THE OPEN UNIVERSITY OF SRI LANKA
B.Sc. Degree Programme / Stand alone course – Level 4

CHU 2125/CHE 4125 – Analytical Chemistry - 2009/2010
Assignment Test II

Duration: One and half-hours

23rd November 2009- 4.00 p.m. to 5.30 p.m.

Index No.

Unanswered		
Correct Answered		
Wrong Answered		
Total		
Percentage		

1.	1	2	3	4	5	2.	1	2	3	4	5	3.	1	2	3	4	5
4.	1	2	3	4	5	5.	1	2	3	4	5	6.	1	2	3	4	5
7.	1	2	3	4	5	8.	1	2	3	4	5	9.	1	2	3	4	5
10.	1	2	3	4	5	11.	1	2	3	4	5	12.	1	2	3	4	5
13.	1	2	3	4	5	14.	1	2	3	4	5	15.	1	2	3	4	5
16.	1	2	3	4	5	17.	1	2	3	4	5	18.	1	2	3	4	5
19.	1	2	3	4	5	20.	1	2	3	4	5	21.	1	2	3	4	5
22.	1	2	3	4	5	23.	1	2	3	4	5	24.	1	2	3	4	5
25.	1	2	3	4	5	26.	1	2	3	4	5	27.	1	2	3	4	5
28.	1	2	3	4	5	29.	1	2	3	4	5	30.	1	2	3	4	5

1. At the triple point of the water, the number of degrees of freedom is equal to:
   1) F=2-2+2 2) F=1-3+2 3) F=1-2+2 4) F=2-3+2 5) F=1-1+2

2. What is the number of degrees of freedom for a system in which liquid ethanol is in equilibrium with its vapour?
   1) 0 2) 1 3) 2 4) 3 5) 4

3. Mole fraction of 'X' in the vapor phase is 'a', while that in the liquid phase is 'c'. Mole fraction of 'Y' in the vapor phase is' d', while that in the liquid phase is 'b'. Volatility of the component 'X' is:
   1) d/b 2) a/d 3) b/c 4) c/a 5) a/c

4. A binary mixture of A and B with a mole fraction of 0.66 with respect to A, boils at 88°C under 1atm. The vapor pressures of pure A and B at this temperature are 1.26 and 0.5 atm respectively. What is the mole fraction of A in the vapour phase?
   1) 0.8303 2) 0.1697 3) 0.8316 4) 0.1710 5) 0.4152

5. 'A' is dissolved in 50 cm^3 of aqueous layer and it is extracted to 50 cm^3 of ether. D_M is given as 5. Calculate the fraction of solute remained after the 4th extraction using the equation: $f_n = (V_w / V_w + D_c V_o)^n$.
   1) 1/1296 2) 1/36 3) 1/216 4) 1/6 5) 1/7776

6. 1g of benzoic acid originally dissolved in 100 ml of water is to be equilibrated with 100 ml of Ether at pH 7. Distribution ratio, $K_D = 100$, $K_a = 6.5 \times 10^{-5}$. D is equal to:
   1) 0.09 2) 0.10 3) 0.17 4) 0.15 5) 0.18

7. Some of the factors affecting solvent extraction are
   a) density b) viscosity c) type of extracting agent d) Miscibility of the solvents.
   The answer is
   1) a) and b) only 2) b) and c) only 3) c) and d) only
   4) a) and d) only 5) All of the above.

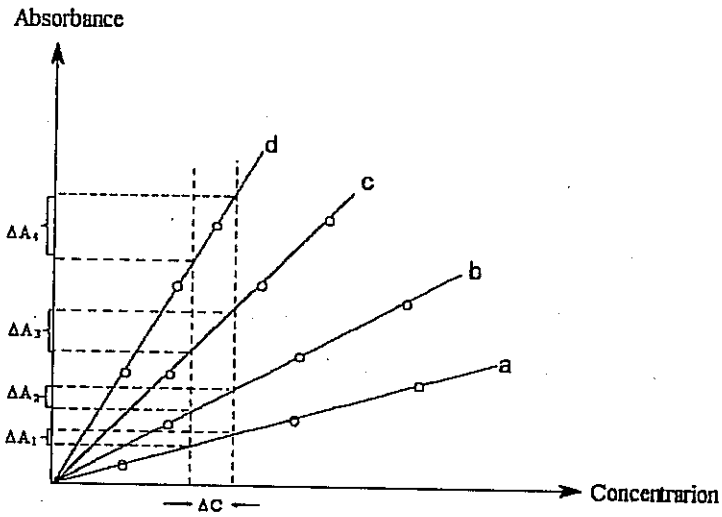
8. A solution of 0.1g I_2 in 50cm^3 of aqueous solution is extracted with 25.00cm^3 of chloroform. What is the percentage of I_2 extracted? ($D_c = 85$)
   1) 99.97% 2) 85.5% 3) 90.0% 4) 95.5% 5) 97.7%

