

LESSON

What are acids?

16

The sour taste of the lemon juice tells us that it is an acid. Acids are special kinds of chemicals. They are common in everyday life. Some are helpful, others are harmful. There are some that are weak. Others are strong. Many acids are dangerous to touch or taste. You should never touch or taste an unknown acid.

Besides the sour taste that acids have, there are other tests for identifying them. Certain chemicals change color when acids are added.

Chemicals that change color are called indicators [IN-duh-kayt-urz].

An example of an indicator is a litmus paper. Litmus paper comes in two colors, red and blue.

Acids turn blue litmus paper red. Acids do not change the color of red litmus paper.

When acids mixed with metals a chemical reaction takes place. Hydrogen gas is given off from this reaction.

TESTING FOR AN ACID

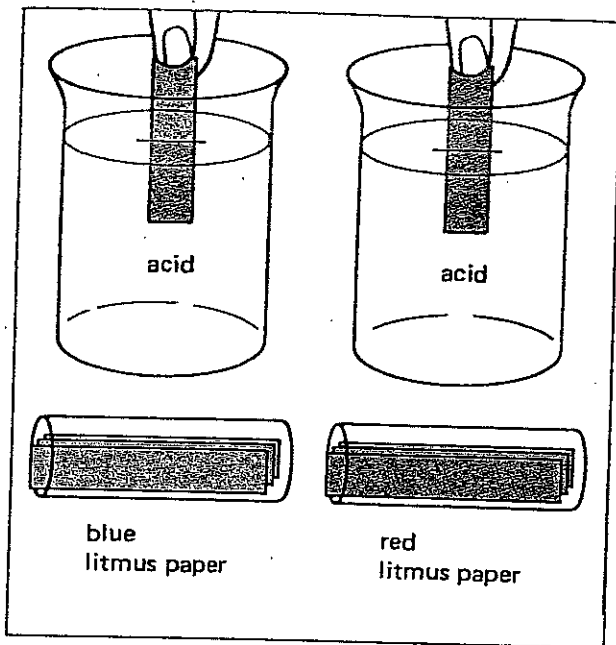


Figure A

Acids turn blue litmus paper red.

Does the red litmus paper change color with acids? _____

SOME COMMON ACIDS

The chart lists some common acids and their chemical formulas. It shows you what all acids have in common. All acids contain the element hydrogen (H+).

	ACID	CHEMICAL FORMULA	USES
1.	Acetic acid	$\text{HC}_2\text{H}_3\text{O}_2$	vinegar
2.	Boric acid	H_3BO_3	eyewash
3.	Carbonic acid	H_2CO_3	club soda
4.	Citric acid	$\text{H}_3\text{C}_6\text{H}_5\text{O}_7$	citrus fruits
5.	Hydrochloric acid	HCl	aids digestion
6.	Nitric acid	HNO_3	fertilizers
7.	Sulfuric acid	H_2SO_4	plastics

ACIDS IN YOUR LIFE

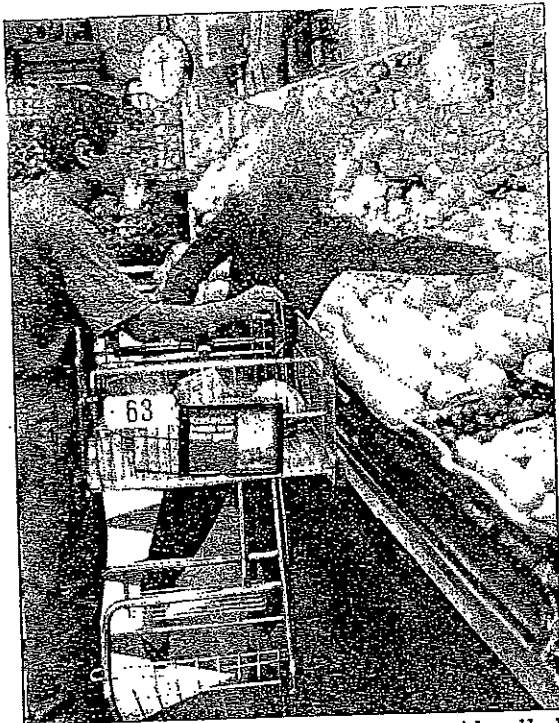


Figure B Citrus fruits have an acid called citric acid.



