

SUBJECT II.—*Amalgamation.*

1. Sketch an amalgamating-table for 5 heads of stamps, giving all dimensions, and angle of inclination, also the area of copper plate.
2. Describe fully (a) the method of cleaning up a battery of 5 heads, (b) the treatment of amalgam from the time it is obtained from the plates and other sources until the mercury emerges from the retort.
3. State the quantity of water required for an amalgamating-table per ton of ore crushed. By what means would you ascertain that the proper quantity was being supplied?
4. What are the chief causes of floueing or sickening of mercury? State how the mercury should be purified.
5. Describe the treatment of magnet iron for the purpose of separating the amalgam.

SUBJECT III.—*Cyanide, Chlorination, and other Chemical Processes.*

1. A parcel of gold-bearing ore has been submitted you for treatment by the cyanide process: state how you would determine the best strength of solution to extract the largest percentage of gold with the smallest consumption of KCN.
2. State how much KCN of 98 per cent. strength should be added to 40 tons of 0.05 per cent. sump solution to bring the working-strength up to 0.25 per cent.
3. State how many tons of a 10-per-cent. solution of KCN should be added to a 0.08-per-cent. sump solution to make up 100 tons of working-solution of 0.25 per cent. strength.
4. State what class of gold-bearing ores are amenable to treatment by chlorination.
5. Describe fully the treatment of a gold-bearing pyritic ore by chlorination.
6. Describe a trustworthy method for the assay of a working cyanide solution (a) for gold, (b) for gold and silver.
7. State what remedies you would use in the event of a workman being overcome (a) by hydrocyanic-acid gas, (b) by chlorine gas.

SUBJECT IV.—*Sizing and Concentration.*

1. By means of a flow-sheet describe fully the process of treatment of an ore containing gold and scheelite.
2. State the advantages of sizing the pulp as it comes from the stamps, and describe a machine suitable for this purpose.
3. A scheelite concentrate is found to contain a large percentage of iron-pyrites: state the means by which a separation can be effected.
4. Describe fully the Frue vanner, giving the amount of pulp it is capable of treating.
5. State conditions under which ore is suitable for concentration by jigging. Sketch a jig by which the concentrate and the gangue are automatically discharged.

SUBJECT V.—*Assaying and Elementary Chemistry.*

1. State what charge of fluxes you would use for the 400-grain fire assay of (a) a clean quartzose gold-bearing ore, (b) a gold-bearing ore containing 4 per cent. of iron-pyrites, (c) gold-bearing pyritic concentrates containing 65 per cent. of iron-pyrites.
2. Describe the separation of silver and lead in an aqueous solution of salts of these metals.
3. Give qualitative tests for sulphuric acid, hydrochloric acid, and nitric acid.
4. Complete the following chemical equations:—

$$(a.) \quad \text{CaO} + 2\text{HCl} =$$

$$(b.) \quad \text{Zn} + \text{H}_2\text{SO}_4 =$$
5. A ton of finely pulverized gold-bearing ore has been submitted to you for valuation: describe fully what steps you would take to obtain an average sample for assay.

SUBJECT VI.—*Arithmetic and Law.**Arithmetic.*

1. Calculate the number of tons of quartz in a heap 50 yd. 2 ft. long and 30 yd. 1 ft. broad, the height of the heap being 10 yards from the ground, and the angle of the slope, or the batter of the heap, being 45 degrees.
2. Make up a pay-sheet for a fortnight's wages in connection with a 10-stamp battery which includes a cyanide plant.
3. Find the square root of 258064. Divide 2.6289 by 306.5.
4. Find the weight of a wrought-iron shaft 15 ft. long. 6 in. diameter. (Wrought iron, cubic inches $\times .28 = \text{lb.}$).
5. A log of timber measures 19 ft. in length, 16 ft. circumference at thicker end and 14 ft. circumference at small end: what is the content in cubic feet?

Law.

1. What are the requirements of the Mining Act as regards the owner of a machine with which it is desired to work for the purpose of treating metals?
2. State the information which is required to be entered in the Machine Register-book.