

4. If you were using stamps of 1,000lb. weight each, give the dimensions and weight of the different parts—namely, the stem, tappet, head, and shoe. Describe how you would fasten the shoe to the stamp-head; also give the drop, and number of drops per minute you would recommend.

5. Give a description of an Ottis ore-crusher, and state the class of ore it is best adapted for crushing, and give your reasons why.

6. Describe the action of Krom rolls, and how these are applied for crushing ore in a finely pulverised state. Show by sketch how you would erect a plant of Krom rolls with all appliances for crushing finely pulverised ore.

7. Describe what appliances you would use to prevent the circulation of dust in a battery building where stamps were used for dry crushing.

8. If ore had to be crushed in a dry state, and afterwards treated with cyanide-solutions, what class of mill would you recommend to be adopted, and give your reasons why.

9. Describe the action of concave and convex buddles, giving their dimensions, speed, and angle of inclination. State the class of ore best adapted for treatment with buddles; and also describe how you would extract the gold from the product saved by the use of buddles.

SUBJECT B.—*Amalgamating Machines.*

1. Show by sketch a Boss, also a Wheeler pan. Describe their action and speed.

2. What is the use of settlers, and under what circumstances are they applied? Describe fully, giving their dimensions, and how they are worked.

3. In working charges of ore in a combination-pan, give the quantity of ore, in hundredweights, you would use in one charge, the time occupied by each charge, and the quantity of quicksilver you would use in the pan.

4. What is meant by amalgam-traps, also agitators, and how are they used? Describe fully.

5. Give the speed that a Watson-Denny pan requires to be worked at, the quantity of quicksilver you would use in the pan, and the horse-power required to work it.

FIRST DAY.—TIME: 2 P.M. TO 5 P.M.

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

1. Describe how you would detect and remove impurities from quicksilver.

2. How would you coat copper plates with quicksilver? Describe fully.

3. Describe how you would treat auriferous or argentiferous ores containing antimony, lead, and zinc in the form of sulphides in order to recover the gold and silver most economically.

4. Describe the method you would adopt in treating concentrates containing a large percentage of iron-pyrites for recovery of the gold.

5. What effect has salt and sulphate of copper on the recovery of gold or silver from ores when used in pan-amalgamation? Describe the chemical reaction that would take place.

SUBJECT E.—*Chlorination Process of Recovering Gold from Ores.*

1. Describe a modern chlorination plant, and give a sketch showing each portion of it in detail, marked with distinguishing letters.

2. Describe the Plattner process, and show the difference between it and the Newberry-Vautin process.

3. How is chlorine generated and applied in connection with the extraction of gold from ores? Give the proportion of the different chemicals you would use.

4. How is the gold precipitated from chlorine solutions?

5. If ore containing a large percentage of silver and gold was treated by the chlorination process, how would you recover the silver?

6. Describe a reverberatory, also a White Howell furnace, and explain fully the method of roasting ore in these furnaces, and why roasting is necessary.

SECOND DAY.—TIME: 9 A.M. TO 1 P.M.

SUBJECT D.—*Lixiviation Process of Recovering Gold and Silver from Ores.*

1. What effect (if any) has copper-sulphides on the extraction of gold and silver from ores by the Cassel process?

2. What class of auriferous and argentiferous ores are best adapted for treatment by the Cassel process? Explain your reasons fully.

3. Show by sketch how you would construct a plant for treating auriferous and argentiferous ores by cyanide-potassium solutions having three percolation vats. Show how you would place these in relation to the other appliances.

4. Describe how you would standard solutions and test the percentage of KCN they contain.

5. In making trial tests in the laboratory to determine the strength of the working solution for new ore, what materials would you use, and how would you apply them?

6. Describe the difference between the Cassel process and the Siemens-Halske process in the extraction of gold and silver from their ores.

7. How many tons of an 18-per-cent. KCN solution would be required to make up 15 tons of a 0.3-per-cent. solution, using a sump solution containing 0.1 per cent. of KCN?