Figure C Vinegar is acetic acid.



Figure D Sulfuric acid is used in car batteries.



Figure E Hydrochloric acid produced in the stomach helps in digestion.

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided. Some words may be used more than once.

never
vinegar
litmus paper
dangerous

acid
hydrochloric acid
hydrogen

blue
red
citric

1. Lemons contain _____ acid.
2. _____ is a kind of indicator.
3. Acids turn _____ litmus paper red.
4. _____ litmus paper does not change color in acids.
5. When acids wear away metals, _____ is given off.
6. Acetic acid is found in household _____.
7. Your stomach produces _____.
8. All acids contain the element _____.
9. Some acids are _____ to touch or taste.
10. You should _____ touch or taste an _____.

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

- _____ 1. Litmus paper is an indicator.
- _____ 2. Acids turn red litmus paper blue.
- _____ 3. Acids contain hydrogen.
- _____ 4. Acids wear away metals.
- _____ 5. Oxygen is given off when acids wear down metals.

WORD SCRAMBLE

Below are several scrambled words you have used in this lesson. Unscramble the words and write your answers in the spaces provided.

1. CADI

2. TRINOCDIA

3. SSTTE

4. SITLUM

5. RUSÖ

REACHING OUT

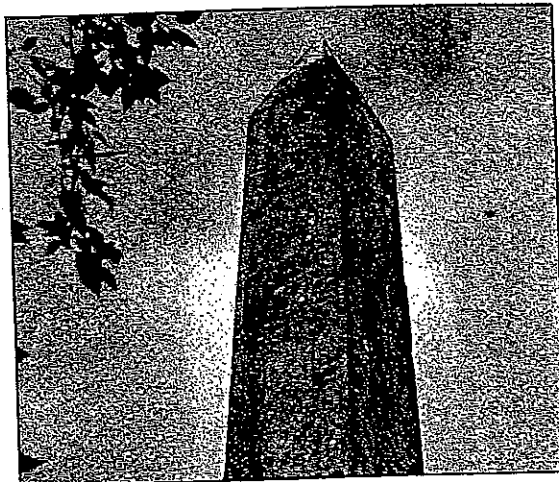


Figure F

Sometimes when rain falls, it mixes with pollution particles in the air. An acid is formed.

Why might this be harmful?

LESSON | What are bases?

17

Bases are a group of chemicals that have certain properties. Their properties are different from the properties of acids. Often they act opposite to the ways that acids act.

However, like acids, bases may be of different strengths. Some are very weak. Some are very strong. Some bases are dangerous to touch or taste. You should never touch or taste an unknown base.

Let us see how bases act with tests that we use to identify chemicals.

Bases have a bitter taste.

If you touch a harmless base it will feel slippery. Acids do not have any special feel.

Bases act the opposite way from acids with indicators. Bases turn red litmus paper blue. They do not change blue litmus paper.

There is another indicator that helps us to identify bases. It is called phenolphthalein [fee-noh-THAL-eeen). This solution is clear in acids. But phenolphthalein turns deep pink in bases.

Unlike acids, bases do not wear away metals.

TESTING FOR A BASE

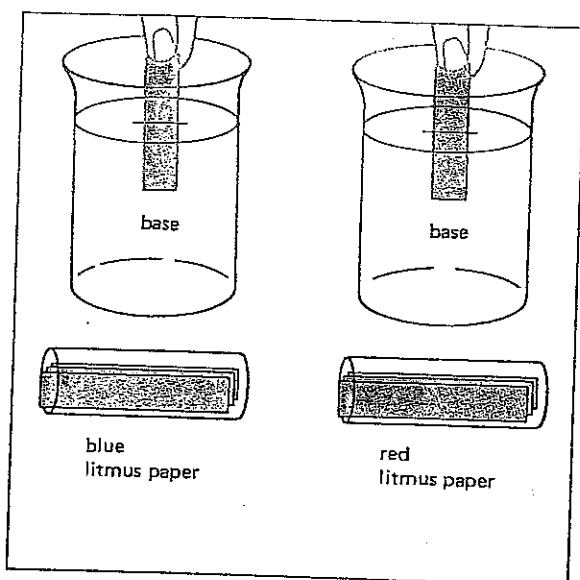


Figure A

Bases turn red litmus paper blue. Blue litmus paper does not change color.

