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Acids and Bases Worksheet 1

1. Finish the following reactions when acids are added to water.

- a. $H_2SO_4 + H_2O \rightarrow$
- b. $HCl + OH \rightarrow$
- c. $NH_3 + H_2O \rightarrow$
- d. $HCl + NH_3 \rightarrow$

2. What are the conjugate bases of these acids?

original acid	conjugate base
HNO_3	
H_2O	
H_3O^+	
H_2SO_4	
HBr	
HCO_3^-	

3. What are the conjugate acids of these bases?

original base	conjugate acid
OH^-	
H_2O	
HCO_3^-	
SO_4^{2-}	
ClO_4^-	

4. Which of the following represent conjugate acid-base pairs?

- a. H_2O, H_3O^+
- b. OH^-, HNO_3
- c. H_2SO_4, SO_4^{2-}
- d. $HC_2H_3O_2, C_2H_3O_2^-$

5. Calculate the $[H^+]$ in a solution in which $[OH^-] = 2.0 \times 10^{-2}$ M. Is this solution acidic, neutral, or basic?

6. Calculate the $[OH^-]$ in a solution in which $[H^+] = 3.99 \times 10^{-9}$ M. Is this solution acidic, neutral, or basic?



In your science journal fill in the definitions of an acid and a base.

- Materials:**
- Small cup of lemon juice, orange juice, apple juice, baking soda, drain cleaner, and bleach. (purchased all at the Dollar Store)
 - Tiny spoon / small flat wooden stick
 - Prepared cabbage pH indicator (60ml)
 - Dropper & cup of water to clean it in
 - Test tube rack & 6 test tubes
 - Masking tape & a marker
 - Graduated cylinder
 - Safety Goggles

1. Label your test tubes A - F using masking tape.
2. In each test tube pour 10ml of the cabbage indicator solution.

*As you complete each step below, please fill in the color each solution becomes. Record on your data table in your science journal. We will fill in all other boxes at the end of the lab. Make sure to clean your dropper after each step.

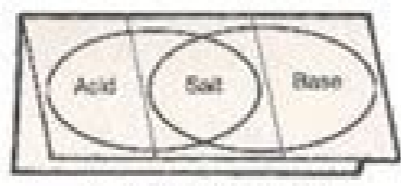
3. With your dropper, add 5 drops of lemon juice to test tube A & swirl.
4. With your dropper, add 5 drops of orange juice to test tube B & swirl.
5. With your dropper, add 5 drops of apple juice to test tube C & swirl.
6. With your dropper, add 1 tiny spoon of baking soda to test tube D & swirl.
7. With your dropper, add 5 drops of drain cleaner to test tube E & swirl.
8. With your dropper, add 5 drops of bleach to test tube F & swirl.

Color						
pH			7			
Test Tube	A	B	C	D	E	F
Acid or base?	Strong		Weak	Neutral	Weak	Strong

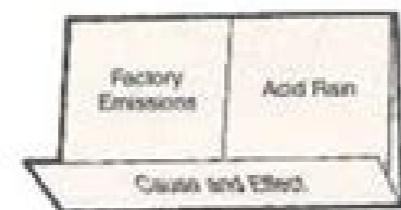
9. Now add 30 more drops (6 scoops for the baking soda) to each test tube, swirl, and observe what happens. Why do you think this happened?

Acid, Base, Salt

Skill	Activity Suggestion	Foldable Parts
chart	foods as acid, neutral (pure water is close to neutral), or base	3
compare and contrast	acids and bases differentiate between strength and concentration	2
define	acid, base, neutral, salt salts formed by the neutralization of an acid and base	4
diagram	a color-coded pH scale; 0-14	any number
explain	procedures for neutralizing things that are acidic buffers and their importance (they maintain constant pH when acids or bases are added) why many water spots and deposits can be cleaned with vinegar observe what happens to a chicken bone in vinegar acid and neutral soils and how they are formed	1
graph	pH levels of different foods	any number
investigate	experiments with litmus paper indicators common household items that are bases, such as ammonia, and baking soda	any number
list	plants that need acidic soil and plants that need alkaline soil examples of substances that are acidic, neutral, and basic	2
make a Venn diagram	of common properties of acids and bases. For example: 1) many can conduct electricity, 2) acids react with bases to form neutral salt and water, called neutralization, and 3) acids and bases change the color of indicators. of acid, base, and salt	3
question	create a "know? like to know? learned?" about acids, bases, salts	3
research	the positive and negative effects of the corrosiveness of acids how to treat insect stings that are acidic and those that are basic methods for making natural acid and base indicators and homemade litmus paper. For example: red cabbage and water the halogen group of elements, or salt formers	2
show cause and effect	the "who, what, when, where" of Soren Sorenson of rainwater becoming more acidic of tooth decay as it relates to acids and bases of bases reacting with fats to form items such as soaps	4



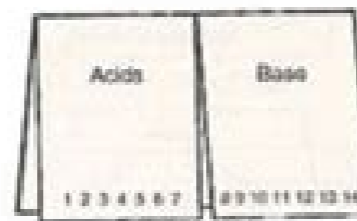
Three-tab Venn diagram



Two-tab match book



Folded chart



Two-tab book



Vocabulary book

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