9. A light beam has a wave length of 0.085 microns. What is the energy of a photon in joules? ($c = 3 \times 10^8$ m s^{-1}; $h = 6.63 \times 10^{-34}$ Js
   1) 2.18×10^{-19} 2) 2.50×10^{-19} 3) 2.23×10^{-25} 4) 2.34×10^{-18}
   5) 2.45×10^{-24}

10. In UV-Visible spectrometer, radiant power of the incident light is 80 and two thirds of it is absorbed by the sample. What is the percentage of transmittance?
    1) 60.75 2) 33.33 3) 80.50 4) 40.87 5) 50.58

11. Four different calibration graphs used for the analysis of a particular species using four different UV spectrometric methods are shown below. For the given change in concentration, what is the highest sensitive plot?

1) c 2) d 3) a 4) b 5) None of the above



12. The main function(s) of the Hollow Cathode Lamp (HCL) is

1) as a liquid transporter
2) to isolate analyte lines
3) to emit only the resonance wave length
4) all of the above
5) to convert light signal to electric signal

13. For the reaction, $A^{+}_{(aq)} + B^{+}_{(aq)} \leftrightarrow A_{(s)} + B^{2+}_{(aq)}$, select the most appropriate Nernst equation,

1) $E = E^0 - \frac{[A_{(s)}][B^{2+}_{(aq)}]}{[A^{+}_{(aq)}][B^{+}_{(aq)}]}$ 2) $E = E^0 - \frac{RT}{F}\ln\frac{[A_{(s)}][B^{2+}_{(aq)}]}{[A^{+}_{(aq)}][B^{+}_{(aq)}]}$ 3) $E = E^0 - \frac{[B^{2+}_{(aq)}]}{[A^{+}_{(aq)}][B^{+}_{(aq)}]}$

4) $E = E^0 - \frac{RT}{F}\ln\frac{[B^{2+}_{(aq)}]}{[A^{+}_{(aq)}][B^{+}_{(aq)}]}$ 5) $E = E^0 - \frac{RT}{F}\ln\frac{[A^{+}_{(aq)}][B^{+}_{(aq)}]}{[B^{2+}_{(aq)}]}$

14. An aqueous solution of KCl was electrolyzed using a current of 2.0 A for 10 min. What is the volume of 0.1M HCl required to neutralize the resulting solution? (F is Faraday)

1) $2x10x0.1$ 2) $\frac{2x10x60}{Fx0.1}$ 3) $\frac{2x10}{Fx0.1}$ 4) $\frac{2x10x10^{-3}}{Fx0.1}$ 5) $\frac{2x10x60x10^{-3}}{Fx0.2}$

15. An ointment which prevents penetration of uv light through human skin, has an absorbance of 0.35 at 300nm. What is the percentage of uv light absorbed by the ointment?

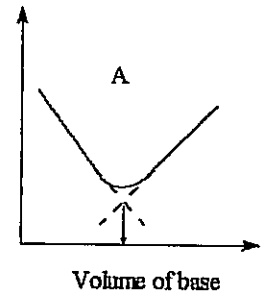
1) 44.7 2) 33.3 3) 64.7 4) 55.3 5) 45.3

16. If the concentration of standard metal solution added to the unknown solution is 'b', that of the analyte in the unknown sample is 'c' and the absorbance of the unknown solution is 'd', what is the absorbance of the unknown solution after adding the metal standard?

