

1. Which of the following pairs of solutions would result in a buffer upon mixing?

1. 25 mL of 4 M HCl & 15 mL of 4 M HNO₂
2. 200 mL of 0.5 M LiOH & 100 mL of 0.5 M H₂SO₄
3. 100 mL of 1 M NH₃ & 10 mL of 10 M HNO₃
4. 150 mL of 3 M Ba(OH)₂ & 200 mL of 2 M HClO
5. 100 mL of 1 M CH₃COOH & 50 mL of NaOH

2. What would be the pH of a solution prepared from 2 L of H₂O, 85 g of NH₃ and 98 g of NH₄Br?

Assume the K_b of ammonia is 2x10⁻⁵.

1. 4
2. 5.4
3. 10
4. 8.6
5. 7

3. Two liters of a buffer containing 0.6 M CH₃NH₂ and 0.8 M CH₃NH₃Cl has 102.4 g of HI added to it.

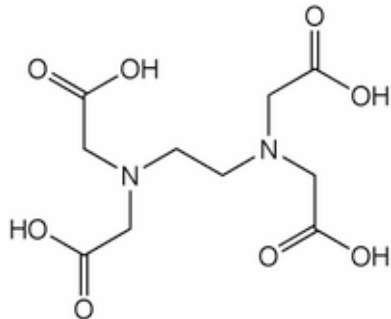
What is the new pH? Assume the K_b of CH₃NH₃ is 6x10⁻⁴.

1. 6
2. 3
3. 11
4. 4
5. 10
6. 8

4. A 0.08 M CH₃NH₂ solution is titrated against a 0.08 M HCl solution. Assuming the K_b of CH₃NH₂ is 4x10⁻¹⁰, what is the pH at the equivalence point?

1. 3
2. 7
3. 9
4. 5
5. not enough information

5. Consider the molecule ethylenediaminetetraacetic acid (EDTA):



As drawn above, how many K_a would be needed to describe the complete deprotonation of EDTA?

1. 4
2. 6
3. 3
4. 5

6. What would be the difference in pH of a 1 M solution of NaH₂AsO₄ and a 1 M solution of Na₂HAsO₄? Assume H₃AsO₄ has a pK_{a1} of 2 and a pK_{a2} of 7 and a pK_{a3} of 12.

1. 7
2. 4.5
3. 9.5
4. 5
5. 2.5

6. 1.5

7. A student erroneously calculated that a solution consisting solely of a weak base dissolved in water had a pH of 6. Which two of the following might have been true?

I. $K_b < 10^{-11}$

II. $K_b > 10^{-3}$

III. $C_b > 10^{-1}$

IV. $C_b < 10^{-4}$

1. I and IV only
2. II and III only
3. I and III only
4. II and IV only

8. An aqueous system with Na_2CO_3 , NaCl and NH_4Cl dissolved in it would require how many equations for a full solution?

1. 3
2. 7
3. 4
4. 6
5. 9