

Chemistry 1020 Sample 3 for Hour Exam #6 (15B, 17, & 16) Revised by SJB, 4/2002

.....**Each of the following questions is worth 7 points**.....

You should study your text, study your handbook modules, and review your drill quizzes BEFORE taking this exam. When taking it you should only use a periodic table and a calculator. After completing the ENTIRE test, check your answers against those available in your handbook. Do NOT study for this exam by merely looking at the answers.

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1. Will a precipitate form if 25 mL of 1.2×10^{-4} M magnesium iodide is mixed with 35 mL of 2.5×10^{-4} M potassium fluoride?
 - A. Q value is 7.3×10^{-9} , so precipitate will form.
 - B. Q value is 7.3×10^{-9} , so precipitate will not form.
 - C. Q value is 1.1×10^{-12} , so precipitate will form.
 - D. Q value is 1.1×10^{-12} , so precipitate will not form.
 - E. None of the above is correct.

2. A certain reaction is found to proceed with an enthalpy change of 3.9 kcal and an entropy change of 24 cal/K. What is the free energy change for the reaction at 178°C?
 - A. -3.7 kcal
 - B. -10.8 kcal
 - C. 14.7 kcal
 - D. -4.3 kcal
 - E. -6.9 kcal

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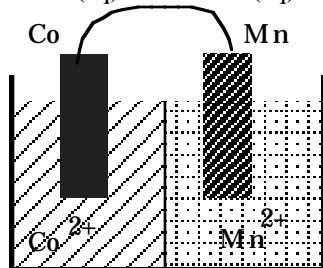
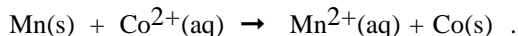
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3. **K-TYPE Answer Format:** Mark *a* if A, B, C are correct; *b* if A, C; *c* if B, D; *d* if D only; *e* otherwise.

Choose the correct statements concerning the cell diagrammed below using K-TYPE answer format.



- A. If manganese nitrate were added to the Mn half-cell, the voltage of the cell would decrease.
- B. The Mn electrode is the anode.
- C. Electrons move from the Mn to the Co electrodes as the battery operates.
- D. The Mn^{2+} ions move toward the Mn electrode as the battery operates.
4. Which of the following indicates what happens if acetaldehyde condenses at 400°C ? Its melting point is -121°C and its boiling point is 21°C .
- A. Free energy decreases, entropy decreases, and enthalpy increases.
- B. Free energy increases, entropy decreases, and enthalpy decreases.
- C. Free energy decreases, entropy increases, and enthalpy decreases.
- D. Free energy increases, entropy increases, and enthalpy increases.
- E. Free energy decreases, entropy decreases, and enthalpy decreases.

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5. If a saturated solution of the base $M(OH)_2$ has a pH of 11.00, what is the K_{sp} of $M(OH)_2$?

(CHALLENGE QUESTION)

- A. 1.0×10^{-30} B. 5.0×10^{-10} C. 1.0×10^{-12} D. 5.0×10^{-8} E. 2.0×10^{-12}

6. Given the reaction $Zn(s) + Cu^{2+}(aq) \rightarrow Zn^{2+}(aq) + Cu(s)$ choose the correct statments using **K-TYPE** Answer Format: *Mark a if A, B, C are correct; b if A, C; c if B, D; d if D only; e otherwise.*
- A. Zn is oxidizing agent in the reaction above.
 - B. Cu^{2+} gains electrons as the reaction above proceeds.
 - C. Cu^{2+} is oxidized as the reaction above proceeds.
 - D. If the reaction $X(s) + Y^{2+}(aq) \rightarrow X^{2+}(aq) + Y(s)$ proceeds spontaneously, then X(s) is a better reducing agent than Y(s).

