

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

The pH of the solution is approximately:

a	3.1
b	8.0
c	7.0
d	11.4

2. 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 $[H_3O^+(aq)]$ 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

3. 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
Hlc	Blue
HPh	Colourless

The pH of the solution is approximately:

a	7.6
b	4.1
c	8.0
d	12.3

4. A 200 mL sample of 0.125 mol/L KOH(aq) is added to 100 mL of 0.100 mol/L HNO₃(aq). The indicator ____ will turn ____ in this mixture.

a	HOr	Orange
b	H ₂ Th	Orange
c	Hlc	Green
d	HPh	colourless

5. Consider the table below

[OH ⁻ (aq)] mol/L	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

6. Consider the table below

[OH ⁻ (aq)] mol/L	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

7. Consider the table below

$[\text{H}_3\text{O}^+(\text{aq})]$ mol/L	pH	Description	Color in HMr
1×10^{-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

8. Consider the table below

$[\text{H}_3\text{O}^+(\text{aq})]$ mol/L	pH	Description	Color in HMv
3×10^{-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

9. Consider the table below

$[\text{OH}^-(\text{aq})]$ mol/L	pH	Description	Color in HPh
5.2×10^{-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

10. Excess zinc is added to 150 mL of 0.10 mol/L HCl(aq). When the reaction is complete, four drops of H₂B(aq) is added. The solution will turn _____.

a	Colourless
b	Yellow
c	Green
d	Blue

11. When phenolphthalein is added to a solution with a pH of 4, the solution will be _____.

a	Colourless
b	pink
c	Blue
d	Yellow

12. 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

13. 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

14. An indicator acquiring a pink/red color in a solution with pH = 10 could be _____

a	HCh
b	HMr
c	HOr
d	HTh

15. 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

16. A sample solution turned yellow when a methyl orange indicator was added. The yellow color was due primarily to the presence of _____

a	$\text{H}_3\text{O}^+(\text{aq})$
b	$\text{Mo}^-(\text{aq})$
c	$\text{HMo}(\text{aq})$
d	$\text{H}_2\text{O}(\text{aq})$

17. 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 _____ mol/L

a	1.0×10^{-4}
b	1.0×10^{-8}
c	1.0×10^{-14}
d	1.0×10^{-7}

18. A solution has a pH of 6.5 and contains a few drops of HPh, HMr, and H_2Th . The solution will appear _____ in colour.

a	Colourless
b	Orange
c	Yellow
d	Green

19. 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 $\text{KNO}_3(\text{aq})$ is solution _____

a	I
b	II
c	III
d	IV

20. 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 $\text{HCl}(\text{aq})$ is solution _____

a	I
b	II
c	III
d	IV

21. 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

22. 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

23. If 20.0 mL of 0.100 mol/L NaOH(aq) is added to 40.0 mL of 0.100 mol/L 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

24. 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

25. 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 $[H_3O^+(aq)]$ 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	1000 times higher in solution II than in solution I

26. 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

27. 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	Hlc	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

28. If 20.0 mL of 0.100 mol/L NaOH(aq) is added to 40.0 mL of 0.100 mol/L HCl(aq) containing alizarin yellow R and methyl violet, the resulting solution will be _____

a	Blue
b	Green
c	Yellow
d	Purple

29. 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	Hlc

30. 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

31. Mason, Cam and Blair add a few drops of HCl to a sample of 4.1×10^{-8} mol/L 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