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## JORDAN UNIVERSITY OF SCIENCE & TECHNOLOGY Dept of Chemical Sciences, 1<sup>st</sup> Exam, Analytical Chemistry Chem. 233, March 10, 2013

الاسم: .....الرقم الجامعي: .....الشعبة: .....

|   |                         |                          |                |                         |               |                           |                       |                        |                        | •              | _         |             |           | :         | دکتو ر    | 11        | ,       |
|---|-------------------------|--------------------------|----------------|-------------------------|---------------|---------------------------|-----------------------|------------------------|------------------------|----------------|-----------|-------------|-----------|-----------|-----------|-----------|---------|
|   |                         |                          |                |                         |               |                           |                       |                        |                        |                |           |             |           | •         | ~         |           |         |
|   | 1                       | 2                        | 3              | <u>4</u>                | <u>5</u>      | <u>6</u>                  | 7                     | 8                      | 9                      | <u>10</u>      | <u>11</u> | 12          | <u>13</u> | <u>14</u> | <u>15</u> | <u>16</u> |         |
|   |                         |                          |                |                         |               |                           |                       |                        |                        |                |           |             |           |           |           |           |         |
| 1. What is the pH of 0.025 M HCl solution with correct significant figures? A) 1.6 B) 1.60 C) 1.602 D) 2.602  |                         |                          |                |                         |               |                           |                       |                        |                        |                |           |             |           |           |           |           |         |
| 2. Which statement is correct regarding the ionic strength of 0.05 M AlCl <sub>3</sub> solution is:  A. It is independent on its concentration.  B. It is smaller than its concentration.  C. It is six times of its concentration.  D. It is smaller than in 0.20 M NaCl solution. |                         |                          |                |                         |               |                           |                       |                        |                        |                |           |             |           |           |           |           |         |
| 3. With correct significant figures, calculate the answer of following mathematical formula $(12.56\pm0.05)/(1.05\pm0.03)$<br>A) $11.96\pm0.03$ B) $12.0\pm0.03$ C) $11.96\pm0.34$ D) $12.0\pm0.34$   |                         |                          |                |                         |               |                           |                       |                        |                        |                |           |             |           |           |           |           |         |
| 4. In which of<br>K <sub>sp</sub> (Ag <sub>2</sub> CrO <sub>4</sub><br>A) 0.01 M Ag   | ) = 1                   | .2 X                     | 10-11          | 2                       |               |                           |                       |                        |                        |                |           |             |           |           | KNO       | 3         |         |
| 5. Which of the A) Accuracy: B) F- test exast C) Confidence D) Error is the   | is the<br>mine<br>e lim | e deg<br>es ag<br>nits & | ree or<br>reem | of ag<br>ent l<br>est a | reem<br>betwo | nent l<br>een t<br>ned tl | betw<br>wo s<br>hat o | een i<br>tand<br>nly s | neas<br>ard d<br>ystei | levia<br>natio | tions     | s.<br>or is | pres      | ent       | e         |           |         |
| 6. How many solution  |                         |                          |                |                         |               | PO <sub>4</sub>           | (98.0                 | ) g/m                  | ol) a                  | re re          | quir      | ed to       | prej      | pare :    | 500 i     | mL o      | of      |
| A) 8.65 g   |                         |                          |                | B) '                    | 7.10          | g                         |                       |                        | C) 5                   | g 00.          | 5         |             |           |           | D)        | 5.76      | g       |