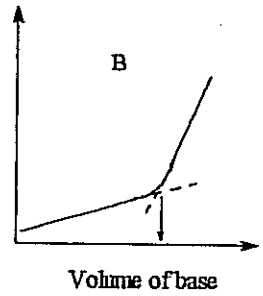
1) (b/c).b + d 2) (b/d).d + b 3) (d/b).c + d 4) (d/c).b + d 5) (d/c).c + d

17. Titration curve for the weak acid with strong base is:

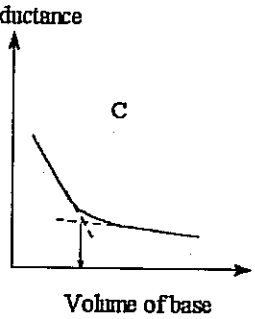
1) Conductance



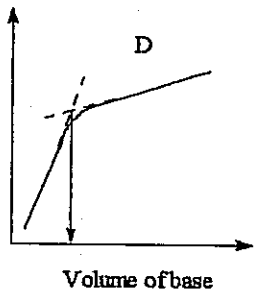
2) Conductance



3) Conductance



4) Conductance



5) —

18. When we compare uv- visible spectrophotometer with the atomic absorption spectrometer, what part of cell functions as the 'cell' in uv- visible spectrometer?
1) Atomizer 2) Nebulizer 3) Flame
4) Hollow Cathode lamp 5) Photodetector

19. In pH measurements using a combined electrode, the cell voltage using a buffer solution of pH z is 'x'. If the cell voltage using an unknown buffer is 'y', what is the pH of the unknown buffer?

1) $\frac{y-x}{59.14}+z$ 2) $\frac{x-y}{59.14}+z$ 3) $\frac{z-x}{59.14}+y$ 4) $\frac{z-y}{59.14}+x$ 5) $\frac{y-x}{59.14}$

20. A solution having a concentration of 0.002 mol dm^{-3} shows an absorption of 0.36 at 256 nm. (The path length of the cell is 2.00 cm). What is the molar absorptivity (dm^3 mol^{-1} cm^{-1}) of this solution?
1) 9 2) 90 3) 900 4) 45 5) 450

21 Separation of metal ions by chelate complexes in solvent extraction depends on
a) pH b) Nature of chelating groups c) Nature of metal ions
d) Solubility of the complexes
The answer is
1. a) and b) only 2. B) and c) only 3. C) and d) only 4. D) and a) only
5. a), b) and c) only

22. The SI unit of the term $\frac{RT}{nF}$ is

1. J 2. JK^{-1} 3. $J\,mol^{-1}$ 4. V 5. CV

23. The disadvantage(s) of Atomic Absorption Spectrometry (AAS) are

a) The method is applicable to metals b) The detection limit is low
c) High sensitivity d) At least one metal detected for every HCL
The answer is
1. a) and b) only 2. B) and c) only 3. C) and d) only 4. D) and a) only
5. a), b) and c) only

24. Which of the following is true about monochromatic light?

a) Light made of only one frequency b) Light made of only one wavelength
c) Light made of only one amplitude c) Light made of only one intensity.
The answer is
1. a) and b) only 2. B) and c) only 3. C) and d) only 4. D) and a) only
5. a), b) and c) only

25. If 98% of the light is transmitted through a sample in a cell of with a path length 2 cm, what is the corresponding absorbance?

1) 0.1 2) 0.05 3) 0.01 4) 0.001 5) 0.9

26. If the absorbance is 0.60, what would be the % transmittance?

1) 60 2) 40 3) 25 4) 6 5) 4

27. Which of following is not a type of interference present in AAS?

1) physical interference 2) solvent interference 3) chemical interference
4) interference by ionization 5) spectral interference

28. The resistance of a voltmeter is 10^{12} Ω; it read 1.5 V, when it was used to measure the potential of a cell. What was the current (in amperes) that passed during the measurement?

1) 6.67×10^{11} 2) 3.34×10^{-11} 3) 5×10^{-12} 4) 1.5×10^{12} 5) 1.5×10^{-12}

29. Which of the following represents the unit Seimen of conductance?

1) $A\,kg^{-1}\,m^{-2}\,s^{3}$ 2) $A^2\,kg^{-1}\,m^{-2}\,s^{3}$ 3) $A^2\,kg^{-1}\,m^{-1}\,s^{3}$
4) $A^2\,kg^{-1}\,m^{-2}\,s^{2}$ 5) $A^2\,kg^{-1}\,m^{-2}\,s^{-1}$

30. The function of a salt bridge is to

a) to replenish salt lost due to evaporation b) to complete the electrical circuit
c) to make sure the system is electrically neutral
d) to bridge the gap between the two solutions.
The answer is
1. a) and b) only 2. B) and c) only 3. C) and d) only 4. D) and a) only
5. a), b) and c) only

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