0.3$: *1 point*

a. $U = U_T\varepsilon^{2.65}$
b. $U = U_T\varepsilon^{0.4}$
c. $U = U_T\varepsilon^{4.65}$
d. $U = U_T\varepsilon^{2.4}$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

9) Beyond the minimum fluidization velocity, distance between the particles _________ with __________ superficial velocity. *1 point*

a. increases, decreasing
b. increases, increasing
c. decreases, decreasing
d. decreases, decreasing

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

10) In fluidization process, beyond incipient fluidization, during the bed expansion, the pressure drop across the bed__________. *1 point*

a. Increases
b. Decreases
c. Remains unchanged
d. None of these

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.

11) Sand and coffee beans, falls under which powder category. *1 point*

a. Group B, Group D respectively
b. Group D, Group B respectively
c. Group A, Group B respectively
d. Group A, Group C respectively

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
a.

12) A packed bed of solid particles of density $2100\ kg/m^3$, occupies a depth of $0.8\ m$ in a vessel of cross-sectional area of $0.08\ m^2$. The mass of solids in the bed is $48\ kg$ and the surface-volume mean diameter of particles is $2\ mm$. A liquid of density $1000\ kg/m^3$ and viscosity of $0.001\ Pa.s$ flows upward through the bed. Calculate the voidage of the bed, the pressure drop across the bed when the volumetric flow rate is $0.64\ m^3/h$ and pressure drop when it becomes fluidized. *3 points*

a. $0.36, 33.504\ Pa, 3107.508\ Pa$
b. $0.64, 33.504\ Pa, 3107.808\ Pa$
c. $0.36, 63.504\ Pa, 6107.068\ Pa$
d. $0.64, 33.504\ Pa, 6107.068\ Pa$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.

13) $25\ kg$ of spherical resin particles of density $1200\ kg/m^3$ and uniform diameter of $50\ \mu m$ are fluidized by water (density $1000\ kg/m^3$ and viscosity of $0.001\ Pa.s$) in a vessel of diameter of $0.4\ m$ and form an expanded bed height of $0.5\ m$. Calculate the difference in pressure between the base and top of the bed and the terminal velocity of the particle for water flow rate of $8\ cm^3/s$. *3 points*

a. $3248.52\ Pa, 4.525 \times 10^{-4}\ m/s$
b. $5008.29\ Pa, 2.012 \times 10^{-4}\ m/s$
c. $8256.62\ Pa, 2.725 \times 10^{-4}\ m/s$
d. $5218.92\ Pa, 2.725 \times 10^{-4}\ m/s$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
d.

14) $4\ kg$ of solid particles of density $2400\ kg/m^3$ and surface-volume mean size $640\ \mu m$ from a packed bed of height $0.5\ m$ in a circular vessel of diameter $0.1\ m$. Water of density $1000\ kg/m^3$ and viscosity of $0.001\ Pa.s$ is passed upwards through the bed. Calculate the bed pressure drop at incipient fluidization and the superficial liquid velocity at the incipient fluidization. *3 points*

a. $5828.52\ Pa, 0.028\ m/s$
b. $5828.52\ Pa, 0.014\ m/s$
c. $2914.26\ Pa, 0.014\ m/s$
d. $2914.26\ Pa, 0.028\ m/s$

a.
b.
c.
d.

No, the answer is incorrect.
Score: 0
Accepted Answers:
c.