

Chemistry 1020 Sample 4 for Hour Exam #5 (14A, 14B, & 15A) 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. 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 salt NH_4Br is related to the acid HBr .
 - B. NaOH reacts with H_3PO_4 to produce the Na_3PO_4 and water.
 - C. A solution which is 0.005 M in CH_3NH_2 and 0.005 in $\text{CH}_3\text{NH}_3\text{NO}_3$ would have buffer properties.
 - D. A solution prepared by adding Na_2S to water would have good buffer properties.

- 2. 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. In the reaction $\text{Ni}^{2+} + 6 \text{F}^- \rightarrow [\text{NiF}_6]^{4-}$, F^- functions as a Lewis base.
 - B. In the equation $\text{BF}_3 + \text{NH}_3 \rightarrow \text{BF}_3\text{NH}_3$, NH_3 acts as a Lewis acid.
 - C. In the reaction $\text{CN}^- + [\text{Fe}(\text{H}_2\text{O})_6]^{2+} \rightarrow [\text{FeCN}(\text{H}_2\text{O})_5]^+ + \text{H}_2\text{O}$, $[\text{Fe}(\text{H}_2\text{O})_6]^{2+}$ functions as a Lewis acid.
 - D. By definition a Lewis acid donates a H^+ during a reaction.

- 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.*
 - A. In the equation $\text{HF} + \text{H}_2\text{O} \rightarrow \text{F}^- + \text{H}_3\text{O}^+$, HF acts as a Bronsted-Lowry base.
 - B. In the equation $\text{HCOOH} + \text{H}_2\text{SO}_3 \rightarrow \text{H}_2\text{COOH}^+ + \text{HSO}_3^-$, HCOOH acts as a Bronsted-Lowry acid.
 - C. NH_3 is the conjugate acid of NH_4^+ .
 - D. According to Bronsted-Lowry, an acid is a substance which donates H^+ .

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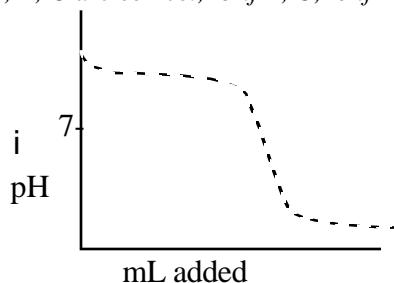
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4. What is the pH of a 0.42 M solution of ammonia?
A. 11.44 B. 8.88 C. 2.56 D. 5.12 E. 9.19

5. **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 curve in the diagram provided represents the titration of a base by an acid.
B. The substance being titrated is a weak electrolyte.
C. The equivalence point on the titration curve is at $\text{pH} < 7$.
D. An acid with a $K_a = 1.8 \times 10^{-4}$ is stronger than one with a $K_a = 7.8 \times 10^{-1}$.
6. **CHALLENGE:** What is the percent ionization of a 1.5 M solution of acetic acid? (15A-Challenge)
A. 0.35% B. 0.0018 % C. 1.5 % D. 100 % E. 0.28 %

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7. What is the pOH of a 0.00032 M solution of nitric acid?
A. 3.49 B. 10.51 C. 10.81 D. 7.00 E. 3.19
8. What is the pOH of a solution whose hydrogen ion concentration is 10^{-5} M?
A. 9 B. 3 C. 7 D. 11 E. 5
9. **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. HI is a less acidic than HBr.
B. H_2SeO_4 is less acidic than H_2SeO_3 .
C. HBrO is more acidic than HClO.
D. HF is more acidic than H_2O .
10. What is the pH of a 0.20 M solution of sodium formate?
A. 8.52 B. 5.48 C. 11.78 D. 10.95 E. 2.22

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11. How does the pH change when $[H^+]$ is decreased to 1/1,000,000 of its original value?
- A. It increases by 6 units.
 - B. It decreases by 6 units.
 - C. It becomes 1,000,000 times larger.
 - D. It decreases to 1/1,000,000 of its original value.
 - E. It is not affected.
12. Choose the substances which are correctly described 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. HI is a strong acid.
 - B. $Ba(OH)_2$ is a strong base.
 - C. H_3BO_3 is a polyprotic acid.
 - D. ClO^- is a stronger base than NH_3 .
13. What is the pH of a solution prepared by adding 200.0 ml of 0.400 M hydroiodic acid to 100.0 ml of 0.150 M barium hydroxide?
- A. 13.336 B. 15.699 C. 13.222 D. 0.778 E. 0.664

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14. What happens to the $[H^+]$ of a solution if its pOH decreases by 6 units?
- A. It increases to 1,000,000 times as large as the original value.
 - B. It decreases to 1/1,000,000 of the original value.
 - C. It becomes 6 times as large as the original value.
 - D. It decreases to 1/6 of the original value.
 - E. It is not affected
15. **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. If KNO_3 were dissolved in water, the resulting solution would consist mostly of KNO_3 molecules with only a few K^+ and NO_3^- ions.
 - B. If the pOH of a solution is 5.2, then its pH is 9.8.
 - C. A solution with a $[H^+] = 8.6 \times 10^{-8}$ M would be acidic.
 - D. A solution of NH_4Cl would turn blue litmus red.
16. What is the pH of a solution which is 0.40 M in ammonia and 0.10 M in ammonium chloride?
- A. 9.18 B. 5.35 C. 8.65 D. 9.85 E. 4.15

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No. in Q-Bank	No. on Test	Correct Answer
27	2	1 A
21	2	2 B
22	2	3 D
31	2	4 A
26	2	5 A
17	2	6 A
24	2	7 B
29	2	8 A
20	2	9 D
32	3	10 A
25	2	11 A
18	2	12 A
19	2	13 D
30	2	14 B
23	2	15 D
28	2	16 D