BINDURA UNIVERSITY OF SCIENCE EDUCATION
FACULTY OF SCIENCE AND ENGINEERING
DEPARTMENT OF CHEMISTRY

HBScEd Chemistry Education: Part 2.2

JAN 2025

Course Code: CH451 Industrial Chemistry

Duration: 2 Hours

ANSWER QUESTION ONE AND ANY TWO FROM SECTION A AND ANY TWO FROM SECTION B. EACH QUESTION CARRIES TWENTY MARKS.

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Q1 a) Distinguish a bulk chemical from a fine chemical. **[5 Marks]**

b) With the help of a reaction equation, explain the manufacture of acetylene from calcium carbide. **[5 marks]**

c) Using your understanding of the Le Chatelier's principle, explain the effect of pressure on the yield of ammonia. **[4 Marks]**

d) State any three methods that can be employed to disinfect water during the water treatment process. **[6 Marks]**

SECTION A: ANSWER ANY TWO QUESTIONS

Q2 a) State the three methods that are used to produce synthesis gas. **[6 Marks]**

b) Explain the principle behind Integrated Gasification Combined Cycle (IGCC). **[6 marks]**

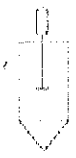
c) What is a renewable raw material? Give any two examples and their applications. **[4 Marks]**

d) Coal is an abundant raw material for the chemical industry. What are the major disadvantage of this resource that has led to its reduced use? **[4 Marks]**

Q3 a) What is the meaning of the following process symbols?

i.

ii.



iii.

[2x3 Marks]

b) Explain the potential sources of Sulphur for the production of sulphuric acid using the Contact Process? **[6 Marks]**

c) With the help of a process flow diagram, describe the production of sulphuric acid using the contact process. **[6 marks]**

d) Why is sulphur trioxide not directly dissolved in water but in concentrated sulphuric acid? **[2 Marks]**

Q4 a) What are the raw materials for the extraction of iron using the Blast Furnace process? **[3 Marks]**

b) With the help of appropriate reaction equations and diagram describe the Blast Furnace process for the production of iron. **[12 Marks]**

c) What are three common grades of steel? **[3 marks]**

d) State any two major uses of steel. **[2 Marks]**

SECTION B: ANSWER ANY TWO QUESTIONS

Q5 a) What is the goal of crude oil refining? **[4 Marks]**

b) With the help of an appropriate diagram, describe an atmospheric distillation of crude oil. **[9 Marks]**

c) What is the main aim of the Fluid Catalytic Cracking (FCC) process? **[2 Marks]**

d) Draw a diagram to illustrate a Fluid Catalytic Cracking process. **[5 Marks]**

Q6 a) State any three major uses of methanol. **[3 Marks]**

b) Write the common reactions involved in the production of methanol from synthesis gas. **[6 Marks]**

c) Draw a simplified process flow diagram for the production of methanol. **[5 Marks]**

d) What are the process conditions for the production of methanol using the following processes:

i. BASF process

ii. Haldor Topsoe process

[2x3 Marks]

Q7 a) Briefly explain why benzene is an important raw material for the chemical industry. **[4 Marks]**

b) State any three Lewis catalysts used in the liquid phase ethylation of benzene. **[3 Marks]**

c) Describe the production process for cumene (isopropyl benzene). **[7 Marks]**

d) Write a reaction scheme for the manufacture of phenol and acetone using the Cumene process. **[6 Marks]**

END OF EXAM