



JARAMOGI OGINGA ODIGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF BIOLOGICAL AND PHYSICAL SCIENCES
BACHELOR OF SCIENCE EDUCATION WITH IT
THIRD YEAR FIRST SEMESTER EXAMINATIONS
SCH 310: ANALYTICAL CHEMISTRY I

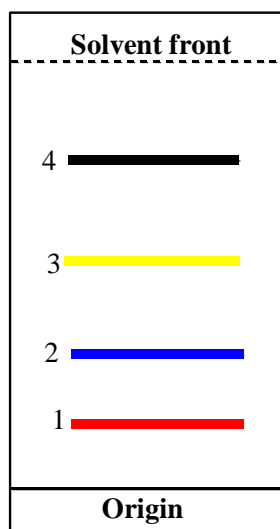
UNIVERSITY EXAMINATIONS: 2017/2018 ACADEMIC YEAR

ANSWER ALL QUESTIONS IN SECTION A AND ANY TWO QUESTIONS IN SECTION B

SECTION A: ANSWER ALL QUESTIONS (30 MARKS)

QUESTION 1

- a) Define the following pairs of terms; (10 marks)
- i) Chemical Shift
 - ii) Wave numbers
 - iii) Precipitation
 - iv) Chromatogram
 - v) Eluant
- b) Explain the following terms; (4 marks)
- i) Chromophore
 - ii) Overtone
- c) Distinguish between the following terms. (6 marks)
- i) Systematic and relative error
 - ii) Qualitative and quantitative analysis
 - iii) Paper and column chromatography
- d) An extract from a plant was analyzed using TLC with a non-polar solvent system.
The chromatogram obtained is shown in the figure below;



The table below gives R_f values of some substances commonly found in plants;

Chemical	Xanthophyll	β -catrotene	Chlorophyll a	Chlorophyll b	Leutin	Neoxanthin
R _f	0.67	0.82	0.48	0.35	0.39	0.27

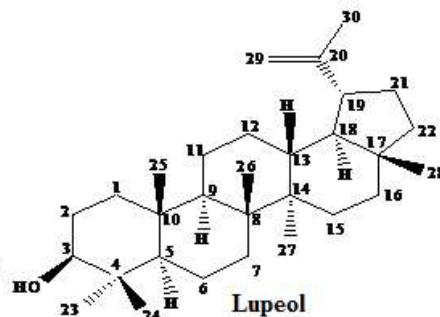
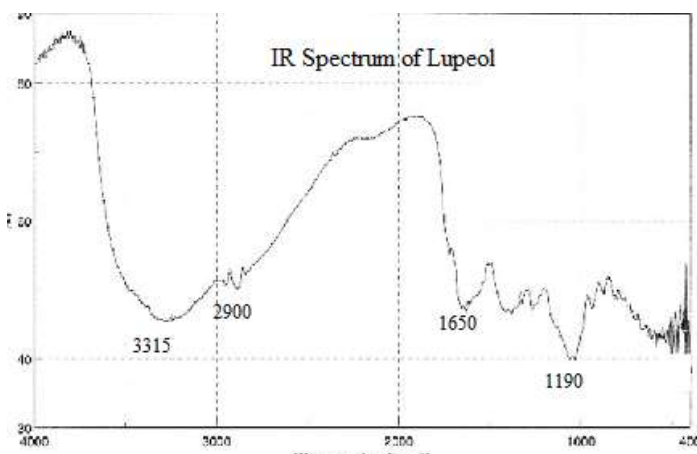
Identify the different components by completing the following table: (10 marks)

Band	R _f	Compound
1		
2		
3		
4		
Solvent front		

SECTION B: ANSWER ANY TWO QUESTIONS FROM THIS SECTION EACH QUESTION CARRIES 20 MARKS

QUESTION 2

- State and explain the two types of HPLC (6 marks)
- Explain the working principle of IR spectroscopy (6 marks)
- Distinguish between Normal and Reverse phase chromatographic technique (4 marks)
- Below is an Infra Red (IR) spectrum of compound lupeol. Identify any FOUR distinct functional groups in it with the corresponding signals (4 marks)



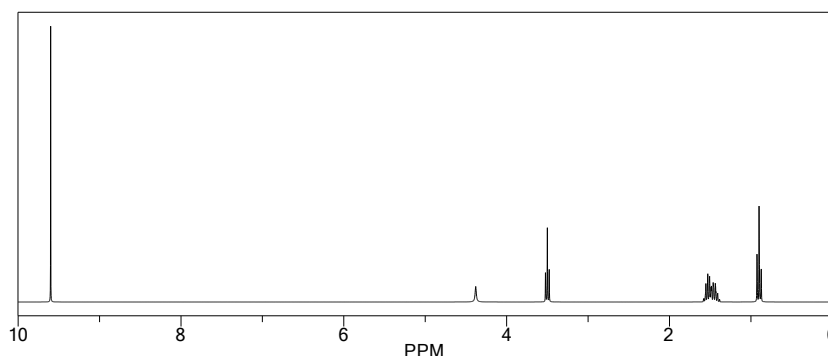
QUESTION 3

- Give the schematic diagram of AAS and explain the function of each part (10 marks)
- Complete the following table; (10 marks)

S/N	Class of Organic compound	Locating agent	Colour
1.	Flavonoids	-	-
2.	-	Ninhydrin	-
3.	-	-	Violet
4.	Quinones	-	-
5.	-	Anisaldehyde	-

QUESTION 4

- a) Below is the NMR spectrum of ethanoic acid. Identify the chemical shifts of the functional groups in it. (4 marks)



- b) Identify and describe how any **FIVE** parameters can be used in qualitative analysis. (10 marks)
- c) What are the functions of the following parts of HPLC machine; (6 marks)
- i) Injector
 - ii) Pump
 - iv) Detector

QUESTION 5

- a) Define the following terms; (10 marks)
- i) Electropogravimetry
 - ii) Calorimetry
 - iii) Potentiometry
 - iv) Conductimetric titration
 - v) Polarimetry
- b) Identify and explain the application of any **FIVE** techniques used in environmental surveillance and risk assessment (10 marks)

E**N*****D***