NATIONAL OPEN UNIVERSITY OF NIGERIA
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FACULTY OF SCIENCES

DEPARTMENT OF PURE AND APPLIED SCIENCES

FEBRUARY/MARCH2018 EXAMINATION

COURSE CODE: **CHM 391**

COURSE TITLE: **PRACTICAL CHEMISTRY V – INORGANIC AND ANALYTICAL**

CREDIT UNIT: **TWO (2)**

TIME: **2 HOURS**

INSTRUCTION: **Question one is compulsory. Answer question one and any other three questions.**

QUESTION ONE

1a) Explain briefly the principle of infrared Spectroscopy. 6 marks

1b) What is digestion of a precipitate and why is it necessary. 6marks

1c) Calculate the total alkalinity of a 100 ml water sample titrated with 0.03M H_2SO_4, using the values obtained for the determination of total alkalinity in a water sample presented below.

NO of titration	Volume of sample (mL)	Initial burette reading	Final burette reading	Volume of Sulphuric (mL)
1	100	0.00	6.40	6.40
2	100	0.00	6.50	6.50
3	100	0.00	6.50	6.50

5 marks

1d) Mention the uses of the following:

I. Gravimetric analysis
II. Potentiometric titration
III. UV- Visible spectroscopy
IV. Colorimetry
V. Infrared spectroscopy
VI. Atomic absorption spectroscopy

6 marks

1f) How would you set the absorbance of UV-Visible spectrophotometer at zero (0)?

2 marks

QUESTION TWO

2a) The concentration of an organic compound is to be determined from its calibration curve by UV-visible spectroscopy, if the wavelength of maximum absorption (λ max) of this compound is unknown, determine the wavelength of maximum (λ max) at which the calibration curve can be prepared using the information provided below.

Absorbance(s) of the organic compound	Wavelengths of absorption of the organic compound (nm)
0.100	360
0.110	380
0.120	400
0.125	420
0.130	440
0.160	460
0.165	480
0.400	500
0.60	520
1.00	540
1.10	560
0.80	580
0.40	600
0.10	620
0.11	640
0.12	660

$7^1/_2$marks

2b) Describe briefly the principle of UV-visible spectroscopy. $7^1/_2$ marks.

QUESTION THREE

3a) In order to determine the concentration by atomic absorption spectroscopy (AAS) of vanadium in a vegetable sample obtained from a farm polluted with crude oil spill, standard

solutions of vanadium was prepared and their absorbance read at 525 nm. If the following data were obtained;

Standard	Concentration (mol/L)	Absorbance
1	0.00008	0.124
2	0.00016	0.239
3	0.00040	0.614
4	0.00080	1.160

Determine the concentration of vanadium in the vegetable sample whose absorbance is 0.56.

11marks

3b)Enumerate on the procedure of determination of concentration of an analyte by colorimetry.
4 marks

QUESTION FOUR

4a Below is an infrared spectrum of an unknown organic compound. Using the table of the characteristic infrared absorption bands of organic functional groups provided below, identify the functional groups present in this organic compounds.
9 marks

4b)What are the sources of acidity in a water body and why is it necessary to determine acidity of a water sample. 6 marks

QUESTION FIVE

5a) In an analysis to determine the chloridepresent in a given sample weighing 1.52g by precipitation gravimetric method, aqueous solution of the sample was acidifiedwith dilute acid and a slight excess of silver nitrate solution was added, whereupon the chloride present in the sample was precipited as silver chloride. If the weight of the silver chloride precipitate obtained is 0.126g, calculate the percentage of chloride in the sample. Gravimetric factor = Cl/Agcl =0.24737.
8 marks

5b Mention the sources of hardness, and state the methods of their determination.7 marks