ABE 457

Practice Problems

Spring 2018

1. Calculate the D value of an organism which shows 100 survivors from an initial inoculum of 10^6 spores after 9 min at 250 F.
2. If an initial inoculum of 100 spores per gram of produce (D_{250} = 1.2 min) and a spoilage rate of 1 can in 100,000 is desired, calculate an F value for the process that will give the desired level of inactivation. Calculate the F_{280} for a z value of 20 F. Assume that can will hold 12 oz.
3. The following heat penetration data were obtained on chili can processed at 250 F in a retort.

Time (min)	Temp (F)	Time (min)	Temp (F)
0	170	30	216
5	170	35	223
10	180	40	230
15	187	45	245
20	200	50	250
25	209		

   Calculate the probability of spoilage from FS 1518 if it has a D value of 3 min at 250 F and a z value of 18 F for an initial spore load of 1.0/can.
4. Calculate the length of a holding tube in high temperature processing in an aseptic packaging system that is necessary to provide a 6 D reduction of spores of ($D_{250} = 1.8\,\text{min}$) at 280 F. Use a z value of 18 F. The rate of flow is 10 gal/min, density is $65\,\text{lb/ft}^3$. The tube has a 1.5 in outside diameter and a wall thickness of 0.064 in. Calculate the extent of overprocessing if the fluid is powerlaw fluid with flow behavior index of 0.4. You can assume the flow to be laminar.
5. Problem 5.5-1 of Geonkoplis.