Acids and Bases: Indicators

1. A student who wanted to determine the pH of an unknown solution recorded these observations:

|  |  |
| --- | --- |
| Indicator | Observation |
| HMo | yellow |
| HMr | yellow |
| HBb | blue |
| HPh | Colourless |

|  |  |
| --- | --- |
| a | 3.1 |
| b | 8.0 |
| c | 7.0 |
| d | 11.4 |

1. Solution I is red in phenol red and colorless in phenolphthalein, while Solution II is pink in phenolphthalein and yellow in alizarin yellow R. The [H3O+(aq)] is about\_\_\_

|  |  |
| --- | --- |
| a | 2 times higher in solution I than in solution II |
| b | 2 times higher in solution II than in solution I |
| c | 100 times higher in solution I than in solution II |
| d | 100 times higher in solution II than in solution I |

1. A solution is tested with a number of indicators in order to determine its pH. The results of the tests are summarized in the table below.

|  |  |
| --- | --- |
| Indicator | Colour  |
| HMv | Blue |
| HPr | red |
| HIc | Blue |
| HPh | Colourless  |

The pH of the solution is approximately

|  |  |
| --- | --- |
| a | 7.6 |
| b | 4.1 |
| c | 8.0 |
| d | 12.3 |

1. A 200 mL sample of 0.125  KOH(aq) is added to 100 mL of 0.100  HNO3(aq). The indicator \_\_\_\_ will turn \_\_\_\_\_\_ in this mixture.

|  |  |  |
| --- | --- | --- |
| a | HOr | Orange |
| b | H2Th | Orange |
| c | HIc | Green |
| d | HPh | colourless |

1. Consider the table below

|  |  |  |  |
| --- | --- | --- | --- |
| [OH-(aq)]  | pH | Description | Color in HBb |
| 1 x 10-5 | ? | ? | ? |

The missing data under the headings pH, description and color in HBb(aq) respectively, are\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| a | 5 | Acidic | blue |
| b | 5 | Acidic | Yellow |
| c | 9 | Basic | Blue |
| d | 9 | Basic | Green  |

1. Consider the table below

|  |  |  |  |
| --- | --- | --- | --- |
| [OH-(aq)]  | pH | Description | Color in HPr |
| 1 x 10-11 | ? | ? | ? |

The missing data under the headings pH, description and color in HPr(aq) respectively, are\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| a | 11 | Acidic | Yellow |
| b | 3 | Basic | Red |
| c | 11 | Acidic | Red  |
| d | 3 | Acidic | Yellow  |

1. Consider the table below

|  |  |  |  |
| --- | --- | --- | --- |
| [H3O (aq)]  | pH | Description | Color in HMr |
| 1 x 10-3 | ? | ? | ? |

The missing data under the headings pH, description and color in HMr(aq) respectively, are\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| a | 3 | Basic  | Orange  |
| b | 11 | Basic  | Yellow |
| c | 3 | Acidic | Red  |
| d | 11 | Acidic | Orange  |

1. Consider the table below

|  |  |  |  |
| --- | --- | --- | --- |
| [H3O (aq)]  | pH | Description | Color in HMv |
| 3 x 10-2 | ? | ? | ? |

The missing data under the headings pH, description and color in HMo(aq) respectively, are\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| a | 12.5 | Basic  | Blue  |
| b | 1.5 | Acidic  | Green |
| c | 12.5  | Basic  | Green  |
| d | 1.5 | Acidic | Blue  |

1. Consider the table below

|  |  |  |  |
| --- | --- | --- | --- |
| [OH-(aq)]  | pH | Description | Color in HPh |
| 5.2 x 10-1 | ? | ? | ? |

The missing data under the headings pH, description and color in HPh(aq) respectively, are\_\_\_\_, \_\_\_\_\_ and \_\_\_\_\_

|  |  |  |  |
| --- | --- | --- | --- |
| a | 13.72 | Acidic | Pink |
| b | 0.28 | Acidic | Colourless  |
| c | 13.72 | Basic  | Pink |
| d | 0.28 | Basic | colourless |

