題號： 86
科目：分析化學(A)
節次： 6

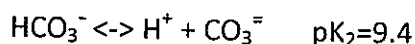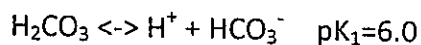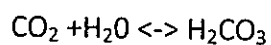國立臺灣大學 111 學年度碩士班招生考試試題

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1. For a group of measurement: 10.2, 10.1 9.8, 10.5, 10.0, 10.0

   Give mean, median, variance, standard deviation, relative standard deviation. If the target value is 10, what is the relative error?(20%)

2. The followings are acid-basic indicators. Please fill in your answer. (20%)

Name	pH Range	pKa	Color change
Methyl orange	3.1-(?)	3.46	(?) - orange
Methyl red	4.4-6.2	(?)	red - (?)
Phenolphthalein	(?)-10	9.7	colorless-(?)
Bromothymol blue	6.2-7.6	(?)	(?)-blue
Phenol red	(?)-8.0	7.81	(?)-red

3. Carbon dioxide in atmosphere will dissolve in ocean, and further dissociate into different species:

   $CO_2 + H_2O <-> H_2CO_3$

   $H_2CO_3 <-> H^+ + HCO_3^-$ $pK_1 = 6.0$

   $HCO_3^- <-> H^+ + CO_3^=$ $pK_2 = 9.4$

   Please draw a diagram to show the fractionation against pH. (i.e. %Conc. Vs pH).(10%)

   If the total concentration of carbon dioxide system in seawater is 2 mM. Please estimate the concentration of the three species at pH 5.6, 7.7 and 9.8. (10%)

4. In chromatography, for a given column with a length L,

   $N = L/H$

   If N is the plate number, what is H? Give its full English name.(5%)

   If W represents peak width, what is the meaning of the following equation? (5%)

   $H = (LW^2)/(16t_R^2)$

   The van Deemter equation can be described as:

   $H = A + B/u + Cu$

   Explain the above equation. (5%)

   Differentiate this equation will give an optimal flow speed u, so u=? (5%)

5. In spectrophotometry, fill in your answer. (20%)

Transmittance	Absorbance
100%	?
?	0.0044
90%	0.046
?	0.301
10%	1.000
?	2.000
0.1%	?

A concentration that produces an absorbance of 0.0044, how do you define it?

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