

Use with textbook pages 220–224.

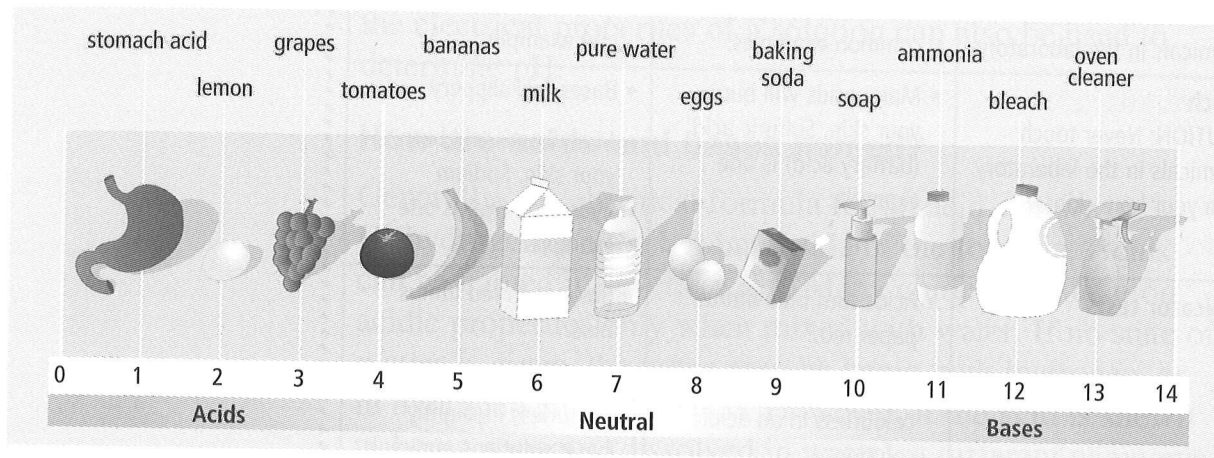
## pH scale and pH indicators

1. Define the following terms:

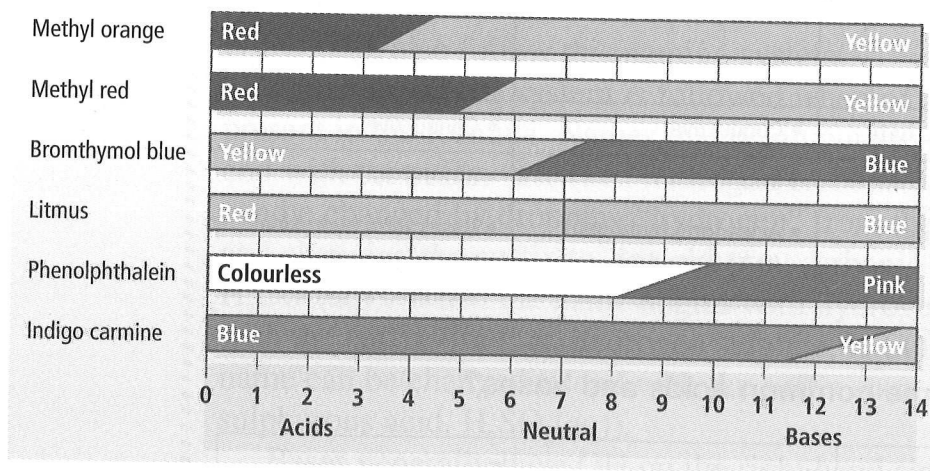
(a) pH indicator \_\_\_\_\_

(b) pH scale \_\_\_\_\_

**Figure 1: pH values of common substances**



**Figure 2: Common acid-base indicators and their pH colour change**



Name \_\_\_\_\_

Date \_\_\_\_\_

**Applying Knowledge**

**Section 5.1**

2. Complete the following tables by using the two figures shown on the previous page. Identify whether the substance is an acid or a base and indicate what colour the pH indicator will turn.

(a)

Substance	pH Value	Acid or Base	Methyl Orange	Bromothymol Blue	Litmus
lemon					
ammonia					
milk					

(b)

Substance	pH Value	Acid or Base	Methyl Red	Phenolphthalein	Indigo Carmine
tomato					
oven cleaner					
egg					

3. Complete the following table. Identify whether the substance is an acid or a base and indicate what colour the pH indicator will turn.

Substance	pH Value	Acid or Base	pH Indicator	Colour of pH Indicator
black coffee	5		litmus	
milk of magnesia	10		phenolphthalein	
battery acid	0		bromothymol blue	
sea water	8		indigo carmine	
orange juice	3		methyl orange	
liquid drain cleaner	14		methyl red	

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## Acids versus bases

1. Compare and contrast acids and bases by completing the following table.

	Acids	Bases
definition		
pH		
what to look for in chemical formula		
production of ions		
electrical conductivity		
taste		
touch		
examples		

2. Classify each of the following as an acid or a base.

- (a)  $+ \text{H}_3\text{PO}_4$  \_\_\_\_\_
- (b)  $\text{NH}_4\text{OH}$  \_\_\_\_\_
- (c)  $\text{Mg}(\text{OH})_2$  \_\_\_\_\_
- (d) has a pH of 4 \_\_\_\_\_
- (e) has a pH of 9 \_\_\_\_\_
- (f) sulphurous acid \_\_\_\_\_
- (g) hydrogen bromide \_\_\_\_\_
- (h) potassium hydroxide \_\_\_\_\_
- (i) causes methyl orange to turn red \_\_\_\_\_
- (j) causes phenolphthalein to turn pink \_\_\_\_\_
- (k) causes indigo carmine to turn yellow \_\_\_\_\_
- (l) causes bromothymol blue to turn yellow \_\_\_\_\_

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## Acids and bases

Match the Term on the left with the best Descriptor on the right. Each Descriptor may be used only once.

Term	Descriptor
1. _____ acid	A. a solution with a pH of 7
2. _____ base	B. can burn skin or eyes on contact
3. _____ neutral	C. number of hydrogen ions in a specific volume of solution
4. _____ pH scale	D. a chemical compound that produces a solution with a pH less than 7
5. _____ corrosive	E. a number scale for measuring how acidic or basic a solution is
6. _____ pH indicator	F. a chemical compound that produces a solution with a pH greater than 7
7. _____ concentration of hydrogen	G. a chemical that changes colour depending on the pH of the solution it is placed in

8. Which of the following describes acids?

I.	has a pH of less than 7
II.	can conduct electricity
III.	produce hydroxide ions when dissolved in solution

- A. I and II only  
 B. I and III only  
 C. II and III only  
 D. I, II, and III

9. What happens to the number of  $H^+$  after  $H_2SO_4$  is added to water?

- A. it increases  
 B. it decreases  
 C. it stays the same

10. Which of the following is a base?

- A. KCl  
 B. HBr  
 C. LiOH  
 D.  $HNO_3$

11. What is the name for  $HClO_3$ ?

- A. chloric acid  
 B. chlorous acid  
 C. perchloric acid  
 D. hypochlorous acid

12. What is the chemical formula for sulphurous acid?

- A. HS  
 B.  $HSO_4^-$   
 C.  $H_2SO_3$   
 D.  $H_2SO_4$

13. What is the pH of a substance that causes methyl orange to turn yellow and methyl red to turn red?

- A. 3  
 B. 4.5  
 C. 6.5  
 D. 8

14. Which of the following would occur if eggs were tested with various pH indicators?

I.	indigo carmine turns blue
II.	phenolphthalein turns pink
III.	bromothymol blue turns blue

- A. I and II only  
 B. I and III only  
 C. II and III only  
 D. I, II, and III