NIVERSITY OF JORDAN
HEM. 0303211
Hour Exam II

DEPARTMENT OF CHEMISTRY
ANALYTICAL CHEMISTRY
Second Semester
December 14, 2015

TUDENT'S NAME........ حلقمعروت علي .... Registration no.: 0127870

nstructor's Name:.................................... 15

ecture times:..

eat No.:....10........

Answer Sheet

1	a	b	c	d	E
2	a	b	c	d	E
3	a	b	c	d	E
4	a	b	c	d	E
5	a	b	c	d	E
6	a	b	c	d	E
7	a	b	c	d	E
8	a	b	c	d	E
	a	b	c	d	E

10	a	b	c	d	e
11	a	b	c	d	e
12	a	b	c	d	e
13	a	b	c	d	e
14	a	b	c	d	e
15	a	b	c	d	e
16	a	b	c	d	e
17	a	b	c	d	e
18	a	b	c	d	E

1. Calculate the pH in a solution that is 0.050 M NaOH

a) 13.11
b) 12.70
c) 11.36
d) 10.63
e) 11.59

2. Calculate the pH for a 0.40 M $NaNO_2$ solution. For HNO_2, K_a for HNO_2 = 4.5×10^{-4}

a) 10.25
b) 8.47
c) 5.52
d) 6.24
e) 9.74

3. Calculate the solubility of $SrSO_4$ (K_{sp} = 3.2×10^{-7}) in a solution that contains 0.100 M $Sr(NO_3)_2$.

a) 1.0×10^{-7}
b) 6.4×10^{-7}
c) 3.2×10^{-6}
d) 1.2×10^{-8}
e) 8.0×10^{-7}

4. One of the following pairs of substances can be used as a buffer

a) NH_3/NH_4^+
b) HCl/CH_3COOH
c) HCl/NH_3
d) NH_3/H_2SO_4
e) None of the above

5. In an aqueous solution of acetic acid, CH_3COOH, the solution contains CH_3COOH and CH_3COO^-. The ratio of $[CH_3COO^-]/[CH3COOH]$

a) Increases with pH of the solution up to pH 7 but decreases with increasing pH between pH 7 and pH 14.
b) Increases with pH of the solution
c) Decreases with pH of the solution
d) Independent of the pH of the solution
e) None of the above

Calculate the pH for a solution that contains 0.0200 M NaOCl and 0.0200 M HOCl . K_a for HOCl = 3.0×10^{-8}

pH = pKa + log [A⁻]/[HA] = 7.52

a) 5.66
b) 7.52
c) 8.91
d) 9.91
e) 10.91

7. Calculate the value of the ionic strength in a 0.10 M NaCl + 0.10 M $MgSO_4$ solution.

a) 0.1
b) 0.5
c) 0.4
d) 0.3
e) 0.2

8. The activity coefficient of one of the following species is equal to 1.00 regardless of the ionic species

a) $Fe(CN)_6^{4-}$
b) CH_3COOH
c) Cl^-
d) SO_4^{2-}
e) Br^-

9. Calculate the activity of Ag^+ in a 0.100 M $AgNO_3$ solution. The activity coefficient of Ag^+ at the ionic strength of the solution is 0.95.

a) 0.0095
b) 0.100
c) 0.950
d) 0.0100
e) 0.095

10. Given the ACTIVITY COEFFICIENTS for ions at 25 °C

ION	Activity coefficient at Indicated Ionic Strength				
	0.001	0.005	0.01	0.05	0.1
Ag^+	0.965	0.925	0.897	0.8	0.75
SCN^-	0.965	0.926	0.900	0.81	0.76

Use activities to calculate the solubility of AgSCN in 0.0333 M solution of $Mg(ClO_4)_2$. For AgSCN, the thermodynamic $K_{sp} = 1.1 \times 10^{-12}$.

a) 1.1×10^{-12} M
b) 4.6×10^{-5} M
c) 2.5×10^{-7} M
d) 6.9×10^{-6} M
e) 1.4×10^{-6} M