1. Excess zinc is added to 150 mL of 0.10 HCl(aq) When the reaction is complete, four drops of HBb(aq) is added. The solution will turn \_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| a | Colourless |
| b | Yellow |
| c | Green |
| d | Blue  |

1. When phenolphthalein is added to a solution with a pH of 4, the solution will be \_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Colourless |
| b | pink |
| c | Blue |
| d | Yellow  |

1. A solution containing thymol blue is red-colored. When another solution is added, the resulting solution is blue. This color change occurs because

|  |  |
| --- | --- |
| a | an acid was added to a base |
| b | a base was added to an acid |
| c | A strong acid is added to a weak acid  |
| d | a strong base was added to a weak base |

1. A student poured a solution into four test tubes and recorded these observations after the indicators were added:

|  |  |  |
| --- | --- | --- |
| Test tube | Indicator | Resulting colour |
| 1. | HMo | Yellow |
| 2. | HMr | Yellow |
| 3. | HBb | Yellow |
| 4. | HPr | Yellow  |

What is the approximate pH of the solution?

|  |  |
| --- | --- |
| a | 4.4 |
| b | 6.0 |
| c | 7.6 |
| d | 8.0 |

1. An indicator acquiring a pink/red color in a solution with pH = 10 could be \_\_\_\_\_\_

|  |  |
| --- | --- |
| a | HCh |
| b | HMr |
| C | HOr |
| d | HTh |

1. A sample of a solution has the following indicators added: HMr(aq) and HMo(aq). The observations are shown below.

|  |  |
| --- | --- |
| Indicator | Color |
| HMr | Red |
| HMo | yellow |

The pH of the solution could be \_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 2.3 |
| b | 4.5 |
| C | 5.3 |
| d | 7.5 |

1. A sample solution turned yellow when methyl orange indicator was added. The yellow color was due primarily to the presence of \_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | H3O+(aq) |
| b | Mo-(aq) |
| c | HMo(aq) |
| d | H2O( aq) |

1. The addition of indicators to a basic solution produced the following colors:

|  |  |
| --- | --- |
| Indicator | Colour |
| HPr | Red |
| HPh | colorless |

The concentration of the hydroxide ion was approximately \_\_\_\_\_\_ 

|  |  |
| --- | --- |
| a | 1.0 x 10-4 |
| b | 1.0 x 10-8 |
| c | 1.0 x 10-14 |
| d | 1. x 10-7
 |

1. A solution has a pH of 6.5 and contains a few drops of HPh, HMr, and H2Th. The solution will appear \_\_\_\_\_\_\_\_\_ in colour.

|  |  |
| --- | --- |
| a | Colourless  |
| b | Orange |
| c | Yellow  |
| d | Green |

1. A student checked four solutions for conductivity and indicator properties, and tabulated the results as shown below.

|  |  |  |
| --- | --- | --- |
| Solution | Conductivity | Colour in HBb |
| I | High | Yellow |
| II | High | Green |
| III | Low | Green |
| IV | High | Blue |

The solution most likely to be KNO3(aq) is solution \_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | I |
| b | II |
| c | III |
| d | IV |

1. A student checked four solutions for conductivity and indicator properties, and tabulated the results as shown below.

|  |  |  |
| --- | --- | --- |
| Solution | Conductivity | Colour in HBb |
| I | High | Yellow |
| II | High | Green |
| III | Low | Green |
| IV | High | Blue |

The solution most likely to be HCl(aq) is solution \_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | I |
| b | II |
| c | III |
| d | IV |

1. A student checked four solutions for conductivity and indicator properties, and tabulated the results as shown below.

|  |  |  |
| --- | --- | --- |
| Solution | Conductivity | Colour in HBb |
| I | High | Yellow  |
| II | High | Green  |
| III | Low  | Green |
| IV | High | Blue |

