

CHL204 - Transport Processes II : Major Test

Time: 120 minutes

Max. Marks : 60
(to be scaled down to 30)

- 1(a) Briefly discuss the operation of a rotary dryer.
- (b) A fibreboard sheet has a dry mass of 0.9 kg. When wet, it weighed 3.6 kg and had a moisture content 75% (wet basis). It was subjected to drying. The board lost weight at the rate of 10^{-4} kg/s until the final moisture content was 60% (wet basis). Determine the time required for drying.
- (c) In the above experiment, the dry bulb and wet bulb temperatures were 100 and 40°C. If the temperature of hot air is reduced to 80°C and humidity is same as before, what will be the temperature of surface of board and what will be the time for drying from 75% to 60% wet solid?

(5+5+5)

2. The equilibrium partial pressure of water vapour in contact with a certain silica gel on which water is adsorbed at 25°C, is as follows.

Partial pr. of water, mmHg	0	2.14	4.74	7.13	9.05	10.5	12.6	14.3	16.7
kg water 100 kg dry gel	0	5	10	15	20	25	30	35	40

- (a) Plot equilibrium data as $X = \frac{\text{g moles water}}{\text{kg dry gel}}$, $Y = \frac{\text{g moles water}}{\text{g moles dry air}}$
- (b) 10 kg of dry silica gel is contained in a packed bed. Because of its exposure to ambient conditions, it has picked up 0.5 kg of moisture. Air containing water vapour (partial pressure = 12 mmHg) and total pressure 760 mmHg at 25°C is passed through the bed for a long time. What mass of additional water will the gel have adsorbed after a long time.
- (c) Discuss the above, highlighting the concept of breakthrough curve and adsorption zone.

(5+5+5)

- 3.(a) Give a brief description of absorption of a gas in a packed tower,
(b) In gas absorption, you have less soluble and more soluble gases. Will the slope of equilibrium for a less soluble gas be more, or less than that of a more soluble gas? Explain qualitatively.

(10+5)

- 4 (a) Discuss briefly cooling of air in a desert cooler.

- (b) What is the significance of reflux in distillation? How is reflux ratio defined? What is the minimum reflux ratio? What is the significances of optimum reflux ratio?

(7+8)