11. In an aqueous solution saturated with $CuCl_2$, the relevant equilibria are

$CuCl_{2(s)} \rightleftharpoons Cu^{2+} + 2Cl^-$
$2H_2O_{(l)} \rightleftharpoons H_3O^+ + OH^-$

The charge balance equation is

a) Indeterminate
b) $[H_3O^+] + [Cu^{2+}] = [Cl^-] + [OH^-]$
c) $[Cu^{2+}] = 2[Cl^-]$
d) $[H_3O^+] + [Cu^{2+}] = 2[Cl^-] + [OH^-]$
e) $[H_3O^+] + 2[Cu^{2+}] = [Cl^-] + [OH^-]$

12. In an acidic aqueous solution saturated with $NaF_{(s)}$ the relevant equations are :

$NaF_{(s)} \longrightarrow Na^+ + F^-$
$HF(aq) + H_2O \rightleftharpoons H_3O^+ + F^-$

One of the following mass-balance equations is correct:

a) $[Na^+] = [F^-] + [HF]$
b) $[H_3O^+] = [F^-]$
c) $[H_3O^+] = [F^-] + [HF]$
d) $[F^-] = [Na^+]$
e) $[Na^+] = [F^-] - [HF]$

13. Use the systematic approach for solving multiequilbria problems to calculate the solubility of Calicium oxalate CaC2O4 in a solution that has been buffered at pH 2. The equations for the relevant equilibria are given below

$CaC_2O_{4(s)} \rightleftharpoons Ca^{2+} + C_2O_4^{2-}$ $K_{sp} = 1.7 \times 10^{-9}$
$H_2C_2O_4 + H_2O \rightleftharpoons H_3O^+ + HC_2O_4^-$ $K_1 = 5.60 \times 10^{-2}$
$HC_2O_4^- + H_2O \rightleftharpoons H_3O^+ + C_2O_4^{2-}$ $K_2 = 5.42 \times 10^{-5}$
$2H_2O \rightleftharpoons H_3O^+ + OH^-$ $K_w = 1.0 \times 10^{-14}$

a) 8.8×10^{-6}
b) 7.0×10^{-5}
c) 6.2×10^{-4}
d) 4.9×10^{-3}
e) 1.8×10^{-2}

14. Precipitation from a homogeneous solution means:

a) Addition of the precipitating reagent by automatic syringe instead of a burette or pipette.
b) Generation of the precipitating reagent in the solution by a slow chemical reaction
c) Addition of the precipitating reagent with vigorous stirring to the analyte solution
d) Addition of the precipitating reagent very slowly to the analyte solution.
e) Addition of the precipitating reagent homogeneously mixed with some other inert substances

15. The choice of the maximum temperature for drying and ignition of a precipitate in gravimetric analysis is based on:

a) The temperature necessary to remove hydrate water
b) The temperature necessary to convert the precipitate to the pure element
c) The temperature necessary to remove moisture
d) The temperature necessary to reach the constant weighing form
e) None of the above

16. The mercury in a 0.7152 g sample was precipitated with an excess of paraperiodic acid, H_5IO_6:

$$5Hg^{2+} + 2H_5IO_6 \rightarrow Hg_5(IO_6)_2 + 10H^+$$

After filtration, washing and drying, the mass of the precipitate, $Hg_5(IO_6)_2$ (molar mass = 1448.8 g/mole) was 0.3408 g. Calculate the percentage of Hg_2Cl_2 (molar mass = 472.1 g/mole) in the sample.

a) 47.22%
b) 38.82%
c) 56.34%
d) 8.96%
e) 25.67%

17. An aqueous solution contains $NaNO_3$ and KSCN. The thiocyanate ion can be precipitated as AgSCN by addition of $AgNO_3$. After an excess of the $AgNO_3$ has been added, the major ion that makes up the counter-ion layer is

a) SCN^-
b) H^+
c) Ag^+
d) NO_3^-
e) K^+

18. One of the following would increase the particle size of a crystalline precipitate:

a) Fast addition of the reactants
b) Addition of the reagent at high temperature
c) Increasing the concentration of the reagent.
d) Increasing the concentration of the analyte
e) None of the above

THE END THE END THE END THE END THE END TH