W1-2-60-1-6

JOMO KENYATTA UNIVERSITY OF AGRICULTURE AND TECHNOLOGY

UNIVERSITY EXAMINATION 2018/2019

BACHELOR OF PHARMACY

THIRD YEAR, THIRD SEMESTER MAIN EXAMINATION.

PHA: 2312 PHARMACEUTICAL CHEMISTRY VI

DATE: MAY 2021 TIME: THREE HOURS

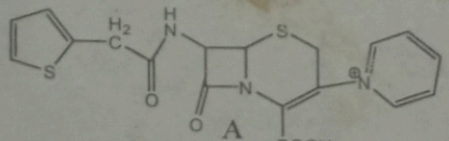
INSTRUCTIONS: ANSWER ALL QUESTIONS IN SECTION A (60 MARKS) AND ANY OTHER TWO QUESTIONS FROM SECTION B (40 MARKS).

ILLUSTRATE YOUR ANSWERS WITH DIAGRAMS/ STRUCTURES WHERE APPROPRIATE.

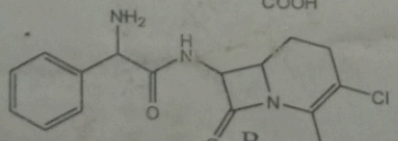
SECTION A (60 MARKS)

1. Describe the structural features of tigecycline that are responsible for higher antibacterial activity compared to tetracycline 5 Marks

2. Describe the effects of the substituents at positions one and three of drugs A and B on the antibacterial activity. 5 Marks



A



B

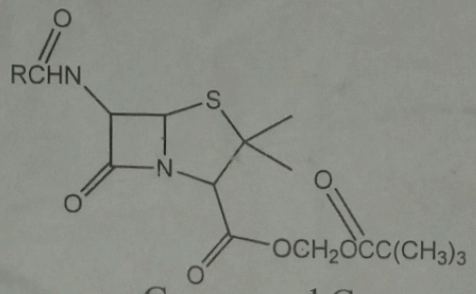
3. Compare and contrast the antibacterial activity of cloxacillin to that of benzylpenicillin. 5 Marks

4. Using relevant structural illustrations, describe the mode of action of clavulanic acid. 5 Marks

5. Using an example of an antibiotic drug, differentiate between threo and erythro isomers. 5 Marks

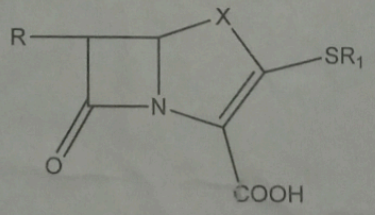
6. Explain the influence of the following on the reactivity of benzylpenicillin.
   a) Acyl amino side chain. 2.5 Marks
   b) Carbonyl group. 2.5 Marks

7. Compound C is the general structure of pivampicillin.
   a) Explain the importance of the R group in pivampicillin. 2 .5 Marks
   b) Illustrate the hydrolysis of the substituent at position three. 2.5 Marks



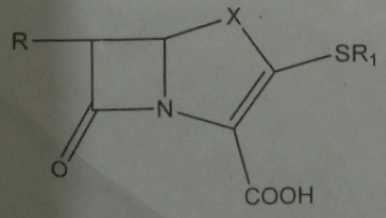
Compound C

8. The following is the general structure of the carbapenems.
   a) Account for the higher reactivity of carbapenems compared to penicillins. 2.5 Marks
   b) Explain the significance of the substituent at position six. 2.5 Marks



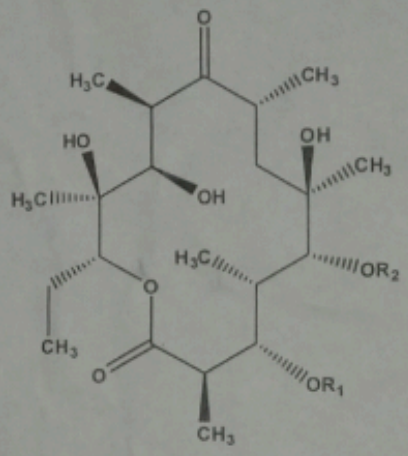
Carbapenem.

9. The following is the general structure of thienamycin.
   a) Illustrate the intermolecular reaction of thienamycin.
   b) Using meropenem, explain the structural modification to overcome 9 a) above.



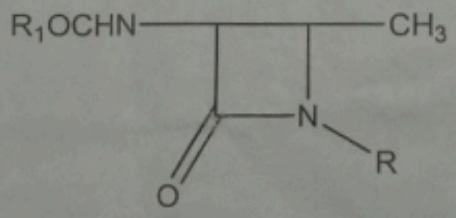
10. Describe the copper iodometric assay of chloramphenicol. 5 Marks

11. The following is the general structure of erythromycin for questions 11 and 14.
    a) Draw the structure of erythromycin estolate. 2.5 marks
    b) Account for the acid stability of roxithromycin. 2.5 Marks



Erythromycin

12. The following is the general structure of the monobactams. Citing one relevant example, describe the significance of R and R_1 5 marks



SECTION B (40 MARKS)

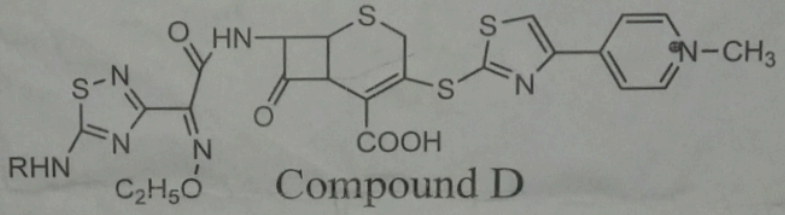
13.
    a) Describe the keto-enol tautomerism of tetracycline. 5 Marks
    b) Account for the amphoteric nature of tetracycline. 5 Marks
    c) Describe the chelation of tetracycline. 5 Marks
    d) Illustrate the stability of oxytetracycline in acidic medium 5 Marks

14.

a) Describe the degradation of erythromycin in acidic medium. 5 Marks
b) Describe the structure activity relationship of azithromycin. 5 Marks
c) Describe the iodometric assay of benzylpenicillin. 5 Mark
d) Account for the antí- staphylococcal activity of methicillin. 5 Marks

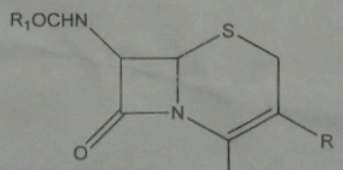
15. a). Compound D is the general structure of ceftaroline fosamil, explain the significance of the following substituents:

i. Aminothiadiazole. 4 Marks
ii. 1,3- Thiazole ring. 4 Marks
iii. Alkoxy imino. 4 Marks
iv. R. 4 Marks



Compound D

15. b). Compound E is the general structure of cefuroxime. Account for the metabolic stability of cefuroxime. 4 Marks



Compound E