



- Q4 (a) Write a brief note on ion exchange chromatography. [5] CO2 BL3
- Q4 (b) The Mw of an unknown protein was investigated along with 5 different standards. [5] CO4 BL5  
The following elution data were obtained. Graphically determine the Mw of unknown protein.

Sample	Mw (kDa)	Ve (mL)
1	158	22.5
2	210	21.4
3	444	18.2
4	669	16.4
5	2000	13.6
Unknown	—	19.5

- Q5 (a) Define nucleation in crystallization. Draw the temperature-product concentration [5] CO3 BL3  
graph to indicate different state of material during crystallization.
- Q5 (b) Describe rotary vacuum drum drier used in industry. [5] CO2 BL4

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