



**National Open University of Nigeria**  
**Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi - Abuja**  
**Faculty of Science**  
**APRIL, 2019 MARKING GUIDE**

**COURSE CODE: CHM413**

**COURSE TITLE: Analytical Chemistry II**

**CREDIT: 2 Units**

**TIME ALLOWED: 2 Hours**

**INSTRUCTION: Answer Question ONE (1) and any other Three (3) Questions**

**Question 1**

- Q1. (a) Explain the term Analytical Chemistry. **(3 marks)**
- (b) List the three types of systematic errors. **(3 marks)**
- (c) Define the term *Precision* **(2 marks)**
- (d) The following titre values were obtained for a redox titration: 21.2, 22.6, 26.7, 18.9, 20.3.  
Determine if the value 26.7 should be rejected at 95% confidence level, given that  $Q_{crit} = 0.829$ . **(4 marks)**
- (e) Define the term glass membrane electrode. **(2 marks)**
- (f) During measurements, what is responsible for change in the potential difference across the membrane in a liquid membrane electrode. **(2 marks)**
- (g) What is Molar Conductivity? **(2 marks)**
- (h) Define each of the following electroanalytical terms:
- (i) Voltammetry      (ii) Amperometry **(4 marks)**
- (i) State the use of: (i) HPLC      (ii) Differential scanning calorimetry **(3 marks)**

**Question 2**

Q2. (a) Explain briefly the importance of statistical treatment of data **(4 marks)**

(b) A sample of an ore was weighed seven times and the masses (g) obtained are as follows: 3.080, 3.094, 3.107, 3.056, 3.112, 3.174, and 3.198. Find the mean and the standard deviation of the masses. **(6 marks)**

(c) Define each of the following terms:

(i) Variance; **(1 mark)**

(ii) Coefficient of Variation; **(2 marks)**

(iii) Confidence Interval. **(2 marks)**

**Question 3**

Q3. (a) (i) What is electroanalytical chemistry? **(1 mark)**

(ii) Explain the relevance of potentiometry in Acid-Base titration **(3 marks)**

(b) Explain briefly the use of pH meter as an analytical instrument: **(3 marks)**

(c) Describe the solid state membrane electrode and its application in pH measurements. **(4 marks)**

(d) List three ways by which systematic errors could be minimized. **(4 marks)**

**Question 4**

Q4. (a) Explain the term conductometry **(3 marks)**

(b) Define each of the following:

(i) Resistance;

(ii) Conductance;

(iii) Electrolyte. **(6 marks)**

(c) Differentiate, with an example in each case, between strong electrolytes and weak electrolytes. **(4 marks)**

(d) State two factors affecting the conductance of electrolyte solutions. **(2 marks)**

**Question 5**

Q5. (a) Explain each of the following techniques:

(i) Thin Layer Chromatography

(ii) Calorimetry

**(6 marks)**

(b) Explain the focus and applications of Radioanalytical chemistry.

**(4 marks)**

(c) Describe the interaction of nuclear radiation with matter.

**(3 marks)**

(d) Explain briefly the term *Tracer Addition*

**(2 marks)**