

Sample Questions

Chemical Engineering

1. Which of the following chemical formulae represents the Newton number?

- a. $(N^2 D_{\alpha}^3)/(\sigma g_i)$
- b. $(N D_{\alpha}^2)/\mu$
- c. $(P g_c)/(N^3 D_{\alpha}^5)$
- d. $(N^2 D_{\alpha})/g$

2. The grading of a phosphate fertilizer is based on its_____.

- a. P content
- b. PCl_3 content
- c. H_3PO_4 content
- d. P_2O_5 content

3. Why does the rate of solid-liquid extraction decrease with increasing temperature?

- a. Due to increased liquid viscosity & diffusivity
- b. Due to increased liquid viscosity & decreased diffusivity
- c. Due to decreased liquid viscosity & increased diffusivity
- d. Due to decreased liquid viscosity & diffusivity

4. What is the change in internal energy of 25kmol of CO_2 gas when it is isothermally expanded from 10,132 kPa to 101.32 kPa at 373 K, the corresponding molar volumes being $0.215 \text{ m}^3/\text{kmol}$ and $30.53 \text{ m}^3/\text{kmol}$? (Assume CO_2 obeys $[P + (365/V^2)] (V - 0.043) = RT$)

- a. 22,143 kJ
- b. 32,143 kJ
- c. 42,143 kJ

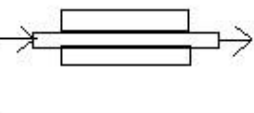
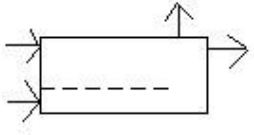
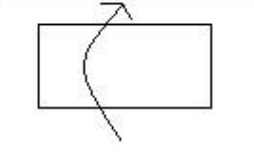
d. 52, 143 kJ

5. A mixture of A and B conforms closely to Raoult's law. The pure component vapor pressures P_A^S and P_B^S in kPa at $x^\circ\text{C}$ are given by $\ln P_A^S = 14.27 - [2945/(x + 224)]$ $\ln P_B^S = 14.20 - [2973/(x + 209)]$

If bubble point of a certain mixture of A and B is 76°C at a total pressure of 80 kPa, then the first vapor will contain_____.

- a. 52.5% A
- b. 72.5% A
- c. 86.5% A
- d. 92.5% A

6. Match the dryers used for different industrial applications

1		a	Drying of refractory bricks
2		b	Drying of sand in foundaries
3		c	Drying of CAN fertilizer

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

7. If scrubber A has a lower HTU than scrubber B for the same performance, which of the following contactors is likely to be more profitable?

- a. Scrubber A
- b. Scrubber B
- c. Cannot Say
- d. HTU has no bearing on profitability

8. Which of the following can be crystallized out of their aqueous solution?

- a. NaCl
- b. Sucrose
- c. Terephthalic Acid
- d. CaCl₂
- e. All of the above

9. Identify the Clausius-Clayperon equation among the following?

- a. $\frac{dP}{dT} = \frac{\Delta H}{T\Delta V}$
- b. $\ln P = -\frac{\Delta H}{RT} + \text{constant}$
- c. $\Delta F = \Delta H + T \left[\frac{\partial(\Delta F)}{\partial T} \right]_P$
- d. None of these