MN-481 Mineral Processing

Assignment - II

Topics

1. Draw a flowsheet of mineral processing stages, i.e. from ROM to end product indicating the various types of equipment used in each stage.
2. Write a detailed note on applications and limitations of various concentration techniques.
3. Explain Gravity concentration method and write a detailed note on the factors affecting its efficiency.
4. Name various gravity concentration techniques. Mention the key differences between Jigging, Shaking Tabling and Humphrey spiral gravity concentrators.
5. Explain the process of Jigging gravity concentration method using a schematic diagram.
6. Explain the process of Shaking Tabling concentration method using a schematic diagram.
7. Explain the process of Humphrey Spiral concentration method using a schematic diagram.
8. Write a detailed note on Dense Media Separation technique, its applications and limitations.
9. What are various principles of HMS and what is the criterion to determine the ease of HMS?
10. Write a note on various types of heavy liquids used in DMS.
11. Explain the process of coal sink and float test. Draw a schematic diagram.
12. Explain the magnetic separation technique and its principles.
13. What is magnetism? Write a detailed note on types of magnetic materials.
14. What are various categories of magnetic separators?
15. Mention the key differences between:
    a. Wet drum and Dry drum magnetic separators.
    b. WHIMS and LIMS
16. Explain the process of magnetizing roasting experiment. Mention the key applications and limitations of magnetic separation technique.
17. Explain the process of electrostatic separation using a schematic diagram.
18. Explain the process of Froth Flotation. Mention its key applications and limitations.
19. Write a detailed note of Flotation Reagents.
20. What are various categories of Collectors? What is the operation technique of froth flotation technique?
21. Write a detailed note on various stages in froth flotation process. Draw flotation circuits.
22. Explain the mechanisms of froth flotation.
23. Explain the procedure of Froth Flotation Test and mention the factors affecting the efficiency of froth flotation.
24. What is solid-liquid separation? What is it important in the mineral processing industry? What are the various methods used for dewatering?
25. Mention the operation and principles of Thickener and Classifier? Mention the types of thickeners used in industry.
26. Explain coagulation and flocculation.
27. Write a detailed note on various tailing disposal methods.
28. What is Talmadge and Fitch Method?
29. A slurry of 25% solids is to be de-watered in a thickener at a rate of 80 tph to produce a product with 10% moisture. A settling test was conducted on the slurry and the results obtained revealed that the mudline height of 75 mm is the critical point of the settling curve and occurs after 260 s. The height of the slurry in the test cylinder initially was 290 mm. The density of the suspended solids is 2700 kg/m^3 and that of the carrier water is 1000 kg/m^3. Determine:
    a. The slurry density D.
    b. The specific gravity of ores in the underflow.
    c. The thickener area required for the slurry.
30. What is a Flowsheet and how can it be presented?
31. Write a note on slurry stream analysis.
32. Consider a slurry stream containing sphalerite solids with a density of 4100 kg/m^3 is delivered into a 1-litre density can and takes 20 s to fill the can. If the density of the slurry was observed to be 3100 kg/m3, calculate:
    a. The volumetric flow rate of the slurry.
    b. The mass flow rate of the slurry.
    c. The % solids by weight of sphalerite in the slurry.
    d. The mass flow rate of the sphalerite solids in the slurry.
    e. The mass flow rate of the carrier water in the slurry.
33. Write the key differences between Centrifugal and Positive Displacement Pumps.
34. What is Reynolds number and depositional velocity? How do you determine these values?

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35. Consider a homogeneous slurry with a flow rate of 1.5 litre/s, pipe with an internal diameter (ID) of 240 mm, a viscosity of 65 cp and a pulp density of 2700 kg/m^3. Determine:
    a. The Reynolds number for the fluid flow.
    b. The critical velocity (Vc) of the slurry if it is Newtonian.
36. Write a note on standard parameters used to assess the quality of concentrate.
37. Explain the techniques used to determine the metallurgical efficiency of separation process.
38. A copper concentrator treats a cuprite copper ore assaying 2.1% Cu and the two possible concentrates are:
    • Low-Grade: 42% Cu, 72% recovery
    • High-Grade: 54% Cu, 65% recovery
    Determine:
    a. % cuprite content of the ore
    b. The Schulz separation efficiency for each of the two processes.
    Take atomic mass as: Cu = 64 g, O = 16 g.
    What do you infer from the results?

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