

# ACIDS & BASES Reading Guide **KEY**

1. What are three properties of acids?

Sour taste, change the color of acid-base indicators, react with metals and release hydrogen gas, react with bases to produce salts and water, conduct electric current

2. What are three properties of bases?

Taste bitter, change the color of acid-base indicators, dilute solutions feel slippery, react with acids to produce salts and water, conduct electric current

3. Name 2 acids and their uses.

Sulfuric Acid - petroleum refining and manufacture of fertilizer

Nitric Acid - making fertilizers and explosives

Phosphoric Acid - Making detergents and fertilizers

Hydrochloric Acid - Gastric juices in the stomach

4. Name 2 bases and their uses.

Ammonia - household cleaner

Aluminum Hydroxide - antacid

5. Describe one way you can **safely** determine whether an unknown solution is an acid or base?

Dip pH paper in the solutions and see what color it changes

6. Write the formula for each acid or base:

barium hydroxide: Ba(OH)<sub>2</sub>

hydrobromic acid HBr

rubidium hydroxide RbOH

hydrosulfuric acid H<sub>2</sub>S

7. Name each as an acid or base:

HF: acid

HClO<sub>3</sub>: acid

H<sub>2</sub>CO<sub>3</sub>: acid

Al(OH)<sub>3</sub>: base

8. What is an Arrhenius acid?

A chemical compound that increases the concentration of hydrogen ions, H<sup>+</sup>, in aqueous solution.

9. What is an Arrhenius base?

A substance that increases the concentration of hydroxide ions, OH<sup>-</sup>, in aqueous solutions.

10. Define a hydronium ion: H<sub>3</sub>O<sup>+</sup>

11. Explain why a hydronium ion forms:

When water reacts with an acid, the H<sub>2</sub>O gains a H<sup>+</sup> from the acid and becomes H<sub>3</sub>O<sup>+</sup>

12. What is the difference between a strong acid and a weak acid?

A strong acid ionizes completely in aqueous solutions. A weak acid releases few hydrogen ions in aqueous solutions.

13. How are acids and bases defined by the Bronsted-Lowry theory?

An acid is a molecules or ion that is a proton donor. A base is a molecule or ion that is a proton acceptor.

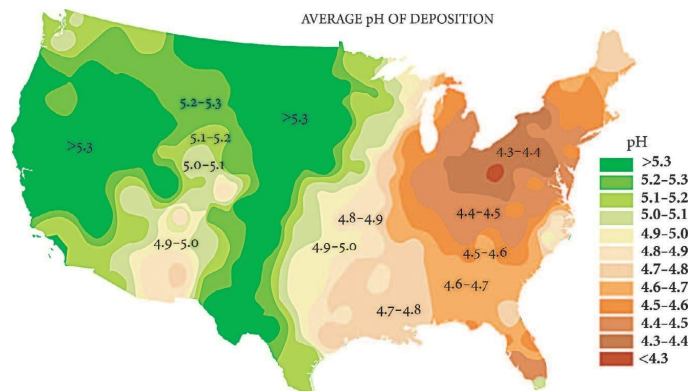
14. How are acids and bases defined by Lewis theory?

A lewis acid is a compound or ionic species which can accept an electron pair from a donor compound. A Lewis base is a compound or ionic species which can donate an electron pair to another compound.

15. Describe the pH scale:

The pH scale indicates the hydronium ion concentration of a solution. pH is the negative of the common logarithm of the hydronium ion concentration. Low pH means acidic, high pH means basic. The scale runs from 0-14, with 7 being neutral.

16. What is the pH range of an acid? 0-7 What is the pH range of a base? 7-14



## ACID RAIN

Acid rain and snow are often worse in areas near heavy industry or large cities. Oxides of nitrogen and sulfur from cars, factories and power plants mix with water in the air to form nitric acid and sulfuric acid. The other factor is the Jet Stream winds which blow storms and pollution from west to east across the USA.

17. What is the range of pH values of the rainfall shown on the above map: 4.3-5.3

Is the rain Acidic or Basic? acidic

18. What is a stronger acid, a pH of 5.5 or a pH of 4.2? 4.2

Explain why:

Because of the way the logarithmic pH scale works, a lower pH means there is a higher concentration of  $H_3O^+$  hydronium ions in the solution.

19. What is the average pH of rain/snow for California? >5.3 In New York 4.3

20. Which region of the country has the worst acid precipitation? The East Coast

21. Why do you think this is?

Jet Stream winds blow pollution from west to east and cause the worst acid rain on the East Coast.

22. Why do you think international agreements are important in dealing with acid rain and snow? Does pollution stay in one place?

Pollution does not stay in one place. Jet stream winds blow storms and pollution across the country and even internationally. International agreements are important to help keep neighboring countries clean and vice versa.

### Circle as either true (T) or false (F):

- True or **False** 23. Acids will not conduct electricity.  
**True** or False 24. Bases will conduct electricity.  
True or **False** 25. Acids taste bitter.  
**True** or False 26. Bases will turn red litmus paper blue.  
**True** or False 27. Acids react with some metals to produce hydrogen gas.  
True or **False** 28. Acids will turn phenolphthalein (PHTH) indicator pink. (p. 511-513)  
**True** or False 29. An indicator is a substance which changes colors in acids and bases. (p. 511-513)  
**True** or False 30. Acids will turn blue litmus paper red.  
**True** or False 31. Bases feel slippery.  
**True** or False 32. The pH of water is 7.

33. Dishwater feels slippery. What can you infer about the detergent used to wash dishes?

It is a base.

34. How can an acid be neutralized? (p. 487)

By adding a base to it.

35. The pH of a strong base would be closest to? 14

36. The pH of a strong acid would be closest to? 0

37. A compound that shows a definite color change when mixed with an acid is called an indicator.

38. Bases have a bitter taste.

39. As the pH number of an acid decreases, the strength of the acid increases.

40. The chemical reaction in which an acid combines with a base is called neutralization.