

Frother Comparison Experiments

Prepared for First Responders

New Data Based on Old Data Laboratories

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1 Feed Characterization

1.1 Size Distribution

The size distribution data collected for the feed is tabulated in Table 1. The resulting fraction in each class and fitted size distributions are shown in Figure 1. The Gaudin-Schumann and Rosin-Rammler distributions are parameterized as shown in Equations (1) and (2) respectively. The fitting parameters are shown in Table 2.

Table 1: Observed Size Distribution Data

Sieve (Mesh)	Sieve Opening (mm)	Sample Weight (g)	Fraction Retained	Fraction Passing
80	0.177	45.303	0.1840	0.8160
100	0.149	53.146	0.2158	0.6002
140	0.105	59.814	0.2429	0.3574
170	0.088	24.307	0.0987	0.2587
200	0.074	23.794	0.0966	0.1620
Pan	0.000	39.906	0.1620	0.0000
Totals:		246.270	100.0000	

$$Y = \left(\frac{X}{k} \right)^m \quad (1)$$

$$Y = 1 - e^{-\left(\frac{X}{k} \right)^m} \quad (2)$$

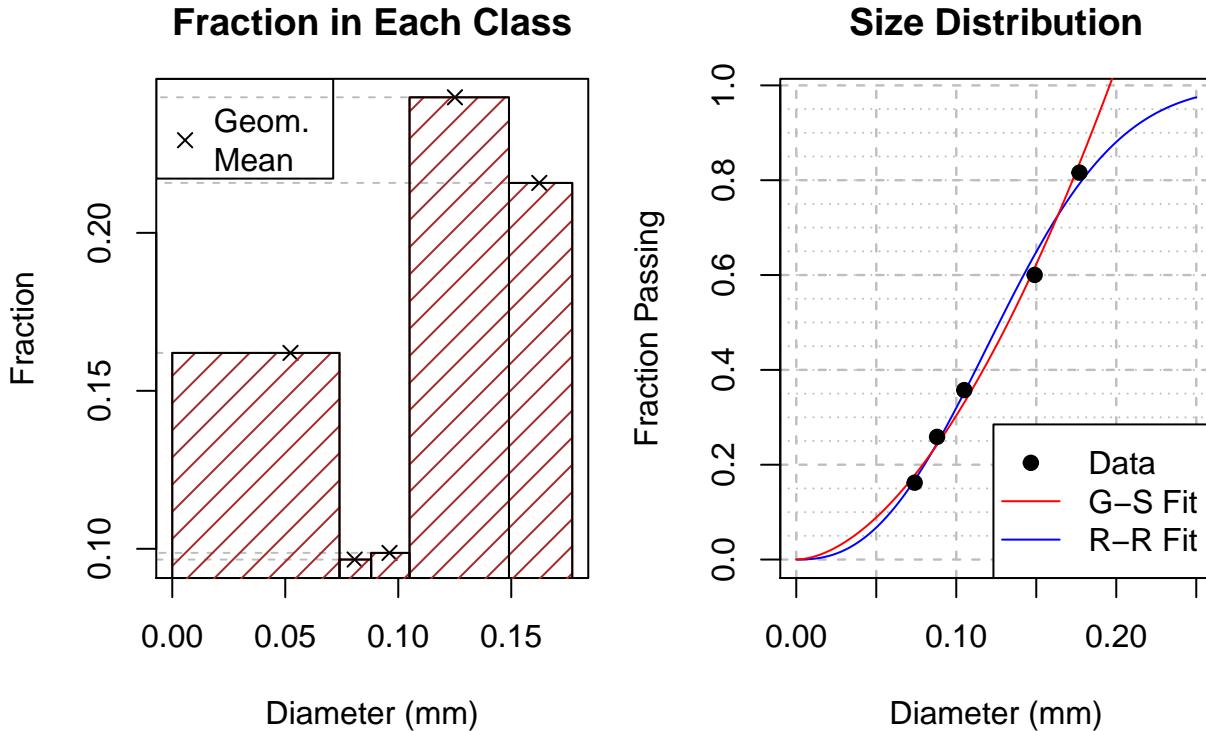


Figure 1: Size distribution data plotted with fitted lines.

Table 2: Size Distribution Fitting Parameters

	Gaudin-Schumann	Rosin-Rammler
k	0.196	0.147
m	1.773	2.464

1.2 Grade

Feed grade is shown in Table 3. The values in Table 3 were generated by back calculating feed grade for each test, and then taking the average. Therefore, the grade displayed in Table 3 should only be used to characterize the feed, and *should not be used for performance and efficiency calculations.*

Table 3: Makeup of Feed

Substance	Grade (%)
Cu	0.3461

2 Procedure

The procedure was conducted as requested. The initial sample was split using a Jones Riffler, and then each of the tests displayed in Table 4 was conducted. XRF analysis was used for assays. Samples were placed in cups for XRF analysis and not pelletized.

3 Lab Findings

Results for a given test are shown in Table 4. Initial mass and assay for each feed sample was not taken, but instead were back-calculated.

Table 4: Experimental Design and Collected Data

Test Number	Frother Used	Frother Dose (drops)	Sample Mass (g)			Total	Cu Grade(%)		
			Rougher Tails	Cleaner Tails	Cleaner Concentrate		Rougher Tails	Cleaner Tails	Cleaner Concentrate
1	X	1	381.89	80.59	20.06	482.54	0.27	0.83	2.62
2	X	2	434.02	65.96	16.66	516.64	0.12	1.10	5.02
3	X	3	414.14	21.64	9.93	445.71	0.06	1.15	1.64
4	U	1	456.20	63.02	8.87	528.09	0.23	1.10	12.46
5	U	2	486.86	23.43	6.98	517.27	0.05	4.05	3.39
6	U	3	456.95	27.23	17.38	501.56	0.10	2.42	0.79

3.1 Images

Images are available in the attached folder. A selection of the images relevant to this particular lab are displayed below.



Figure 2: Chalcopyrite ore after splitting



Figure 3: Sieves used for obtaining size distribution



Figure 4: Flotation vessel