| 7. How many 0.001 mc Pb <sup>2+</sup> + 2.  | ol Pb                   | $a^{2+}$ a               | nd gi          |                         |               |                           |                       |                        | oreci                  | pitat          | e the     | lead        | l in a    | solu      | ıtion     | cont      | taining |
| A) 10.0 mL  |                         | 2                        |                | B) 1                    | 1.0 r         | nL                        |                       |                        | C) 2                   | 2.0 n          | nL        |             |           | D) 2      | 4.0 r     | nL        |         |

| 8. Activity coefficient of and charge (n) of M  |   | n always increas  | ses if ionic st                                      | rength of solution                                     |
|---|---|---|--|--|
| A) Increases, increases   |   | decreases   |  |  |
| C) Increases, decreases   | D) Decreases,   | increases   |  |  |
| 9. Which statement is con<br>A) Two sets of a<br>B) It is necessar<br>C) Tabulated "t'<br>D) The true valu  | replicates are obtry that N1 equals "is calculated at | tained by two di<br>N2.<br>N1+N2-1 degre                      | fferent methor                                       | ods.   |
| 10. What is the concentra K <sub>2</sub> SO <sub>4</sub> (174.2 g/mol   |   | g/mol) in part p  | er million (p  | pm) in a 1.0 x 10 <sup>-4</sup> M                      |
| A. 3.91 ppm B) 7.   |   | C) 17.42 ppm  | D) 8.  | 71 ppm   |
| 11. Consider the following 5.28. If the replicate deviation of these real. 5.30, 0.10 B. 5.30   | 5.55 is question plicates are: (Q(                    | able; after apply<br>table)= 0.690 )                          | ying Q-test, the                                     | he average and standard                                |
| 12. What mass (mg) of K 0.0116 M MnO <sub>4</sub> <sup>-</sup> , according 5C <sub>2</sub> O <sub>4</sub> <sup>2-</sup> + 2MnO <sub>4</sub> A) 78.56 mg B) 62.8 | ding to following $0_4^- + 16H^+ \rightarrow 2$       | g equation? $2Mn^{+2} + 8H_2O +$                              | + 10 CO <sub>2</sub>                                 | y react with 32.6 mL of                                |
| 13. How many mgs of K ppm P <sub>2</sub> O <sub>5</sub> (142 g/mg   | ol)?  |   |  |  |
| A) 74.8 mg B) 37  | '.4 mg  | C) 112.1 mg   | D) 2   | 12.3 mg  |
| 14. Consider the following $F^- + H_2O \leftrightarrow HF + O$ reaction: $HF \leftrightarrow H^+$   | $H^{-}$ K2=1.47 x 10                                  | onstants: H <sub>2</sub> O ← O <sup>-11</sup> . Calculate the | → H <sup>+</sup> + OH <sup>-</sup><br>he equilibrium | K1= 1.0 x 10 <sup>-14</sup> and m constant (K) for the |
|   | B) 6.8 x 10 <sup>-6</sup>                             | C) 1.0  | x 10 <sup>-14</sup>                                  | D) 6.8 x 10 <sup>-4</sup>                              |
| 15. What is the activity α size α= 400 pm   | coefficient of OH                                     | Tion in 0.010 M   | I NaCl soluti  | on, given that the ion                                 |
| A) 0.964 B) 0.  | 901   | C) 0.815  | D) 0.  | 77   |
| 16. The concentration of sample are containing  |   | in soil sample is   | s 250 ppb. Ho  | ow many grams of                                       |
| A) 6.0 g B) 6   |   | g   | D) 6000 g  |  |
|   |   |   |  |  |

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|   | ىلسل  | التس                               |  | :                              | الشعبة                                  | ١                         |                       |                        |                | معی:-         | ء الحاد               | ۔الر قد |                  |             |           |           | الاسم:  |
|---|---|------------------------------------|--|--------------------------------|---|---------------------------|-----------------------|------------------------|----------------|---------------|-----------------------|---------|------------------|-------------|-----------|-----------|---------|
| ·   |   |                                    |  | •                              | •                                       |                           |                       |                        |                | ي.            | -                     |         |                  | :           | دكتور     | ــــالـ   | الاسم:  |
|   | 1   | 2                                  | 3  | 4                              | <u>5</u>                                | <u>6</u>                  | 7                     | 8                      | 9              | 10            | <u>11</u>             | 12      | <u>13</u>        | <u>14</u>   | <u>15</u> | <u>16</u> |         |
