BINDURA UNIVERSITY OF SCIENCE EDUCATION
CHEMISTRY DEPARTMENT

COURSE: CH209 MINERAL TECHNOLOGY

BSc CHEMICAL TECHNOLOGY (HONS): PART II

2 HOURS

ANSWER QUESTIONS ONE AND FOUR OTHERS.TWO FROM EACH OF THE SECTIONS, A AND B. EACH QUESTION CARRIES 20 MARKS

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1 a) Briefly explain the following terms:

i) Isomorphism.

ii) Polymorphism.

iii) Native mineral.

iv) Coagulation.

v) Mineral. [2×5 marks]

b) Describe the information that needs to be included on results report of a sieve analysis. [6 marks]

c) Distinguish between gravitational vessels and centrifugal separators used in dense medium separation (DMS). [4 marks]

SECTION A: ANSWER ANY TWO QUESTIONS

2 a) i) Name the three equivalent diameters. [3 marks]

ii) Explain how the equivalent diameters in (i) are measured. [3 marks]

b) Give the factors that affect the rate of filtration. [5 marks]

c) Discuss the limitations of handsieving. [4 marks]

d) Explain why gravity sedimentation is the most widely applied Dewatering technique in mineral processing. [5 marks]

3. a) i) Name the most widely used parameter to measure grindability. [1 mark]

ii) Define the parameter in (i). [2 marks]

b) Explain why wood material should be removed at an early stage in mineral processing. [5 marks]

c) Describe machine sieving analysis procedure. [3 marks]

d) i) Define comminution. [2 marks]

ii) State two primary comminution processes. [2 marks]

e) Describe the two common methods of heating used in the mineral industry. [5 marks]

4. a) i) Give the two classes of grinding mills. [2 marks]

ii) Briefly explain how each of the grinding mills given in (i) operates. [8 marks]

b) Explain the effects of under grinding an ore. [7 marks]

c) Explain how surge tank contents are agitated. [3 marks]

SECTION B: ANSWER <u>ANY TWO</u> QUESTIONS FROM THIS SECTION.

5. a) i) Describe the properties of a good filtering media. [5 marks]

ii) Give three materials that are used to manufacture filter media. [3 marks]

b) Discuss the factors that can cause a decrease in efficiency of DMS. [8 marks]

c) Using a relevant diagram, explain how a collector adsorbs on the surface of a mineral. [4 marks]

6 a) Describe briefly how "frothers" achieve their purpose of stabilizing bubble formation in the pulp phase. [9 marks]

b) The rate equation for floatation can be expressed as follows:

$$v = \frac{-dW}{dt} = K_n W^n .$$

Define all the terms in the equation. [5 mark]

c) The floatation of copper ore was shown to be essentially a first order process. Write the rate equation and define the terms in it. [6 marks]

7 a) Explain what is fire assaying? [2 marks]

b) Describe the advantages and disadvantages of using fire assaying in gold analysis. [8 marks]

c) Briefly describe the following fire assay procedures used for analysis of platinum group metals (PGMs).

i) Nickel sulphide. [5 marks]

ii) Lead oxide [5 marks]

END OF PAPER