



**NATIONAL OPEN UNIVERSITY OF NIGERIA**  
**UNIVERSITY VILLAGE, PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE**  
**EXPRESS WAY, JABI - ABUJA.**  
**FACULTY OF SCIENCES**  
**DEPARTMENT OF CHEMISTRY**  
**2023\_1 POP EXAMINATION.**

**COURSE CODE:** CHM 391  
**COURSE TITLE:** PRACTICAL CHEMISTRY V – INORGANIC AND ANALYTICAL  
**CREDIT UNIT:** TWO (2)  
**TIME:** 2 HOURS  
**INSTRUCTION:** Answer question one and any other two questions.

**QUESTION ONE**

- 1a. Give a brief description of transitions in charge-transfer complexes. 3 mks
- 1b. Inclusion is impurity associated with formation of precipitates in gravimetric analysis.  
Discuss 3mks
- 1c. Give a very concise description of how Group 3 cations can be determined qualitatively in the laboratory 8 mks
- 1d. Use the data below to plot a graph of absorbance against concentration, from the graph determine the concentration at an absorbance of 0.01.

	Concentration	Absorbance
Calibration Zero	0.0000	-0.0033
Standard 1	2.5000	0.0081
Standard 2	5.0000	0.0177
Standard 3	10.0000	0.0372

10 mks

- 1e. Explain the origin of acidity in water and its effect. 6 mks

**QUESTION TWO**

- 2a. Describe the three methods which can be used for preparation of solid samples for infrared analysis

- 9mks
- 2a. Describe the removal of 'inclusion' through re-precipitation 5 mks
- 2c. Enumerate the standard way of handling water sample meant for analysis. 6 mks

### QUESTION THREE

- 3a. Explain how wavelength of maximum absorption ( $\lambda_{\max}$ ) is determined 6 mks
- 3a. With the aid of a sketched diagram, show the folding of filter paper and placing of the folded paper in a funnel for filtration process in precipitation gravimetry 5mks
- 3(b) Discuss the following as applied to gravimetric analysis (i) Precipitation (ii) Digestion 9 mks

### QUESTION FOUR

- 4a. Explain alkalinity in water. 4 mks
- 4b. Enumerate two importance of the value of alkalinity. 4 mks
- 4c. State four (4) precautions that will aid accurate determination of acidity in water sample 6mks
- 4d. Comment on the advantages of potentiometric titration over classical visual indicator. 6 mks

### QUESTION FIVE

- 5a. Give a schematic diagram for a manual potentiometric titration. 8 mks
- 5b. Describe two analytical methods that can be used to obtain end point from the possible curve from above titration. 8 mks
- 5c. Name four cations that are found in Group II. 4 mks