



UNIVERSITY OF MINES AND TECHNOLOGY, TARKWA

FIRST SEMESTER EXAMINATIONS, NOV/DEC 2018

COURSE NO: MR 471

COURSE NAME: HYDROMETALLURGICAL APPLICATIONS

CLASS: MR IV

TIME: 3 HOURS

Name: _____ Index Number: _____

Attempt All the Questions in Section A and TWO Others in Section B

SECTION A

Attempt all Questions. Short and direct answers are preferred. (5 marks each)

Question 1

- i. Explain how copper sulphides ores are prepared and processed by bioheap leaching.
- ii. Why are refractory gold ores difficult to treat?
- iii. Roasting and bio-oxidation of gold ores are pre-treatment processes prior to leaching. Which of these would you prefer and why?
- iv. With the help of a hydrolysis curve, explain how cyanide toxicity is controlled.
- v. Mention four (4) non-cyanide leaching reagents and explain the performance of one of them in gold leaching.
- vi. Bauxite may be leached using a low or high temperature process. What informs the selection of the process?
- vii. What is referred to as the silica modulus? Any company that sells bauxite with high silica content may pay a penalty, why?
- viii. Blasting of rocks with high powder factors has the potential to influence leaching rate. Explain.
- ix. Explain how the surface and nature of activated carbon influence gold adsorption.
- x. There is no thermodynamic restriction to the precipitation of gold using zinc. However, some key practical issues should be satisfied in the gold solution preparation before the reaction can proceed at a good rate. What are these key issues?

SECTION B
Attempt TWO Questions

Question 2

- a. As a Supervisor on a Carbon-in-Leach Plant on the Tarkwa Mine of Gold Fields Ghana Ltd, discuss five process variables that should be monitored closely to ensure maximum gold extraction and smooth movement of ore slurry and activated carbon. **(25 marks)**

Question 3

- a. In your opinion, what has prevented Ghana from setting up a plant to recover aluminium from the large bauxite deposits available in the country? **(5 marks)**
- b. The conventional process for extracting aluminium from bauxite is the Bayer process. Using appropriate equations and a flow sheet explain how aluminium can be recovered from the bauxite mined at Awaso, Ghana. **(20 marks)**

Question 4

Hydrometallurgical processing of copper may not end with pure copper. With the aid of a flow sheet and appropriate equations explain how you can obtain a highly concentrated solution suitable for electrowinning from copper sulphide ore. **(25 marks)**

Examiner: R K Amankwah