
CHUKA



UNIVERSITY

UNIVERSITY EXAMINATIONS

**EXAMINATION FOR THE AWARD OF DEGREE OF BACHELOR OF SCIENCE
CHEM 447: INDUSTRIAL AND APPLIED CHEMISTRY II**

STREAMS:

TIME: 2 HOURS

DAY/DATE: WEDNESDAY 4/12/2019

8.30 A.M – 10.30 A.M

INSTRUCTIONS

Answer question **One** (Compulsory) and any other **Two** questions

QUESTION ONE [30 MARKS]

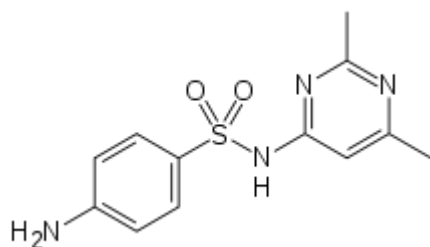
- (a) Discuss the treatment processes of natural gas before domestic use (6 marks)
- (b) Describe five parameters that are used to characterize crude oils (5 marks)
- (c) Explain the industrial production of each of the following compound from ethylene (6 marks)
- (i) Ethylene glycol (ii) vinyl chloride (iii) ethanol
- (d) (i) Explain the mode of action of penicillins (1 marks)
- (ii) Discuss the biosynthetic method for industrial production of penicillins (5 marks)
- (ii) Explain two methods that are used to counter β -lactamases (2 marks)
- (e) Discuss the industrial manufacture of the superphosphate fertilizer from apatite (5 marks)

QUESTION TWO [20 MARKS]

- (a) Discuss, with the aid of relevant equations, the catalytic reforming of during naphtha fractions (8 marks)
- (b) Describe, with the aid of relevant equation(s), the industrial manufacture of ibuprofen from isobutyl benzene (6 marks)
- (c) Describe the industrial production of each of the following compound from butenes (6 marks)
- (i) Acetic Acid (ii) Methyl ethyl ketone (iii) Methyl-*tert*-butyl ether (MTBE)

QUESTION THREE [20 MARKS]

(a) Design a stepwise method for synthesis of sulfisomidine, starting with benzene and any other reagent(s) of your choice. (6 marks)



Sulfisomidine

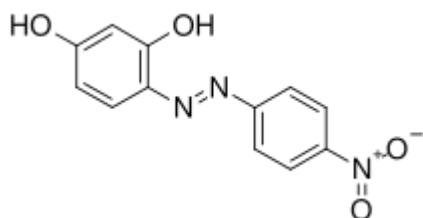
(b) Describe, with the aid of a suitable example, the semi-synthetic industrial production of penicillins. (6 marks)

(c) Explain the industrial production of the following compounds from propene. (8 marks)

(i) Acrolein (ii) Acrylonitrile (iii) Propylene oxide (iv) Butanal

QUESTION FOUR [20 MARKS]

(a) Design a stepwise method of synthesizing the Azo violet from aniline and other reagents of your choice (6 marks)



Azo violet

(b) Compare the chemical structures and related physical-chemical properties, as well as expected bioaccumulation and persistence of DDT and endosulfan. (4 marks)

(c) Explain why pyrethrins do not accumulate in soils or biota although they are lipophilic compounds. (2 marks)

(d) Discuss, with the aid of suitable equation(s), the steam cracking of ethane. (8 marks)