What happens to blue litmus paper in acids? _____

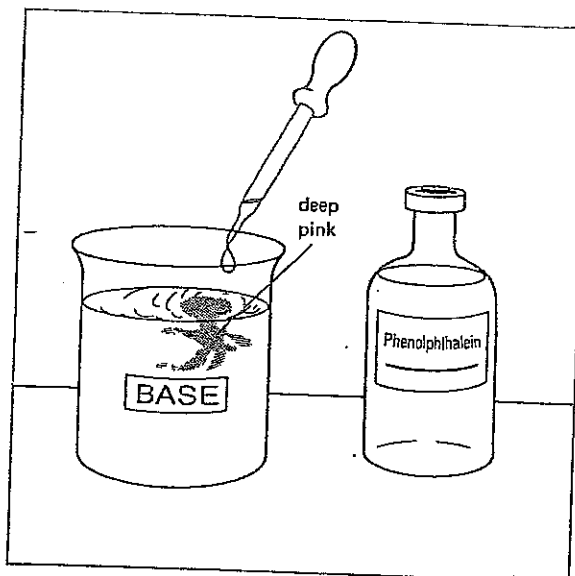


Figure B

Phenolphthalein turns deep pink in bases.

What happens to phenolphthalein in acids? _____

SOME COMMON BASES

The chart lists some common bases and their chemical formulas. It shows you what all bases have in common. All bases contain special groups of oxygen and hydrogen atoms called hydroxides (OH^-).

	BASE	CHEMICAL FORMULA	USES
1.	Potassium hydroxide	KOH	soap
2.	Magnesium hydroxide	$\text{Mg}(\text{OH})_2$	milk of magnesia
3.	Calcium hydroxide	$\text{Ca}(\text{OH})_2$	mortar
4.	Ammonium hydroxide	NH_4OH	ammonia
5.	Sodium hydroxide	NaOH	soap

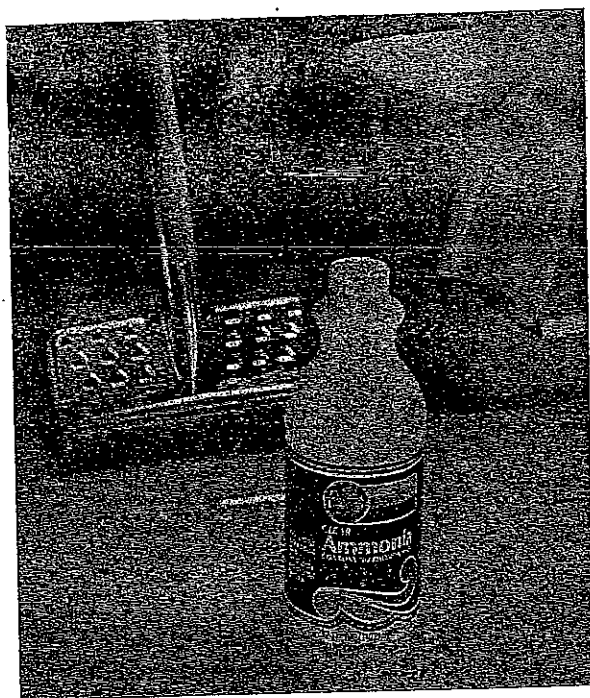


Figure C Ammonia is used in cleaning products.



Figure D Soap contains a base called lye.

