National Open University Of Nigeria
Plot 91, Cadastral Zone, Nnamdi Azikiwe Expressway, Jabi - Abuja
Faculty of Science

October/November 2016 Examination

Course Code : CHM413
Course Title: ANALYTICAL CHEMISTRY II
Credit Unit:2
Time: 2 Hours

Question 1

a) Define the following terms and give the mathematical formulae where applicable,(12 marks)
i) Arithmetic mean
ii) Spread
iii) Variance
iv) Confidence limit
v) Confidence level
vi) Outlier
b) Discriminate between positive and negative correlation. (3 marks)
c) What is a solid state membrane? (2 ½ marks)

Question 2

The transfer factors of heavy metals from soil to a leafy vegetable, *Gongronema Latifolium are shown hereunder:* (17 ½ marks)

Metal	Cd	Pb	Ni	Cu	Zn	As	Hg
Transfer factor	0.044	0.052	0.133	0.410	0.114	0.251	0.111

From the values of Transfer factor above, calculate;

i) Mean
ii) Median
iii) Mode
iv) Standard deviation
v) The 95% confidence limits for the true pH

See the values of t for confidence intervals on the last page

Question 3

a) Elucidate the principle of a liquid membrane electrode. (8 $\frac{1}{2}$ marks)

b) List and explain the factors that affect the conductance of electrolyte solutions. (9 marks)

Question 4

a) State the Kohlrausch law of independent migration of ions (3 $\frac{1}{2}$ marks)

b) Explain brieflythe two relevances of Kohlrausch law of independent migration of ions (5 marks)

c) Suppose that a solution is 10^{-3}M in $Cr_2O_7^{-2}$ and 10^{-2}M in Cr^{3+}. If the pH is 2.0, what is the potential of the half reaction? (9 mark)

Questions 5

a) State 3 (three) applications of radioanalytical chemistry (3 marks)

b) Interaction of radiation with matter depends on a wide range of factors. List 3 (three) of these factors (3 marks)

c) Write short notes on the following:

i) Electrochemical deposition ii) Particulate radiation iii) Scintillation Detectors

(11 ½ marks)

Question 6

a) Explain the basic principle of solvent extraction and outline the important role it has played in radiochemical separations. (8 marks)

b) Describe the principle and applications of Size-exclusion chromatography (SEC) (5 ½ marks)

c) State four advantages of Size-exclusion chromatography **(SEC)** (4 marks)

Table 1.1 Values of t for confidence intervals

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
11	1.36	1.80	2.20	3.11	4.44
12	1.36	1.78	2.18	3.06	4.32
13	1.35	1.77	2.16	3.01	4.22
14	1.34	1.76	2.14	2.98	4.14
∞	1.29	1.64	1.96	2.58	3.29