

7. Give a sketch of a stamp-mill with rock-breakers, copper-plated tables, vanners, and cyanide plants; show the distance you would construct the different portions of the appliances from the tramway where the ore is dumped from the mine, and give your reasons for same.

SUBJECT B.—*Amalgamating-machines.*

1. Give a sketch of a combination pan, and describe fully the quantity of pulverised ore it will treat in twenty-four hours, its action, the quantity of quicksilver required in the pan, and the speed the pan requires to be worked at; also the horse-power required to work it.

2. What is the use of a settler? Describe its action; state the number of revolutions per minute it requires to be driven to give the best results, and give your reasons for same.

3. Describe the difference between a McKay pan and a Watson-Denny pan; give the speed that each requires to be driven, the quantity of ore each will treat in twenty-four hours, and the horse-power required to work them.

4. If you were erecting berdans 3 ft. 6 in. in diameter, what angle would you set them at; state the speed you would work them, the quantity of tailings each would treat in twenty-four hours, the horse-power required to drive them, and the quantity of quicksilver you would use in each berdan.

SUBJECT C.—*The Use of Quicksilver, and the Methods of using it in connection with the Extraction of Gold and Silver from Ores.*

1. Give the width, length, and gradient you would construct amalgamating-tables for each five heads of stamps, the thickness and dimensions of copper-plates you would use, and describe fully how you would coat the plates with quicksilver.

2. If quicksilver contained antimony and lead, how would you separate these metals from the quicksilver; also, describe fully how you would ascertain, by handling the quicksilver, that it contained these metals.

3. What effect, if any, has electrical action on quicksilver used for recovering gold from ores? If you were using electricity in connection with quicksilver for amalgamating purposes, describe fully how you would apply it.

4. Describe fully the method of removing the gold from copper-plated tables, how you would keep the plates clean and bright, and how often you would remove the gold from the plates if the mill were working continuously.

5. What effect, if any, has ore containing a large percentage of sulphurets on quicksilver?

6. Describe fully, step by step, how you would remove gold and silver from quicksilver and put it in bullion fit for the market.

SUBJECT D.—*Cyanide, Chlorination, and other Chemical Processes of recovering Gold and Silver from Ores.*

1. Give a sketch of a modern cyanide plant for treating auriferous ores, with five percolating-vats, showing all dimensions, and the position in which you would place the whole of the appliances.

2. How do you ascertain the strength of cyanide solutions best suited to the class of ore you have to deal with?

3. Describe fully how you dissolve cyanide of potassium, and what strength to make your stock solutions.

4. How do you recover the gold and silver from KCN solutions?

5. How many tons of a solution having 18 per cent. of KCN would you require to make up 50 tons of a sump solution containing 0.015 per cent. of KCN to a 0.3-per-cent. solution?

6. If you had 30 tons of a sump solution containing 0.02 per cent. of KCN, how many pounds of crude KCN would be required to make up a 0.25 solution, supposing the crude salt only contained 70 per cent. of KCN?

7. How many tons of a 0.6-per-cent. KCN solution would you require to make up 40 tons to a 0.25-per-cent. solution, supposing you were using a sump solution containing 0.01 per cent. KCN?

8. How many pounds of crude salt containing 64 per cent. KCN would you require to make up a stock solution containing 19 per cent. of KCN?

9. If a vat were 30 ft. in diameter, and it were required to treat 150 tons of ore, what depth of ore would there be in the vat?

10. A vat is 35 ft. 3 in. in diameter and 6 ft. deep; show by calculation its capacity in imperial gallons.

11. Describe fully the remedies you would apply if any of your workmen showed signs of cyanide poisoning.

12. Give a sketch of a modern chlorination plant; describe the difference between the Plattner process and the Newberry-Vautin process.

13. How is the gold precipitated from chlorine solutions? Describe fully.

14. Describe step by step how you recover the gold from chlorine solutions, and also from KCN solutions, until it is left in bars fit for market.

SUBJECT E.—*Sampling and Testing of Ores.*

Describe in detail the steps you would take to test samples from 5 cwt. of ore-stuff in order to determine its value for gold, silver, copper, lead, zinc, and any other valuable metals present. Quote in outline an example of such testing which has occurred in your own experience.