The solution most likely to be KOH(aq) is solution \_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | I |
| b | II |
| c | III |
| d | IV |

1. Phenolphthalein is put into a solution containing 0.20 mol of HCl(aq). If 0.18 mol of NaOH(aq) is added then the solution will be \_\_\_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
| a | Colourless | Acidic |
| b | Colourless | Basic |
| c | Pink | Acidic |
| d | Pink | Basic  |

1. If 20.0 mL of 0.100 NaOH(aq) is added to 40.0 mL of 0.100 HCl(aq) containing the indicators HPh and HBb, then the resulting colour of the solution will be \_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Blue |
| b | Pink |
| c | Yellow |
| d | Colourless  |

1. A sample of NaOH(aq) is titrated to completion with HCl(aq) If the indicator HMo(aq) is added at the beginning of the titration, the colors that will be observed (in order) as the titration will be \_\_\_\_\_, and then \_\_\_\_\_\_.

|  |  |  |
| --- | --- | --- |
| a | Red | Yellow |
| b | Yellow | Red  |
| c | Yellow | Blue |
| d | Blue | Yellow  |

1. Solution I turns yellow in orange IV and red in methyl orange. Solution II turns yellow in methyl red and yellow in bromothymol blue. The [H3O+(aq)] is about \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 3 times higher in solution I than in solution II |
| b | 3 times higher in solution II than in solution |
| c | 1000 times higher in solution I than in solution II |
| d | 1. times higher in solution II than in solution I
 |

1. When HPh and HBb are added to a solution with a pH of 7.0, the resulting colour will be \_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Blue |
| b | Yellow |
| c | Pink  |
| d | Green  |

1. A student poured a solution into four test tubes and recorded these observations after the indicators were added:

|  |  |  |
| --- | --- | --- |
| Test tube | indicator | Solution colour |
| 1 | HBb | Blue |
| 2 | HIc | Blue |
| 3 | HNb | Colourless |
| 4 | HTh | Colourless |

The approximate pH of the solution is \_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | 9.1 |
| b | 12.1 |
| c | 7.2 |
| d | 5.1 |

1. If 20.0 mL of 0.100 NaOH(aq) is added to 40.0 mL of 0.100 HCl(aq) containing alizarin yellow R and methyl violet, the resulting solution will be \_\_\_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Blue  |
| b | Green  |
| c | Yellow  |
| d | Purple |

1. Delaine and Jaycee test a sample of concentrated nitric acid with several indicators. The indicator turns **Yellow** in the acid solution. The indicator is probably

|  |  |
| --- | --- |
| a | HMo |
| b | HMr |
| c | HPr |
| d | HIc |

1. Marion and Laura titrate a sample of sodium hydroxide with hydrochloric acid. The indicator used to find the end point of the reaction is HBb. The indicator will start with the colour \_\_\_\_\_\_ and will turn to the colour \_\_\_\_\_\_ when the reaction is complete.

|  |  |  |
| --- | --- | --- |
| a | Red | Yellow  |
| b | Yellow | Red |
| c | Blue | Yellow  |
| d | Yellow | Blue |

1. Mason, Cam and Blair add a few drops of HCh to a sample of 4.1 x 10-8  NaOH(aq) solution . The colour of the indicator will be \_\_\_\_\_\_\_\_\_

|  |  |
| --- | --- |
| a | Colourless  |
| b | Red  |
| c | Yellow  |
| d | Orange  |

Solutions:

1. B
2. C
3. C
4. C
5. C
6. D
7. C
8. B
9. C
10. C
11. A
12. B
13. B
14. A
15. B
16. B
17. A
18. C
19. B
20. A
21. D
22. A
23. C
24. A
25. C
26. D
27. A
28. B
29. C
30. C
31. D