|   |   |                                    |  |                                |   |                           |                       |                        |                |               |                       |         |                  |             |           |           |         |
| 1. What is the A) 1.6   | е рН  |                                    | 0.025<br>1.60  |                                | HCl                                     | solu                      |                       | with<br>1.60           |                | ect s         | ignif                 |         | t figi<br>2.60   |             | •         |           | ı       |
| 2. Which state A. It is indepe B. It is smalle C. It is five tin D. It is smalle 3. With corre                          | ender<br>or that<br>mes or<br>or that<br>ect si | nt on<br>in its<br>of its<br>in in | concession of the concession o | conce<br>centr<br>centr<br>M N | entraration<br>ration<br>ration<br>NaCl | tion.<br>1.<br>n.<br>solu | tion.                 |                        |                |               |                       |         |                  |             |           |           |         |
| $(12.56 \pm A) 11.96 \pm 0.0$   |   | ,                                  |  |                                | ,                                       |                           | C)                    | 11.9                   | 6 ± (          | 0.34          |                       | D)      | 12.0             | $0 \pm 0$ . | .03       |           |         |
| 4. In which of $K_{sp}(Ag_2CrO_4)$  | ) = 1   | .2 X                               | $10^{-1}$  | 2                              |   |                           |                       |                        |                |               |                       |         |                  |             | ALO.      |           |         |
| A. 0.01 M Ag  | ;NO <sub>3</sub>                                | ; B)                               | 0.01   | Mŀ                             | C <sub>2</sub> Cr                       | $O_4$                     | <b>C</b> )            | 0.05                   | МГ             | NaNC          | <b>J</b> <sub>3</sub> | D)      | 0.10             | M           | KNO       | 3         |         |
| <ul><li>5. Which of the A) Accuracy is</li><li>B) F- test exact</li><li>C) Confidence</li><li>D) Error is the</li></ul> | is the<br>mine<br>e lim                         | e deg<br>es ag<br>nits &           | gree (<br>reem<br>& t- to  | of ag<br>ent l<br>est a        | reem<br>oetwo<br>ssum                   | nent l<br>een t<br>ned tl | betw<br>wo a<br>nat o | een i<br>vera<br>nly s | ges (<br>syste | (mea<br>matic | ns)<br>e erre         | or is   | pres             | ent         | t         |           |         |
| 6. How many solution  | _   |                                    |  |                                |   | PO <sub>4</sub>           | (98.0                 | ) g/m                  | ol) a          | ıre re        | quir                  | ed to   | pre <sub>l</sub> | pare        | 500       | mL (      | of      |
| A) 8.65 g   |   |                                    | 5  |                                | 7.10                                    | g                         |                       |                        | C) 5           | .00 g         | 3                     |         |                  |             | D)        | 5.76      | g       |
| 7. How many 0.001 mc Pb <sup>2+</sup> + 21  | ol Pb   | $a^{2+}$ a                         | nd gi  |                                |   |                           |                       |                        | preci          | pitat         | e the                 | lead    | l in a           | solu        | ıtion     | cont      | taining |
| A) 10.0 mL  |   | 2                                  | , ,  | B) 1                           | 1.0 r                                   | nL                        |                       |                        | C) 2           | 2.0 r         | nL                    |         |                  | D) 2        | 4.0 r     | nL        |         |

| <b>8.</b> Activity coefficient of I and charge (n) of M <sup>n</sup>   |  | n always decrea  | ses if ionic s                                     | trength of solution                                  |
|--|--|--|--|--|
| A) Increases, increases  |  | decreases  |  |  |
| C) Increases, decreases  |  |  |  |  |
| 9. Which statement is not A) Two sets of r B) It is not necess C) Tabulated "t" D) The true value  | eplicates are obt<br>ssary that N1 eq<br>'is calculated at | tained by two di<br>uals N2.<br>N1+N2-2 degre          | fferent metho                                      | ods.   |
