

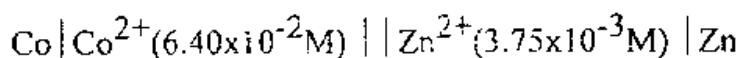
# 國立中央大學八十七學年度轉學生入學試題卷

化學系 三年級

科目：分析化學

共 2 頁 第 1 頁

- 10 1. Which of the following statements are false: **複選題**
- (a) voltammetry is based upon the measurement of a current that develops under complete concentration polarization.
  - (b) Voltammetry differs from electrogravimetry and coulometry in that with the latter ones the concentration polarization is kept at minimum.
  - (c) In voltammetry a large consumption of analyte results in the end.
  - (d) In electrogravimetry essentially all of the analyte is converted to another state.
  - (e) In potentiometry a large current flow through the voltmeter.
- 10 2. The difference between amperometric titration and coulometric titration: **複選題**
- (a) Coulometric titrations carried out with a constant-current source are called amperostatic titrations.
  - (b) The amperometric titration needs indicators or potentiometry to indicate the end-point.
  - (c) In amperometric titrations the cell is seriously polarized; whereas in coulometric titrations the polarization is sometimes circumvented by adding auxiliary agent, such as in the determination of  $\text{Fe}^{+2}$  concentration by adding  $\text{Ce}^{+4}$  in excess.
  - (d) The current efficiency of coulometric titrations does not need to be 100%, as long as it is constant throughout the titration.
  - (e) Both titration methods are based upon redox reactions.
- 15 3. Draw a voltammogram for a mixture of cations A, B, and C with concentration ratio of 1:2:3, and the  $E_{1/2}$  for A, B, and C are 0.2V, -0.4V, and -1.2V, respectively.
- 10 4. Calculate initial potential needed for a current of 0.078 A in the cell, if the cell resistance is  $5.00\Omega$ . ( $E_{\text{Co}^{2+}}^{\circ} = -0.277\text{V}$ ;  $E_{\text{Zn}^{2+}}^{\circ} = -0.763\text{V}$ )



- 20 5. Define the following terms:
- (a) coordination number
  - (b) chelating agent

參考用

注意：背面有試題

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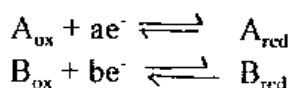
科目: 分析化學

共 2 頁 第 2 頁

(c) zwitterion

(d) buffer capacity

- 10 6. Calculate the hydronium ion concentration of a buffer that is 0.0500 M in KHP and 0.150M in  $K_2P$ .  $K_{a1}=1.12 \times 10^{-3}$ ;  $K_{a2}=3.91 \times 10^{-8}$ .
- 15 7. Generalize an equation for calculating an equilibrium constant from standard potentials, assuming the two half reactions are:



- 10 8. Students measured the concentration of HCl in a solution by titrations using different indicators to find the end-point. Is the difference between indicators 1 and 2 significant at the 95% confidence level?

Bromothymol blue	0.09565 ± 0.00225 (M)	5 measurements
Methyl red	0.08686 ± 0.00098 (M)	6 measurements

**Values of t for Various Levels of Probability**

Degrees of Freedom	Factor for Confidence Interval				
	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

**Critical Values for F at the 5% Level**

Degrees of Freedom (Denominator)	Degrees of Freedom (Numerator)							
	2	3	4	5	6	12	20	∞
2	19.00	19.16	19.25	19.30	19.33	19.41	19.45	19.50
3	9.55	9.28	9.12	9.01	8.94	8.74	8.66	8.53
4	6.94	6.59	6.39	6.26	6.16	5.91	5.80	5.63
5	5.79	5.41	5.19	5.05	4.95	4.68	4.56	4.36
6	5.14	4.76	4.53	4.39	4.28	4.00	3.87	3.67
12	3.89	3.49	3.26	3.11	3.00	2.69	2.54	2.30
20	3.49	3.10	2.87	2.71	2.60	2.28	2.12	1.84
∞	3.00	2.60	2.37	2.21	2.10	1.75	1.57	1.00