Aalto University
School of Chemical Technology

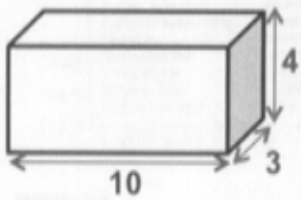
CHEM-E6140: Fundamentals of Mineral Processing and Recycling
Final Exam

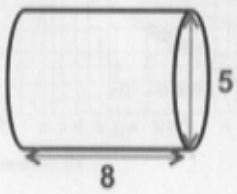
1.1 A mine extracts a mineral containing 5% pyrite (FeS_2), 2% chalcopyrite ($CuFeS_2$), 4% hematite (Fe_2O_3), 6% sphalerite (ZnS) and the rest being silica (SiO_2). What is its chemical composition? (15 points)

1.2. The results of elemental analysis of a mineral are shown below. What is its mineralogical composition? (10 points)

Element	Composition (%)
Fe	26,35
Cr	2,32
Si	28,00
O	43,33

2. What are the dS, dV, dSV, dC and sphericity values of the following particles? (25 points)





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3. We need to pump an aqueous slurry containing 10% of solids from a preparation tank to a concentrator. What is the power required (in KW) to transport 50 ton/h of slurry? (25 points)

- The slurry must be transported a total of 1 km in 5-in diameter steel piping and the concentrator is 80 m higher than the stirred tank
- We know that the solid density of the mineral is 2,8 ton/m^3
- The slurry's viscosity is 1 cp (assume it behaves as a Newtonian fluid)

4. The following data of specific gravity was obtained for a mined coal. Produce separability curves for coal and ash (5 points).

- With which property set-point could we recover 80% of coal? (10 points)
- What is the best grade achievable with this recovery? (10 points)

Specific gravity	Total Mass Distribution (%)	Chemical Assay (Ash %)
Float-1,30	41	2,1
1,30-1,35	7	5
1,35-1,40	2,3	12,6
1,40-1,45	2,2	19,1
1,45-1,50	2,9	24
1,50-1,60	5,9	30,7
1,60-1,70	6	38,4
1,70-1,80	4,4	47,2
1,80-Sink	28,3	70,1

R. Serna

Diagrams

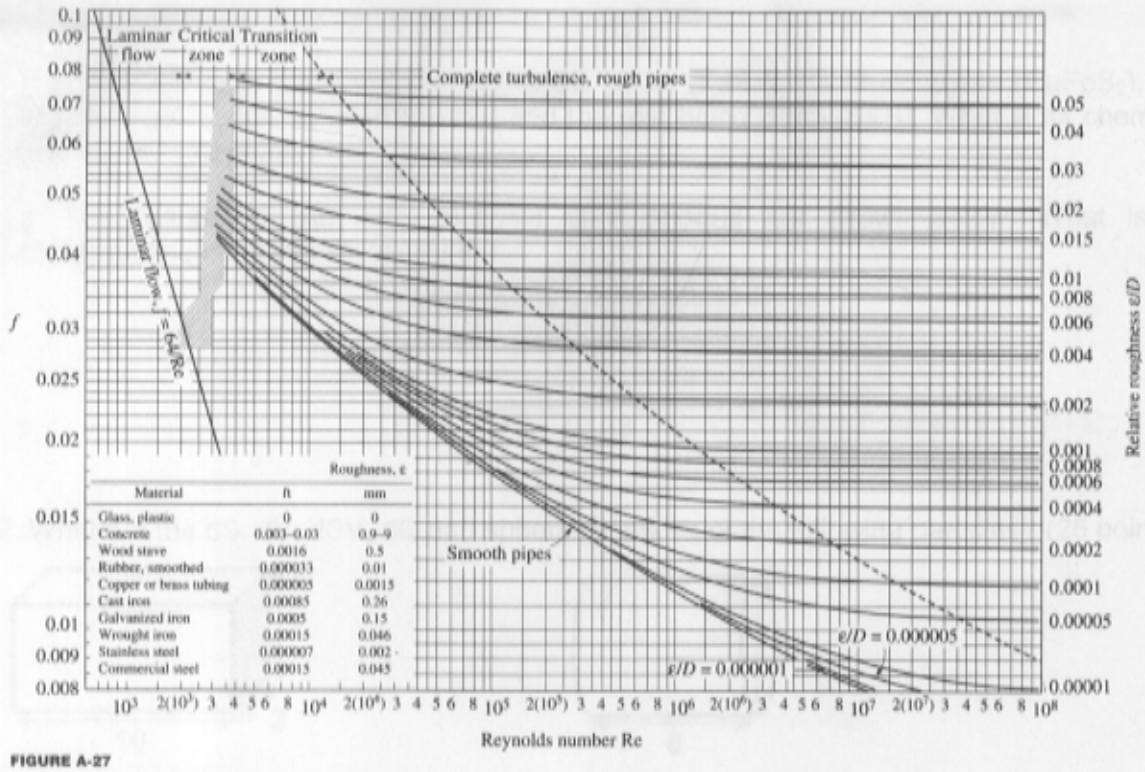

FIGURE A-27

The Moody chart for the friction factor for fully developed flow in circular tubes.

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