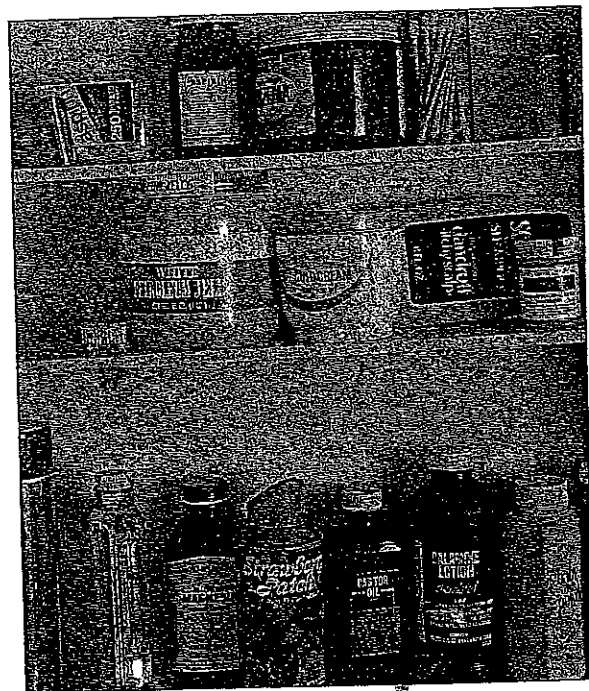


Figure E Milk of magnesia is used to neutralize excess stomach acids.

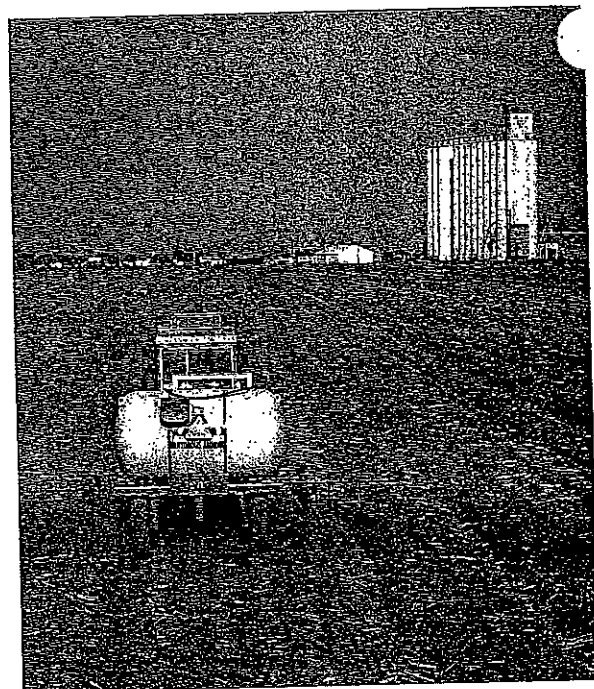


Figure F Ammonium hydroxide is important in making fertilizers.

FILL IN THE BLANK

Complete each statement using a term or terms from the list below. Write your answers in the spaces provided.

bitter
chemicals
change
lye

dangerous
do not change
indicators

opposite to
pink
sour

1. Bases are a group of _____.
2. Bases often act _____ the ways that acids act.
3. Both acids and bases can be _____.
4. Bases have a _____ taste.
5. Acids have a _____ taste.
6. Bases _____ the color of red litmus paper.
7. Bases _____ the color of blue litmus paper.
8. Phenolphthalein turns _____ in bases.
9. Phenolphthalein and litmus paper are _____.
10. Soap contains a base called _____.

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

Column A

- _____ 1. red litmus paper
- _____ 2. blue litmus paper
- _____ 3. phenolphthalein
- _____ 4. an acid
- _____ 5. a base

Column B

- a) ammonia
- b) turns pink in bases
- c) turns blue in bases
- d) stays blue in bases
- e) vinegar

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

- _____ 1. Bases taste sour.
- _____ 2. Bases feel slippery.
- _____ 3. Bases turn blue litmus paper red.
- _____ 4. Bases turn red litmus paper blue.
- _____ 5. Phenolphthalein turns deep pink in bases.
- _____ 6. Bases wear away metals.
- _____ 7. Bases can be dangerous.
- _____ 8. Acids contain the OH^- groups.
- _____ 9. Acids contain the H^+ groups.
- _____ 10. All bases are strong.

REACHING OUT

Why are indicators useful? _____
