pH / Indicators Practice:

Name: SOLUTIONS

1. In a laboratory, a student has prepared three solutions: HCl, NaCl and NaOH. He has forgotten to label his three solutions. To identify each, he has used litmus paper. These are his results:

Solution A: turns red litmus to blue NaOH
Solution B: no reaction NaCl
Solution C: turns blue litmus to red HCl

Identify the three substances.

2. The following are some characteristics of a certain liquid:

- produces a gas when in contact with a piece of metal
- conducts electricity
- turns litmus paper red

How would you describe this liquid?

a) This liquid is a neutral solution.
c) This liquid is a basic solution.
(b) This liquid is an acidic solution.
d) This liquid is a neutral salt solution.

3. To determine the pH of fruit juice, one would normally use universal indicator paper. However, none of this paper is available. You use litmus paper instead and observe that the juice turns blue litmus paper red.

What could the pH of the juice be? Acid pH 0-7

4. The following table gives the colours of a universal indicator in solutions that have pH values ranging from 1 to 13.

Colour	Red	Yellow	Turquoise Blue	Violet
pH	1	5	9	13

A given solution turns orange when this indicator is added.

Which of the following statements is definitely TRUE?

(a) This solution is acidic.
c) This solution is neutral.
b) This solution is basic.
d) This solution is saline.

5. A universal indicator changes colour as indicated by the table below.

pH	1	3	5	7	9	11	13
Colour	green	blue	violet	colourless	red	orange	yellow

What are the indicators' colours in the presence of an acid ?

a) Green, blue, violet
b) Green, blue, violet, colourless
c) Colourless
d) Red, orange, yellow

6. Blood in the body has a pH between 7.2 and 7.4. This means that blood is:

a) a strong acid
b) slightly acidic
c) a strong base
d) slightly basic

7. Kim and Sebastien measured the pH of different solutions using a universal indicator. The following results were recorded:

SOLUTIONS	pH
Salt water	8
Soft drink	3
Cleaning liquid	11
Window cleaner	9
Antacid	10
Grape juice	3
Potato juice	6
Vinegar	3

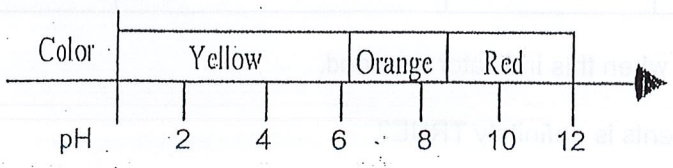
Which solutions are acidic ?

a) Cleaning liquid, grape juice, antacid and salt water.
b) Soft drink, grape juice, potato juice and vinegar.
c) Cleaning liquid, window cleaner, soft drink and vinegar.
d) Potato juice, window cleaner, antacid and salt water.

8. Given $NaOH$, $CaCl_2$, H_2SO_4, NH_4OH, H_2O, circle which have a pH over 8 ?

→ BASE

9. The table below indicates the colour of the indicator phenol red in solution with a pH varying from 1 to 12.

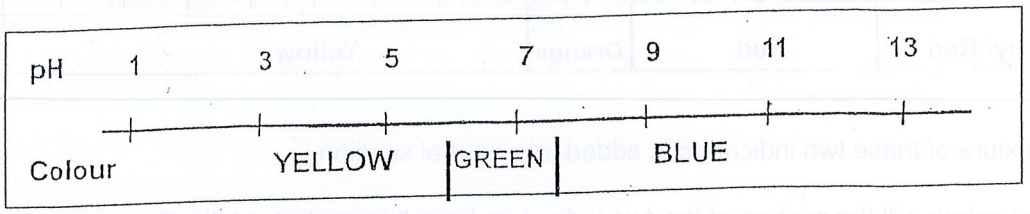


A drop of this indicator is added to some lemon juice.

→ LEMON = ACID → YELLOW

What colour is the indicator after being added to the lemon juice? Explain your answer.

10. The following table gives the colours of the indicator bromothymol blue in solutions whose pH values vary from 0 to 14. What is the turning point of the indicator?



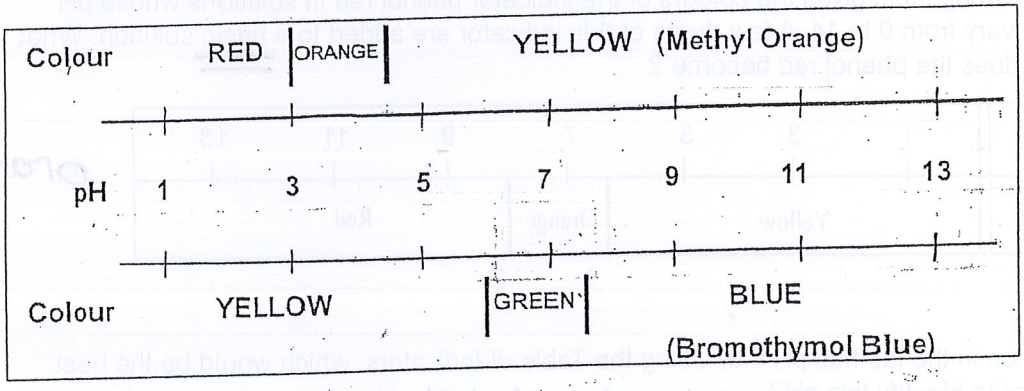
a) from pH 0 to pH 7.6

b) from pH 6.0 to pH 7.6

c) from pH 6.0 to pH 14.0

d) from pH 7.6 to pH 14.0

11. The following table gives the colours of the indicators methyl orange and bromothymol blue in solutions whose pH values vary from 0 to 14.



