

SNC2D CHEMISTRY

CHEMICAL REACTIONS

- ☞ The pH Scale
(P.196-197)

The pH Scale

*Chemists measure the acidity of a solution using a pH scale. **pH** is a measure of how acidic or basic a solution is and the pH scale ranges from 0 (car battery acid) to 14 (some industrial-strength drain cleaners).*

pH	Substance
0	stomach acid (1.0)
2	lemon juice
3	apple
4	tomatoes
5	black coffee
6	milk
7	pure water
8.3	baking soda (8.3)
9	borax
10	milk of magnesia
11	ammonia cleaner
12	bleach
13	drain cleaner

February 24, 2013 2DCHEM - The pH Scale 1

The pH Scale

*A solution with a pH of 7 is considered **neutral** – neither acidic nor basic. A solution with a pH < 7 is acidic while a solution whose pH > 7 is basic.*

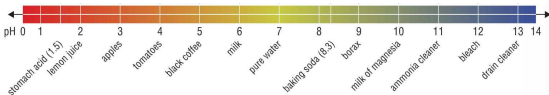
pH	Substance
0	stomach acid (1.0)
2	lemon juice
3	apple
4	tomatoes
5	black coffee
6	milk
7	pure water
8.3	baking soda (8.3)
9	borax
10	milk of magnesia
11	ammonia cleaner
12	bleach
13	drain cleaner

February 24, 2013 2DCHEM - The pH Scale 2

The pH Scale

pH SCALE

- used to represent how acidic or basic a solution is
- ranges from 0 (very acidic) to 14 (very basic/alkaline)
 - acid $\text{pH} < 7$
 - base $\text{pH} > 7$
 - neutral $\text{pH} = 7$




February 24, 2013 2DCHEM - The pH Scale 3

The pH Scale

NOTE!

Have you ever noticed that clear tea changes colour when lemon juice is added to it? This is because the acidity of the lemon juice slightly changes the chemicals that give tea its distinctive colour. Several natural chemical and many synthetic (human-made) chemicals change colour when they are placed in acidic or basic solutions. A substance that changes colour depending on the acidity or basicity of the solution is known as an **acid-base indicator**.

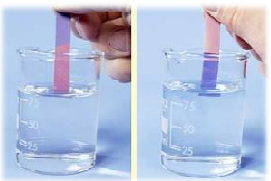


February 24, 2013 2DCHEM - The pH Scale 4

The pH Scale

ACID-BASE INDICATOR

- substance that changes colour in the presence of an acid or base
- can be synthetic or natural
- most common is litmus
 - blue litmus paper turns red in an acid
 - red litmus paper turns blue in a base



February 24, 2013 2DCHEM - The pH Scale 5

The pH Scale

PRACTICE

- Use the chemical or physical properties identified below to classify each solution as acidic, basic, or neutral.

(a) feels slippery and conducts electricity	base
(b) red litmus stays red, and blue litmus turns red	acid
(c) tastes sour and feels wet but not slippery	acid
(d) has a pH of 3 and turns blue litmus red	acid
(e) conducts electricity and has a pH of 9	base

February 24, 2013 2DCHEM - The pH Scale 6

The pH Scale

PRACTICE


- Could you determine a specific pH value for a solution using blue litmus paper? Explain.

no – blue litmus paper only indicates if the solution is acidic or not, it does not indicate how acidic it is

February 24, 2013 2DCHEM - The pH Scale 7

The pH Scale

NOTE!
In order to determine the exact pH of a substance, a universal indicator is used. A **universal indicator** is a substance that turns different colours in solutions with different pH values.



UNIVERSAL INDICATOR

- substance that turns different colours in solutions with different pH values


February 24, 2013 2DCHEM - The pH Scale 8

The pH Scale

PRACTICE

3. Why is a universal indicator more useful than red or blue litmus paper for measuring the pH in some applications?


universal litmus paper allows you to determine a pH value



February 24, 2013 2DCHEM - The pH Scale 9

The pH Scale – DYK?

The pH of soaps and other cosmetic products affect skin cells. The top layer of your skin contains natural acids, produced by "good" bacteria, that protect your skin from infection (pH ranges from 5 to 6). However, frequent washing using basic (high-pH) products such as soap may kill some of these bacteria, making your skin less acidic and more inviting to disease-causing bacteria.




February 24, 2013 2DCHEM - The pH Scale 10

The pH Scale – DYK?

NOTE!

Washing with soap is important for proper hygiene, but it is also important to allow your skin time to recover to its normal acidity between washings.

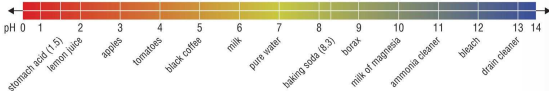


February 24, 2013 2DCHEM - The pH Scale 11

Check Your Learning

1. Classify the following as very acidic, slightly acidic, neutral, slightly basic, or very basic:

- (a) a solution with a pH of 13 **strongly basic**
- (b) a solution with a pH of 6 **slightly acidic**
- (c) a solution with a pH of 1 **strongly acidic**
- (d) lemon juice **strongly acidic**
- (e) milk of magnesia **slightly basic**



February 24, 2013 2DCHEM - The pH Scale 12

Check Your Learning

2. Toothpastes are usually slightly basic (alkaline). Why does this make sense? (Hint: consider the types of compounds in our mouths that may damage teeth.)

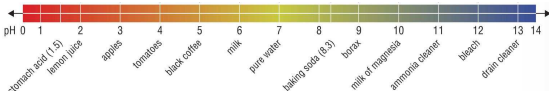
your mouth is acidic (digestion starts in the mouth) – acids can erode teeth causing cavities – increasing the pH (slightly) will help prevent cavities

February 24, 2013 2DCHEM - The pH Scale 13


Check Your Learning

3. (a) Where are most of cleaning products found on the pH scale? Why?
 (b) Where would detergent and shampoos be found? Why?

(a) far right of pH scale – need to be strong to get rid of stains
(b) between 7 and 8 – people use them on their skin and get them in their eyes so they need to be mild



February 24, 2013 2DCHEM - The pH Scale 14

 ✓ Check Your Learning

TEXTBOOK
P.197 Q.1-5

February 24, 2013 2DCHEM - The pH Scale 15
