BT-306 (Bioseparation Engineering)

Mid-Sem Examination

Date: 28.02.2024 **Total Marks: 30**

Q1: For the constant rate period of the adiabatic drying, derive the expression of the drying time. State all the assumption clearly and show all the steps.

Marks: 8

Q2: The following screen analysis is for a product prepared during a study of sucrose crystallization:

Product size, mesh	Screen size, mm	Cumulative percent	Average size of crystal, mm	Population density as Ln n
+20	0.841	3	1.02	9.8
+28	0.595	14	0.72	12.45
+35	0.420	38	0.51	14.61
+48	0.297	76	0.36	16.46
+65	0.149	92	0.25	16.98

Sucrose has a density of 1.588 g/cm3. The slurry density and retention time were given as 335 g/liter and 2.5 hr, respectively. From these data determine:

(a) The crystal growth rate,
(b) The nucleation rate,
(c) The dominant crystal size, and
(d) The slurry concentration.

Marks: 2.5x4 = 10

Q3: Perform the discrete stage analysis of an elution chromatographic column and establish the concentration profile as follows:

$$y = \frac{y_F}{\sqrt{2\pi N}} \exp\left(-\left(\frac{\frac{t}{t_0}-1}{\frac{2}{N}}\right)^2\right)$$

State all the assumption clearly and show all the steps. Marks: 8

Q4: Explain precipitation with salt and precipitation with nonsolvent. Marks: 4
