



NATIONAL OPEN UNIVERSITY OF NIGERIA
DEPARTMENT OF PURE AND APPLIED SCIENCES
SEPTEMBER 2020_1 EXAMINATIONS

COURSE CODE: CHM 413

CREDIT UNIT: 2

COURSE TITLE: ANALYTICAL CHEMISTRY

TIME: 2 HRS

INSTRUCTION: *Answer question 1 and any other 3 questions*

QUESTION ONE

- (a) In tabular form, compare and contrast the cathodic and anodic stripping voltammetry in terms of (i) stripping step, (ii) plating step and (iii) quantity determined. 6mks
- (b) What is the importance of Analysis of Variance in data treatment? 4mks
- (c) The following values were obtained for the determination of Lead in a sample of dust: 4.3, 4.1, 4.0, 3.2 microgram/gram. Should the value 3.2 be rejected? Critical values of Q (P = 0.05) is given below:

Sample size	Critical value
4	0.831
5	0.717
6	0.621
7	0.570
8	0.524

6mks

- (d) A chemist obtained the following results for the alcohol content of a sample of human blood. %C₂H₅OH:0.084, 0.089, and 0.079
Calculate the 95% confidence interval for the mean given the table below (9mks)

Degrees of freedom	Values of t for confidence interval of				
	80%	90%	95%	99%	99.9%
1	3.08	6.31	12.7	63.7	637
2	1.89	2.92	4.30	9.92	31.6
3	1.64	2.35	3.18	5.84	12.9
4	1.53	2.13	2.78	4.60	8.60
5	1.48	2.02	2.57	4.03	6.86
6	1.44	1.94	2.45	3.71	5.96
7	1.42	1.90	2.36	3.50	5.40
8	1.40	1.86	2.31	3.36	5.04
9	1.38	1.83	2.26	3.25	4.78
10	1.37	1.81	2.23	3.17	4.59

QUESTION TWO

- (a)
- i. NaI(Tl), Si(Li), Ge(Li) and High-pure germanium are example of which type of detector? 1mk
 - ii. In what ways are each of the detectors applied? 4 ½ mks
- (b) State (i) the Chromatogram resolution equation and (ii) the plate number and plate height equations derived from Gaussian curve, identify all the parameters. 9 ½ mks

QUESTION THREE

Fill in the missing items of commonly measured long lived cosmogenic isotopes. 15mks

Element	Mass	Half life(years)	Typical source
Technetium	-----	214,000	_____
Radon	_____	_____	Rain and ground water, atmosphere
_____	3	_____	Air, water, and biota samples
_____	_____	5730	Dating of organic matter
Uranium	____, ____ , _____ ____, _____, _____	_____	Terrestrial element
Plutonium	____, ____ , _____ ____, _____	_____	Nuclear weapons reactors
_____	90	28.8	Common fission products

QUESTION FOUR

- (a) Extensively differentiate between Carrier addition and Tracer addition. 10mks
- (b) Write short note on Scintillation detectors. 5mks

QUESTION FIVE

- (a) State the difference(s) and similarities between Flame ionization detector (FID) and Thermal conductivity detector (TCD). 6mks
- (b) What do you understand by High Performance Liquid Chromatography? 9mks