7. Calculate the emf for the reaction $3 Ag^+(aq) + Cr(s) \rightarrow 3 Ag(s) + Cr^{3+}(aq)$, under standard conditions.
- A. -1.54 v B. 1.54 v C. 0.06 v D. 3.14 v E. -3.14 v

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8. The solubility of cadmium(II) carbonate is 2.3×10^{-6} M. What is the K_{sp} of the compound?
- A. 8.3×10^{-3} B. 7.3×10^{-22} C. 5.3×10^{-12} D. 1.5×10^{-3} E. 4.7×10^{-17}
9. Copper metal can be plated from a solution containing copper(II) nitrate. How many grams of copper will be plated out with a current of 3.6 amps in 0.50 hours?
- A. 4.3 g B. 2.1 g C. 0.071 g D. 0.036 g E. 64 g
10. **K-TYPE** answer format: *Mark a if A,B,C are correct; b if A, C; c if B, D; d if D only; e otherwise.*
- A. A negative ΔH would indicate that a reaction would occur slowly.
B. It is possible for both $A \rightarrow 2 B$ and $2 B \rightarrow A$ to be spontaneous at the same temperature.
C. Entropy is a measure of the energy available to do work under conditions of constant pressure.
D. A reaction in which free energy decreases would be spontaneous.
11. If $I^{-}(aq) + MnO_4^{-}(aq) \rightarrow I_2(aq) + MnO_2(s)$ (basic solution) is balanced, the sum of the coefficients of the products would be
- A. 3 B. 5 C. 13 D. 9 E. 17

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12. The K_{sp} of silver (I) sulfide is 2.6×10^{-49} . What is the solubility of silver(I) sulfide in water?
A. 5.1×10^{-25} M B. 4.0×10^{-17} M C. 3.1×10^{-13} M D. 6.8×10^{-98} M E. 6.4×10^{-17} M
13. What is the solubility of silver(I) iodide in 0.20 M sodium iodide ?
A. 1.5×10^{-16} M B. 7.5×10^{-16} M C. 3.8×10^{-16} M D. 1.2×10^{-8} M E. 1.2×10^{-15} M
14. A certain reaction is found to proceed in such a way that heat is absorbed and entropy decreases. Which of the following correctly describes the reaction?
A. The reaction is spontaneous at all temperatures.
B. The reaction is spontaneous at high temperatures, but not at low.
C. The reaction is spontaneous at low temperatures, but not at high.
D. The reaction is not spontaneous at any temperature.
E. There is no way to choose an answer from the above on the basis of the information provided.

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15. Choose the correct statements from the following using **K-TYPE** answer format: *Mark a if A,B,C are correct; b if A, C; c if B, D; d if D only; e otherwise.*
- A. AgCl is more soluble in pure water than in 0.1 M NaCl.
 - B. The solubility of Mg(OH)₂ increases as the acidity of the solution in which it is dissolving increases.
 - C. If it appears in an aqueous reaction alone, [Cu(NH₃)₄]²⁺ would have to be in solution, i.e. could not be a solid.
 - D. Al(OH)₃ is probably soluble in water.
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16. **K-TYPE Answer Format:** *Mark a if A,B,C are correct; b if A, C; c if B, D; d if D only; e otherwise.*
- A. The oxidation number of N in KNH₂ is -3.
 - B. Cl₂ is a better oxidizing agent than NO₃⁻.
 - C. O₂, Cl₂, MnO₄⁻ are common oxidizing agents.
 - D. Pb is a better reducing agent than Zn.

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| No. in Q-Bank | No. on Test | Correct Answer |
|------------------|----------------|----------------|
| 46 | 1 | D |
| 35 | 1 | E |
| 45 | 1 | A |
| 36 | 1 | B |
| 48 | 1 | B |
| 42 | 1 | C |
| 40 | 1 | B |
| 38 | 1 | C |
| 41 | 1 | B |
| 34 | 1 | D |
| 44 | 1 | C |
| 37 | 1 | B |
| 47 | 1 | C |
| 33 | 1 | D |
| 39 | 1 | A |
| 43 | 1 | A |