FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA

DEPARTMENT OF CHEMISTRY

FIRST SEMESTER EXAMINATION   2021/2022 ACADEMIC SESSION

COURSE CODE: CHM418   COURSE UNIT: 3

COURSE TITLE: FOOD PROCESSING TEHNOLOGY

INSTRUCTION: ANSWER ANY FOUR (4) QUESTIONS   TIME: 2 HOURS

C= 12, O = 16, H =1

Q1a. What type of factory would you proposed to be set up in an environment whose predominant agricultural produce is malt and barley? Outline schematically the steps involved in the production of the major product from this industry and state the economic importance of this product. **(9 marks)**

  b. State the importance of diethylpyrocarbamate in the food industry and show chemically how it can be converted to urethane. **(3 marks)**

  c. Explain using chemical reactions why low level of benzoic acid in food is not toxic to the body.   **(3 marks)**

Q2a. Using a flow diagram show the production of margarine from blends of suitable oil and milk. **(4 marks)**

  b. With the aid of balanced chemical equation(s), describe how a sweetening agent can be obtained from cassava. **(5 marks)**

  c. Write short note on heavy metal contamination in food (**6 marks**)

Q3a. Explain, the following terms as used in food processing technology:
     i. Kneading ii. Blanching   iii. Lagering iv. Brinning **(4 x 2 = 8 marks)**

  b. What physical and chemical treatment should be carried out on green beer to obtain a high quality product with good shelf life? **(3 marks)**

  c. Evaluate the amount of alcohol that can be produced from a wort containing 35kg of glucose as fermentable sugar. **(4 marks)**

Q4a. Write short notes on the role of the following in foods:
     i. Anticaking agent **(3 marks)** **ii**. Chelating agent **(3 marks)**

  b. Outline the basic steps involved in the canning of a named food and state the importance of canning foods. **(5 marks)**

  c. Draw the structure of gossypol and state its importance in foods. **(4 marks)**

Q5a. Draw the structure of goistrogen and describe in chemical terms how it can lead to the production of pungency in foods. **(7 marks)**

c. Show chemically the conversion of nitrites to nitrosamines and state the importance of this conversion in the food industry. **(4 marks)**

d. Using chemically balanced equation(s), explain how pyruvic acid can be obtained from 2- phospoglyceric acid. **(4 marks)**

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
DEPARTMENT OF CHEMISTRY

FIRST SEMESTER EXAMINATION 2021/2022 ACADEMIC SESSION

COURSE CODE: CHM417   COURSE UNIT: 2

COURSE TITLE: INDUSTRIAL CHEMICAL TECHNOLOGY II

INSTRUCTION: ANSWER ANY THREEE (3) QUESTIONS   TIME: 1 HOUR 30 MINUTES

Q1a. Explain the principle of Kraft chemical pulping process. **(5 marks)**

b. Write briefly on the following chemical recovery methods as applied in the paper industry:

i. Black liquor concentration **(5 marks)**   ii. Recovery furnace **(5 marks)**

iii. Causticizing and calcining **(5 Marks)**

Q2ai. Using balanced equations deduce how hydrogen can be extracted from water without electrolysis. **(4 marks)**

ii. With balanced equations, state the three most cost effective methods of industrial production of hydrogen. **(3 marks)**

iii. State the pros and cons of using hydrogen for the generation of electricity. **(3 marks)**

b. Outline the basic components of an oil-based paint formulation and state their major roles. **(6 marks)**

c. State the economic and environmental impacts of chemical recovery in paper industry. **(4 marks)**

Q3a. Discuss briefly the effects of pollution under the folowing headings:

i. Environmental degradation ii. Human health iii. Global warming

iv. Infertile land **(12 marks)**

bi. Outline the six principal air pollutants and their classes as reported by the national Ambient Air Quality Standard **(6 marks).**

ii. State the role(s) of Primary and Secondary standards to the public health and the environment. **(2 marks)**

Q4a. Write briefly on the following C-3 organic chemicals; propylene oxide and isopropylbenzene based on the following;
i. Method of production **(4 marks)** ii. Industrial application **(4 marks)**
b. Starting with carbon ((II) oxide and hydrogen show how acetic acid can be produced industrially. **(4 marks)**
c. Explain the importance of the following in paper manufacturing;
i. Bleaching **(4 marks)** ii. Pulping **(4 marks)**

FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA
DEPARTMENT OF CHEMISTRY
FIRST SEMESTER EXAMINATION 2021/2022 ACADEMIC SESSION
COURSE CODE: CHM511 COURSE UNIT: 2

Q(1a) Discuss the production of phosphoric acid using wet process. **(6 marks)**

(b) Explain how nitrogen is obtained for Haber process using atmospheric air **(5 marks)**

(c) Using flow chart only, outline various steps involved in the production of the following from phosphate rock.

(i) Single superphosphate   (ii) Triple superphosphate

(iii) Ammonium phosphate   (iv) Superphosphoric acid **(5 marks)**

(d) Enumerate five (5) industrial application of monosodium dihydrogenphosphate. **(4 marks)**

Q2a. Describe the industrial production of metallic sodium using the Down's   Cell   method, stating the limitations of the process. **(6 marks)**

bi. Give the name and characteristic features of the inorganic chemical used   in   the construction of armoured tank and bullet proof vest. **(3 marks)**

ii. State four (4) other applications of the named inorganic chemical in b(i) above. **(2 marks)**

iii. Explain how boron can be used to generate electric power that would   propel   an   electric motor. **(3 marks)**

c. Which of the Chloroakali process techniques is most appropriate for the   industrial production of chlorine from brine? Justify your answer. **(6 marks)**

Q3a) Using CO_2 and H_2 as starting material, discuss the production of methanol **(8 marks)**

(b) Write short note on single and triple superphosphate fertilizer **(6 marks)**

(c) Using balance equations only, outline manufacturing of HNO_3 starting with NH_3

(3 marks)

(d) List three (3) application of ammonia in petroleum and mining **(3 marks)**

Q4ai. What is an alum? **(2marks)**

ii. Describe the industrial production of alum from bauxite ore. **(6 marks)**

bi. What is a flux in metallurgy? **(2marks)**

ii. Describe how borax acts as a flux in the metallurgical industries. **(4 marks)**

c. Using balanced equations describe the industrial production of tetaoxosulphate (VI) acid by the contact process. **(6marks)**