Department of Chemical Engineering

ChE 454A: Unit Operations Involving Particulate Solids for Chemical Engineers

Quiz 1 (2021-22 II) Duration: 45 minutes Maximum Marks: 15

Instructions

- Start a new question on a new page
- Be attentive and careful while dealing with units
- Write down clearly assumptions made

Problem 1: Dolomite is produced at a rate of 2 tonne/h by crushing and then screening through a 16-mesh screen. Calculate the total load to the crusher and the effectiveness of the screen for the following screen analysis (weight percent). **(7 Marks)**

Mesh (%)	Feed (%)	Undersize (%)	Oversize
4	12	-	22
8	21	-	26
16	22	0	28
32	30	42	24
60	8	28	-
100	5	18	-
100 through	2	12	-

Problem 2: Calculate the specific surface in cm^2/g of pyrite having the screen analysis below. Density of pyrite = 5 g/cm^3. Assume sphericity to be one. Use Tyler screen table (provided back of this page) for the calculation. **(8 Marks)**

Mesh no.	**Weight percentage retained**
-3 + 4	0
-4 + 6	4.0
-6 + 8	7.2
-8 + 10	12.0
-10 + 14	17.6
-14 + 20	15.4
-20 + 28	12.0
-28 + 35	10.0
-35 + 48	7.2
-48 + 65	6.0
-65 + 100	3.8
-100 + 150	2.8
-150 + 200	2.0

Table for Tyler Screen

Opening in inches	Opening in millimeters	Mesh	Diameter of wire in decimals of 1 in.
1.0500	26.670	...	0.1490
0.7420	18.850	...	0.1350
0.5250	13.330	...	0.1050
0.3710	9.423	...	0.0920
0.2630	6.680	3	0.0700
0.1850	4.699	4	0.0650
0.1310	3.327	6	0.0360
0.0930	2.362	8	0.0320
0.0650	1.651	10	0.0350
0.0460	1.168	14	0.0250
0.0328	0.833	20	0.0172
0.0232	0.589	28	0.0125
0.0164	0.417	35	0.0122
0.0116	0.295	48	0.0092
0.0082	0.208	65	0.0072
0.0069	0.175	80	0.0056
0.0058	0.147	100	0.0042
0.0049	0.124	115	0.0038
0.0041	0.104	150	0.0026
0.0035	0.088	170	0.0024
0.0029	0.074	200	0.0021