Acids and Bases: Stoichiometry

1. The [OH-(aq)] in a solution made by mixing 50.0 mL of 0.100 HCl(aq) with 200 mL of 0.300 NaOH(aq) is \_\_\_\_\_\_\_\_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 0.240 |
| b | 0.0400 |
| c | 0.275 |
| d | 0.220 |

1. When 100 mL of 1.00 HCl(aq) is added to 100 mL of 2.00  NaOH(aq), the final mixture has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| a | pH greater that 7 |
| b | pH less than 6 |
| c | [OH-(aq)] that is equal to [H3O+(aq)] |
| d | [OH-(aq)] that is less than [H3O+(aq)] |

1. A 900 mL sample of 1.80  HCl(aq) solution is added to 300 mL of 0.400  NaOH(aq) solution. The resulting [H3O+(aq)] is \_\_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 1.25 |
| b | 0.925 |
| c | 0.300 |
| d | 0.120 |

1. If 200 mL of 0.300  HCl(aq) is added to 300 mL of 0.150  NaOH(aq) then the equilibrium [H3O+(aq)] is \_\_\_\_\_\_ .

|  |  |
| --- | --- |
| a | 0.0150 |
| b | 0.0300 |
| c | 0.0500 |
| d | 0.0750 |

1. A 20.0 mL sample of 0.300  NaOH(aq) is required o completely react with 30.0 mL of HNO3(aq). The concentration of the nitric acid is \_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 2.56 |
| b | 1.56 |
| c | 0.450 |
| d | 0.200 |

1. Chromium(VI) oxide is used to form the highly acidic "chromic acid" in chromium plating solution. Production of "chromic acid" is

**2 CrO3(s) + H2O(l) 🡪 H2Cr2O7(aq)**

The "chromic acid" ionizes completely in water according to the following reaction.

H2Cr2O7(aq) + H2O(l) 🡪 H3O+(aq) + HCr2O7-(aq)

What is the pH in a chromium plating solution in a 1.00 kL tank when 24.0 of CrO3(s) is dissolved?

|  |  |
| --- | --- |
| a | 0.620 |
| b | 0.958 |
| c | -0.380 |
| d | 0.544 |

1. Which 50.0 mL solution requires the greatest volume of 0.100 HCl(aq) to completely react with it?

|  |  |
| --- | --- |
| a | 0.100  NaOH(aq) |
| b | 0.100 NH3(aq) |
| c | 0.100  Ba(OH)2(aq) |
| d | 0.100 HOOCCOOH(aq) |

1. A hydrochloric acid solution(HCl(aq)) is standardized using pure Na2CO3(s) as the primary standard. If 30 mL of the acid is required to react completely with a 0.50 g sample of Na2CO3(s) , what is the pH of the HCl(aq)?

|  |  |
| --- | --- |
| a | 2.02 |
| b | 1.10 |
| c | 0.80 |
| d | 0.50 |

1. During a titration, a 25 mL sample of HCl(aq) of unknown concentration was titrated with 0.20  NaOH(aq). The equivalence point was reached after 21 mL of NaOH(aq) were added. The concentration of the HCl(aq) was calculated and found to be \_\_\_\_\_\_\_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 0.010 |
| b | 0.17 |
| c | 0.20 |
| d | 0.25 |

1. A 275 mL sample of 0.400 HCl was titrated with 100 mL of KOH(aq) to reach the endpoint. The concentration of the KOH(aq) was \_\_\_\_ 

|  |  |
| --- | --- |
| a | 0.400 |
| b | 0.800 |
| c | 1.10 |
| d | 2.20 |

1. A student titrates 10.0 mL of H2SO4(aq) solution with 0.020 of NaOH(aq) solution. If 30.0 mL of NaOH(aq) are required to completely neutralize the solution, the concentration of the acid is \_\_\_\_ 

|  |  |
| --- | --- |
| a | 6.0 x 10-2 |
| b | 3.0 x 10-2 |
| c | 6.0 x 10-1 |
| d | 3.0 x 10-1 |

1. The volume of 0.40 KOH(aq) that is required to neutralize 0.080 L of 0.20 HNO3(aq) is \_\_\_\_ L

|  |  |
| --- | --- |
| a | 0.202 |
| b | 0.040 |
| c | 0.080 |
| d | 0.16 |

1. A 0.409 g sample of impure methanoic acid (HCOOH(aq))was titrated with a 0.100 NaOH(aq). It required 50.0 mL of the NaOH(aq) solution to neutralize the acid. What per cent (by mass) of the sample was methanoic acid?

|  |  |
| --- | --- |
| a | 0.312 % |
| b | 0.642 % |
| c | 28.1 % |
| d | 56.3 % |

1. A volume of \_\_\_\_ mL of 2.00  H2SO4(aq) would be needed to react completely with 4.20 g of NaOH(s).

|  |  |
| --- | --- |
| a | 26.3 |
| b | 52.2 |
| c | 105 |
| d | 420 |

1. The volume of 0.100 NaOH(aq) required to neutralize 1.00 L of a strong monoprotic acid solution with a pH of 3.00 is \_\_\_\_\_\_\_\_\_\_\_ mL

|  |  |
| --- | --- |
| a | 10.0 |
| b | 333 |
| c | 1.00 x 103 |
| d | 100 |

1. The volume of 2.0 HCl(aq) that will take 30 mL of 1.5 K2SO3(aq) to completion is \_\_\_\_\_\_\_\_ mL

|  |  |
| --- | --- |
| a | 23 |
| b | 45 |
| c | 30 |
| d | 11 |

1. A 10 mL sample of HCl(aq) with a pH of 1.50 is reacted with 0.025 Ba(OH)2(aq). The volume of Ba(OH)2(aq) needed to take the reaction to completion is \_\_\_ mL

|  |  |
| --- | --- |
| a | 10 |
| b | 5.0 |
| c | 13 |
| d | 6.3 |

Solutions:

1. D
2. A
3. A
4. B
5. D
6. A
7. C
8. D
9. B
10. C
11. B
12. B
13. D
14. A
15. A
16. B
17. D