A solution turns yellow when methyl orange is added; it also turns yellow when bromothymol blue is added.

What could the pH of this solution be?

a) 4

b) 5

c) 7

d) 9

12. The following table gives the colours of the indicators phenolphthalein and methyl red in solutions that have pH values ranging from 1 to 14.

a)

Phenolphthalein	Colourless							Pink		Red					
pH	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Methyl Red	Red					Orange		Yellow							

A mixture of these two indicators is added to a neutral solution.

What colour will the mixture of the two indicators be in this neutral solution?

a) colourless
c) orange
(b) yellow
d) pink

b) The following table gives the colours of the indicator phenol red in solutions whose pH values vary from 0 to 14. A few drops of this indicator are added to a basic solution. What colour does the phenol red become ?

pH	1	3	5	7	9	11	13
Color	Yellow			Orange	Red		

orange-Red

13. A solution in the lab has pH 9.5. Using the Table of Indicators, which would be the best indicator to identify this pH? phenolphthalein

14. Below is the colour scale of three indicators.

pH	1	3	5	7	9	11	13
A	Red		Orange		Yellow		
B	Yellow			Green	Blue		
C	Yellow			Orange		Red	

a) What is the colour of each indicator in the presence of an acid?
b) What is the colour of each indicator in the presence of a base?
c) What is the turning point of each indicator?

	A	B	C
a)	Red-Orange	Yellow	Yellow
b)	Yellow	Green-Blue	Yellow Orange Red
c)	4-7	7.3-10	10-11

Refer to the Table of Indicators to answer questions 15, 16, & 17

15. A certain salt is very soluble in an acidic solution. Which indicator should be used to demonstrate that the solution is of the highest acidity ?

a) Methyl orange
b) Methyl red
c) Bromothymol blue
d) Carmine indigo

16. Indicate which of the above indicators would be the best to use to determine that the pH of water in an aquarium is neutral.

a) Methyl orange
b) Methyl red
c) Bromothymol blue
d) Carmine indigo

17. Which of the following mixtures would be the best to determine the pH of an unknown solution ?

a) Methyl orange and methyl red
b) Methyl red and bromothymol blue
c) Methyl orange and violet m-cresol
d) Bromothymol blue and violet m-cresol

This table gives the behavior of certain indicators. Use it to answer questions 10 and 11.

pH	2	3	4	5	6	7	8	9	10	11	12
A	Yellow					Green		Blue			
B	Colourless							Pink		Fuchsia	
C	Red		Orange			Yellow					
D	Red			Orange				Yellow		Green	

18. You are given a solution and told it is neutral. You would like to check if this is true. Which indicators in the table will you use ?

a) Indicator A
b) Indicator B
c) Indicator C
d) Indicator D

19. The pH of a given solution is unknown. Indicators A and C turn yellow in this solution. What colour will indicator D become in the solution ?

a) Red
b) Orange
c) Yellow
d) Green

20. If solution A has a pH 3.5, solution B has pH 4.0, solution C has pH 4.6, and solution D has pH 5.6, which solution has the greatest H^+ ion concentration?

a) Solution A c) Solution C

b) Solution B d) Solution D

21. What is the pH of a solution with a $[H^+]$ of 0.01 mol/L ? $[H^+] = 10^{-2}$ mol/L → pH = 2

22. In solution A, the $[H^+]$ is 10^{-3} mol/L and in solution B, the value is 10^{-4} mol/L. Which solution is more acidic ? (10^{-3}: pH = 3; 10^{-4}: pH = 4) solution 3 is more acidic

23. What is the [OH-] in a solution with pH 6 ?

↳ $[H^+] = 10^{-6}$, therefore $[OH^-] = 10^{-8}$ mol/L

24. Fill in the blank space for the following three solutions.

	A	B	C
$[H^+]$ mol/L	10^{-1}	10^{-4}	10^{-13}
$[OH^-]$ mol/L	10^{-13}	10^{-10}	10^{-1}
pH	1	4	13
nature	A	A	B

25. The pH of a swimming pool was found to be 7.2. It then rained for two days and when the pH was checked again it was found to be 6.1. What do you think caused the change in pH and how would you re-establish the original pH? Explain your answers.

Rain was acidic, → Add some base until neutral (~7)

26. Fill in the table below for each solution.

	$[H^+]$	$[OH^-]$	pH	Nature
A	10^{-9}	10^{-5} mol/L	9	B
B	0.001 mol/L	10^{-11}	3	A
C	10^{-6}	10^{-8}	6	A

KOH → BASE

27. What is the pH of a Potassium hydroxide solution that has a concentration of 0.000001mol/L ?

↳ $[OH^-] = 10^{-6}$ mol/L

$[OH^-] \cdot [H^+] = 10^{-14}$

$[10^{-6}] \cdot [H^+] = 10^{-14}$

$[H^+] = 10^{-8}$ → pH = 8