| 10. What is the concentration K <sub>2</sub> SO <sub>4</sub> (174.2 g/mol)   |  | g/mol) in part p                                       | er million (p                                      | pm) in a 5.0 x 10 <sup>-5</sup> M                    |
| A. 3.91 ppm B) 7.8   |  | C) 17.42 ppm   | D) 8.  | 71 ppm   |
| 11. Consider the followin<br>5.28. If the replicate<br>deviation of these rep<br>A. 5.30, 0.10 B. 5.3  | 5.55 is question plicates are: (Q(                         | able; after apply<br>table)= 0.690 )                   | ving Q-test, the                                   | he average and standard                              |
| 12. What mass (mg) of K <sub>2</sub><br>0.0116 M MnO <sub>4</sub> <sup>-</sup> , accord<br>5C <sub>2</sub> O <sub>4</sub> <sup>2-</sup> + 2MnO <sub>4</sub><br>A) 78.56 mg B) 62.8 | ling to following $0_4^- + 16H^+ \rightarrow 2$            | g equation?<br>2Mn <sup>+2</sup> + 8H <sub>2</sub> O + | - 10 CO <sub>2</sub>                               | y react with 16.3 mL of                              |
| 13. How many mgs of K<br>ppm P <sub>2</sub> O <sub>5</sub> (142 g/mo   | 01)?   | · •  |  |  |
| A) 74.8 mg B) 37   | .4 mg  | C) 112.1 mg  | D) 21  | 12.3 mg  |
| 14. Consider the following HF $\leftrightarrow$ H <sup>+</sup> + F <sup>-</sup> K2=6<br>F <sup>-</sup> + H <sub>2</sub> O $\leftrightarrow$ HF + O                                 | 5.8 x 10 <sup>-4</sup> . Calcu                             | onstants: $H_2O \leftarrow$ late the equilibr          | → H <sup>+</sup> + OH <sup>-</sup><br>rium constan | $K1=1.0 \times 10^{-14}$ and t (K) for the reaction: |
| A) 1.47 x 10 <sup>-11</sup>  |  | C) 1.0 x   | x 10 <sup>-14</sup>                                | D) 6.8 x 10 <sup>-4</sup>                            |
| 15. What is the activity c size α= 400 pm  | oefficient of OH   | Tion in 0.050 M  | I NaCl soluti                                      | on, given that the ion                               |
| A) 0.964 B) 0.9  | 901  | C) 0.815   | D) 0.  | 77   |
| 16. The concentration of sample are containin  |  | in soil sample is                                      | 250 ppb. Ho  | ow many grams of                                     |
| A) 6.0 g B) 60   |  | g  | D) 6000 g  |  |
|  |  |  |  |  |

## JORDAN UNIVERSITY OF SCIENCE & TECHNOLOGY Dept of Chemical Sciences, 1<sup>st</sup> Exam, Analytical Chemistry Chem. 233, March 10, 2013

|   | ىلسىل   | التس       |            | :2            | الشعبأ   |                   |                |             |       | معی:.     | م الجا    | - الرق    |        |        |       |      | لاسم:   |
|---|---|------------|------------|---------------|----------|-------------------|----------------|-------------|-------|-----------|-----------|-----------|--------|--------|-------|------|---------|
|   |   |            |            |               |          |                   |                |             |       | •         | -         |           |        | :      | دكتور | 1    |         |
|   | 1   | 2          | 3          | 4             | <u>5</u> | <u>6</u>          | 7              | <u>8</u>    | 9     | <u>10</u> | <u>11</u> | <u>12</u> |        |        |       |      |         |
|   |   |            |            |               |          |                   |                |             |       |           |           |           |        |        |       |      |         |
| <ul> <li>I. What is the pH of 0.025 M HCl solution with correct significant figures?</li> <li>A) 1.60 B) 1.6 C) 1.602 D) 2.602</li> <li>2. Which statement is correct regarding the ionic strength of 0.05 M AlCl<sub>3</sub> solution is:</li> <li>A. It is independent on its concentration.</li> <li>B. It is smaller than its concentration.</li> <li>C. It is six times of its concentration.</li> <li>D. It is smaller than in 0.20 M NaCl solution.</li> </ul> |   |            |            |               |          |                   |                |             |       |           |           |           |        |        |       |      |         |
| $(12.56 \pm$  | <ul> <li>3. With correct significant figures, calculate the answer of following mathematical formula (12.56 ± 0.05)/ (1.05 ± 0.03)</li> <li>A) 11.96 ± 0.03 B) 12.0 ± 0.03 C) 11.96 ± 0.34 D) 12.0 ± 0.34</li> </ul>  |            |            |               |          |                   |                |             |       |           |           |           |        |        |       |      |         |
| 4. In which of K <sub>sp</sub> (Ag <sub>2</sub> CrO <sub>4</sub> ) A) 0.01 M K <sub>2</sub>   | )=1   | .2 X       | $10^{-12}$ | 2             |          |                   |                |             |       |           |           |           |        |        | .10 N | M KI | $NO_3$  |
