

# Quiz 1 (BT201)

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The biomass production in a batch reactor is given by the empirical equation  $X=0.34 \exp(0.2t)$ , where  $X$  is biomass density (gm/L ) and  $t$  is age of the culture ( h). What are the units of 0.34 and 0.2 respectively?

- ☐ gm/L and 1/h
- ☐ gm/L and h
- ☐ L/gm and h
- ☐ h and gm/L

An ideal gas mixture contains 30% helium, 10% methane, and 60% nitrogen by volume at 1.5 atm absolute pressure and 80 °C. What is the density of the gas mixture in kg/cubic meter?

- ☐ 2.01
- ☐ 1.02
- ☐ 0.21
- ☐ 0.12



A liquid mixture contains 70.0 wt% ethanol, 10.0 wt% of a dissolved component, and the balance water. This mixture is fed to a continuous distillation column under steady state condition. The column is designed such a way that the mass flow rates of top and bottom product are become equal. The top stream contain 95.0 wt% ethanol and no dissolved solute. What is the fraction of the ethanol in the feed that leaves in the bottom product stream

- ☐ 0.25
- ☐ 0.32
- ☐ 0.41
- ☐ 0.57

The density of a liquid mixture (30 °C) containing 20 % (w/w) ethanol, 50 % (w/w) butanol and 30% (w/w) water is

- ☐ 0.78 gm/cc
- ☐ 0.92 gm/cc
- ☐ 0.85 gm/cc
- ☐ 0.97 gm/cc



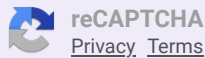
Propane can be used to extract oleic acid from cotton seed oil. A stream of 2.00 wt% oleic acid in cottonseed oil enters an extraction unit at a rate of 50.0 kg/h. The unit operates as an equilibrium stage at 80 °C. At this temperature, propane and cottonseed oil are essentially immiscible, and the distribution coefficient(oleic acid mass fraction in propane/oleic acid mass fraction in cottonseed oil) is 0.15. Calculate the rate at which liquid propane must be fed to the unit to extract 85% of the oleic acid.

- ☐ 86.5 kg/h
- ☐ 40.9 kg/h
- ☐ 72.8 kg/h
- ☐ 26.3 kg/h

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