NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF APPLIED CHEMISTRY
BACHELOR OF SCIENCE HONOURS DEGREE
END OF FIRST SEMESTER EXAMINATIONS – FERUARY 2010
INDUSTRIAL INORGANIC CHEMISTRY I – SCH 2114
TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATES

Answer ***any four*** questions from the five provided. Start your answers to different questions on new pages. Each question carries 25 marks.

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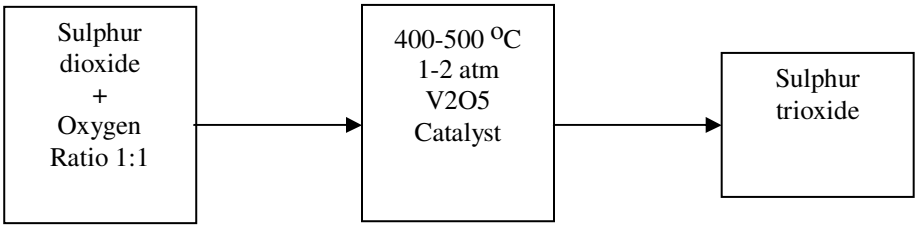
1. a) Using a detailed flow chart of the Fischer-Tropsky process (SASOL) explain how coal is converted to useful hydrocarbon chemicals.
(12 marks)

b) Differentiate between fixed, fluidized and dynamic bed reactors. Which reactor is suitable for:

i) ore roasting
ii) syngas synthesis and
iii) prill formation. Explain your choices with relevant illustrations.
(12 marks)

c) Identify the catalyst used in the hydrocarbon reformation reaction.
(1 mark)

2. a)



Explain the reasons for each given condition in this process flow chart.
(8 marks)

b) '*The re-use, without treatment, of the bleedwater would require all conduits and equipment with which it came in contact to be made of special noncorrosive material, which is extremely costly*.'

Explain this statement in relation to sulphur mining. (6 marks)

Suggest the most economic methods of dealing with the problem of bleeding water in sulphur mines. (5 marks)

c) Name three uses of sulphur dioxide. (6 marks)

3. a) Compare and contrast the manufacturing processes of phosphoric and nitric acids. Make use of comparison tables and manufacturing flow charts to give an in depth answer. (20 marks)

b) Explain how ethanol amine is produced. (5 marks)

4. Write short notes on the following ceramic processes (show illustrations):
   - Direct foaming (5 marks)
   - Extrusion (5 marks)
   - Glazing (5 marks)
   - Vitrification (5 marks)
   - Porcelain-to-metal restoration (5 marks)

5. a) Define flow charting. (2 marks)

b) Explain how a flow chart can be used to:
   - measure improvement effectiveness
   - enhance efficiency
   - shorten training period of employees
   - improve employee morale (16 marks)

c) Draw the process flow chart for clinker production at Collen Bawn in Gwanda. (7 marks)

End of question Paper!!!