| <ul><li>A) Accuracy i</li><li>B) F- test exam</li><li>C) Confidence</li></ul>   | A) 0.01 M K <sub>2</sub> CrO <sub>4</sub> B) 0.01 M AgNO <sub>3</sub> C) 0.05 M NaNO <sub>3</sub> D) 0.10 M KNO <sub>3</sub> 5. Which of the following statements is correct?  A) Accuracy is the degree of agreement between replicates of a measurement B) F- test examines agreement between two averages (means)  C) Confidence limits & t- test assumed that only systematic error is present D) Error is the absolute difference between measured value and true value. |            |            |               |          |                   |                |             |       |           |           |           |        |        |       |      |         |
| 6. How many solution  | _   |            |            |               |          | PO <sub>4</sub> ( | (98.0          | g/m         | ol) a | re re     | quir      | ed to     | prep   | pare   | 500   | mL o | of      |
| A) 8.65 g   | 01 0.   | 10 10      | 111,1      | -             | 7.10     | g                 |                |             | C) 5  | .00 g     | 5         |           |        |        | D)    | 5.76 | g       |
| 7. How many 0.001 mc Pb <sup>2+</sup> + 21  | ol Pb   | $a^{2+}$ a | nd gi      | M Na<br>iving | aI ar    | e req<br>% ex     | uired<br>cess' | d to p<br>? | preci | pitato    | e the     | leac      | l in a | . solu | ıtion | con  | taining |
| A) 10.0 mL  |   |            |            | B) 1          | 1.0 r    | nL                |                |             | C) 2  | 4.0 n     | nL        |           |        | D) 2   | 2.0 r | nL   |         |

| 8. Activity coefficient of M and charge (n) of M <sup>n</sup>  | M <sup>n+</sup> in a solutio                           | on always decrea                                       | ases if ior         | nic strength of s | solution                      |
|--|--|--|---------------------|-------------------|-------------------------------|
| A) Increases, increases C) Increases, decreases  | B) Decreases,  |  |                     |                   |                               |
| <ul><li>9. Which statement is corr</li><li>A) Two sets of re</li><li>B) It is necessary</li><li>C) Tabulated "t"</li><li>D) The true value</li></ul>                   | eplicates are ob<br>that N1 equals<br>is calculated at | tained by two dis N2. t N1+N2-1 degr                   | ifferent n          | nethods.          |                               |
| 10. What is the concentrat K <sub>2</sub> SO <sub>4</sub> (174.2 g/mol)  |  | g/mol) in part p                                       | er millio           | n (ppm) in a 1.   | $0 \times 10^{-4} \mathrm{M}$ |
| A. 3.91 ppm B) 8.7   |  | C) 17.42 ppm   | Ι                   | O) 7.82 ppm       |                               |
| 11. Consider the following 5.28. If the replicate 3 deviation of these rep A. 5.30, 0.10 B. 5.30   | 5.55 is question olicates are: (Q(                     | nable; after apply<br>(table)= 0.690 )                 | ying Q-te           | est, the average  |                               |
| 12. What mass (mg) of K <sub>2</sub><br>0.0116 M MnO <sub>4</sub> <sup>-</sup> , accord<br>5C <sub>2</sub> O <sub>4</sub> <sup>2-</sup> + 2MnO<br>A) 78.56 mg B) 157.2 | ing to following $+ 16H^+ \rightarrow 2$               | g equation?<br>2Mn <sup>+2</sup> + 8H <sub>2</sub> O - | + 10 CO             | 2                 | n 32.6 mL of                  |
| 13. How many mgs of K <sub>3</sub> ppm P <sub>2</sub> O <sub>5</sub> (142 g/mol  | _  | mol) are require                                       | ed to prep          | pare 250 mL so    | olution of 50.0               |
| A) 74.8 mg B) 112  | 2.1 mg   | C) 37.4 mg   | Ι                   | O) 212.3 mg       |                               |
| 14. Consider the followin<br>$HF \leftrightarrow H^+ + F^- K2 = 6$<br>$F^- + H_2O \leftrightarrow HF + OF$   | .8 x 10 <sup>-4</sup> . Calc                           | ulate the equilib                                      | rium con            | stant (K) for the | e reaction:                   |
| A) 1.47 x 10 <sup>-11</sup>  | B) 6.8 x 10 <sup>-6</sup>                              | C) 1.0   | x 10 <sup>-14</sup> | D) 6.8 x          | 10 <sup>-4</sup>              |
| 15. What is the activity co $\alpha$ = 400 pm  | pefficient of OF                                       | T ion in 0.10 M  | NaCl sol            | lution, given th  | at the ion size               |
| A) 0.964 B) 0.9  | 01   | C) 0.815   | Ι                   | 0) 0.77           |                               |
| 16. The concentration of C sample are containing   |  | -  | s 250 ppt           | o. How many g     | rams of                       |
| A) 6.0 g B) 60   |  |  | D) 6000             | g                 |                               |