

pH Worksheet

1. What colour will litmus paper turn when it is dipped in each of the substances in the table below?

Substance	Litmus paper
Table salt dissolved in water	∅
Apple juice	blue → red
Vinegar	blue → red
Liquid soap	red → blue
Lemon juice	blue → red

2. Answer the questions, using the information in the table below.

Fruit	pH	Fruit	pH
Lime	2.5	Tomato (juice)	4.4
Grapefruit	3.5	Banana	4.5

- a) Which is the most acidic fruit? lime
- b) Which is the least acidic fruit? banana
- c) How many times less acidic is the banana than the lime? 100 x less
- d) How many times more acidic is the lime than the grapefruit? 10 x more
3. An apple has a pH of 3, while a carrot has a pH of 5.
- a) Which of these two foods is more acidic? apple
- b) How many times more acidic is it? 100 x more
4. What colour does neutral litmus paper turn if it is dipped in ...
- a) soapy water? blue
- b) rainwater? red
- c) distilled water? ∅
5. You find a bottle containing an unidentified liquid. By using universal indicator paper, you determine that the pH of this liquid is 11. Therefore you have to neutralize it before disposing of it. Which of the following methods can be used to neutralize the liquid?
- A) Add a solution of NaOH C) Add distilled water
- B) Add a solution whose pH is 5 D) Add a solution whose pH is 8
- base* *add acid*

6. The following table gives the pH value of four liquids. Which liquid is strongly acidic?

Liquid	pH
Tap water	6.8
Lemon juice	2.3
Human blood	7.3
Liquid bleach	11

- A) Tap water B) Lemon juice C) Human blood D) Liquid bleach

7. A student must classify six aqueous solutions. The student knows that all except one of the solutions must be an ACID, a BASE, or a NEUTRAL SALT. The student writes a procedure and carries out certain tests. The table shows the results that were obtained.

Solution	Litmus paper	Electrical conductivity
1	No effect	Good <i>neutral salt</i>
2	Turned blue	Good <i>base</i>
3	Turned red	Good <i>acid</i>
4	No effect	None <i>neutral salt</i>
5	Turned blue	Weak <i>weak base</i>
6	Turned blue	Good <i>strong base</i>

Based on these results, which conclusion is the most appropriate?

- A- Solutions 2, 5 and 6 are bases, solution 3 is an acid and solutions 1 and 4 are salts
 B- Solutions 2, 5 and 6 are bases, solution 3 is an acid and solutions 1 and 4 are distilled water
 C- Solutions 2, 5 and 6 are bases, solution 3 is an acid, solution 1 is a salt and solution 4 can not be classified
 D- Solution 3 is a base, solutions 2, 5 and 6 are acids and solutions 1 and 4 are salts

8. Identify the following pH as either acid, base or salt:

pH 6	pH 8	pH 14	pH 2	pH 11	pH 7
<i>WA</i>	<i>WB</i>	<i>SB</i>	<i>SA</i>	<i>WB</i>	<i>NS</i>

9. How many times more acidic is a solution of pH 2 than a solution of pH 9?

10. How many times more basic is a solution of pH 11 than a solution of pH 8?

11. How many times more acidic is lemon juice (pH 2) than coffee (pH 5)?

Handwritten calculations:
 $2\ 3\ 4\ 5\ 6\ 7\ 8\ 9 = 10^7 \times$
 $8\ 9\ 10\ 11 = 10^3 \times$
 $2\ 3\ 4\ 5 = 10^3 \times$

$$5678 = 10^3 \times$$

12. Rain has a pH of about 5, while the pH of seawater is about 8. How many times more acidic is rainwater than seawater?

13. Use the table below to answer the questions.

indicator lab

pH	1	2	3	4	5	6	7	8	9	10	11	12	13
Ind A	Yellow				orange						Red		
Ind B	red	blue		yellow									
Ind C	Blue						green	yellow					
Ind D	red							purple				blue	
Ind E	colorless								blue		dark blue		

- a. Which indicator would you use to find a strong acid B, a strong base D and a neutral solution C?
- b. Which indicator gives the best information about acids, bases or neutral solutions? C
- c. What color would indicator D give if a substance that has a pH of 5 is used? red
- d. What color would indicator B give if it has a pH of 9? yellow
- e. What is the pH of a substance if it becomes yellow with A and yellow with B? pH 4-5
- f. What is the pH of a substance if it becomes purple with D and colorless with E? pH 8-9
- g. What is the pH of a substance if it becomes purple with D and dark blue with E? pH 9-11
- h. 14. What is the pH range if indicator A turns orange? pH 5-11

14. You have 2 substances and you want to neutralize each. Explain what you must add to each to neutralize them.

- A) 50 mL of a pH of 9 an acid
- B) 25 mL of a pH of 2 a base

C) What test can be done to ensure the substance is neutralized? BTB = green / litmus / pH meter

15. The pH of certain substances was taken using a universal indicator. The following results were recorded. Which substances are basic?

pH	3 <u>A</u>	11 <u>B</u>	10 <u>B</u>	3 <u>A</u>	4 <u>A</u>	9 <u>B</u>
solution	Cola	Cleaning liquid	Antacid	Grape juice	Vinegar	Window cleaner

- A) cola, grape juice and vinegar X
- B) cleaning liquid, antacid and window cleaner
- C) cola, grape juice and vinegar
- D) they are all acidic

16. The following table gives the colours of an acid-base indicator after it is added to solutions with the pH value ranging from 2 to 12. A few drops of the indicator are added to a highly acidic solution. What will the color of the indicator be?

PH	2	3	4	5	6	7	8	9	10	11	12
Colour	Yellow			Green			Blue		Violet		

A) yellow

B) green

C) blue

D) violet

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

Methyl Orange	Colour	Red	Orange	Yellow				
	pH	1	3	5	7	9	11	13
Bromothymol Blue	Colour	Yellow			Green	Blue		

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?

~ pH 4.4 - pH 6