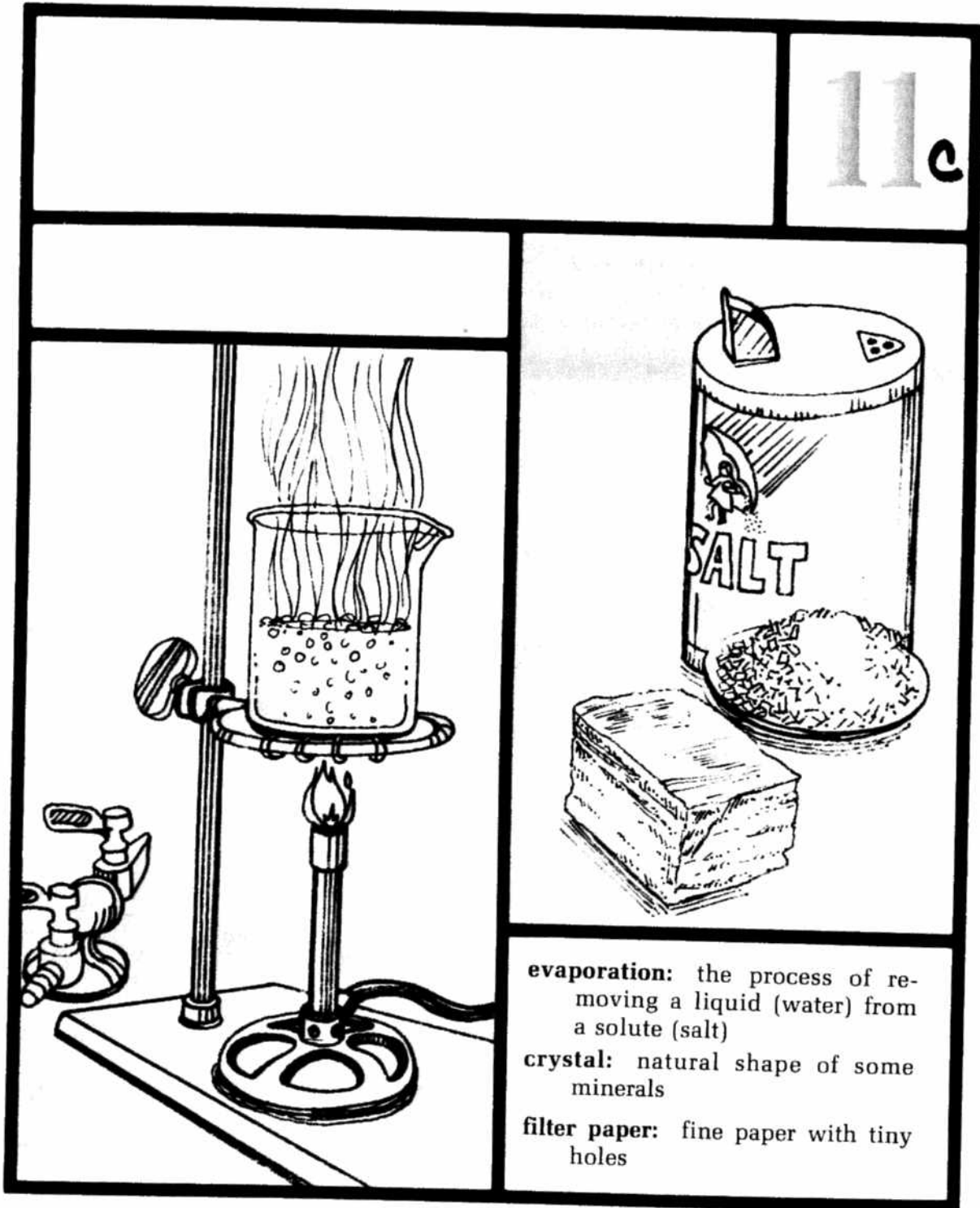


HOW CAN WE GET THE SOLUTE FROM A LIQUID SOLUTION?

11c



AIM | How can we get the solute 11 | from a liquid solution?

Everybody knows that ocean water tastes salty. Ocean water tastes salty because there is salt dissolved in it—the same kind of salt you sprinkle on your food.

Sea water is a liquid solution. The water is the solvent. The salt is one of the solutes dissolved in it. How can you prove that sea water contains dissolved salt? Simple! Place some sea water into a shallow dish and let it stand for a few hours. Slowly the water evaporates. The water changes to a gas and goes into the air. The salt stays behind as a solid.

You can make this happen faster if you heat the water. Heat speeds evaporation.

Any liquid solution can be separated by evaporation. But remember—only the solid solute will remain. The solvent escapes into the air.

What happens if you pass salt water through filter paper? Does the filter paper trap the salt? The answer is *no!* *A liquid solution cannot be separated by filtering.*

This is because the parts of a liquid solution are the size of molecules. They are so tiny that they pass right through the holes of the filter paper. Filter paper holes are small—but molecules are much smaller.

HOW MUCH DISSOLVED SALT DOES THE OCEAN HAVE?

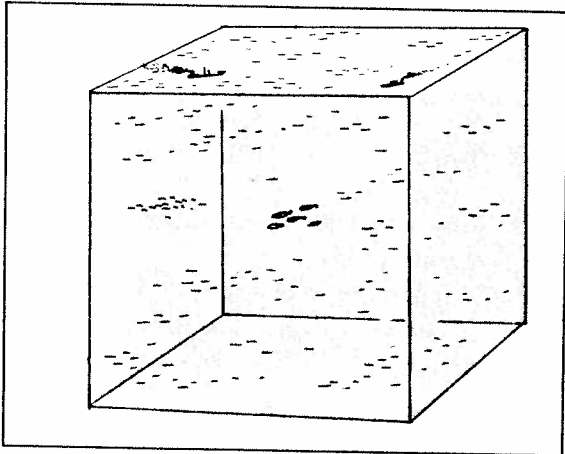


Figure A

The ocean has a huge amount of salt.

Just 2.5 cubic kilometers (1 cubic mile) of sea water has 109 million metric tons (120 million tons) of salt.

All the oceans together contain about 34 *quadrillion* (34,000,000,000,000,000) metric tons. That's a lot of salt!

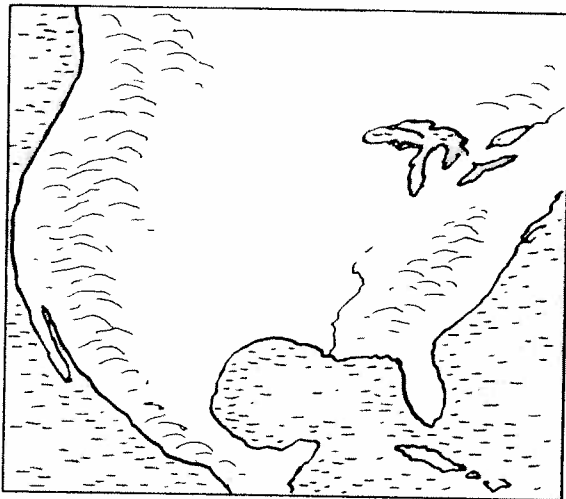


Figure B

This much salt (in solid form) would cover *all* of the United States with a layer about .6 meters (2 feet) thick.

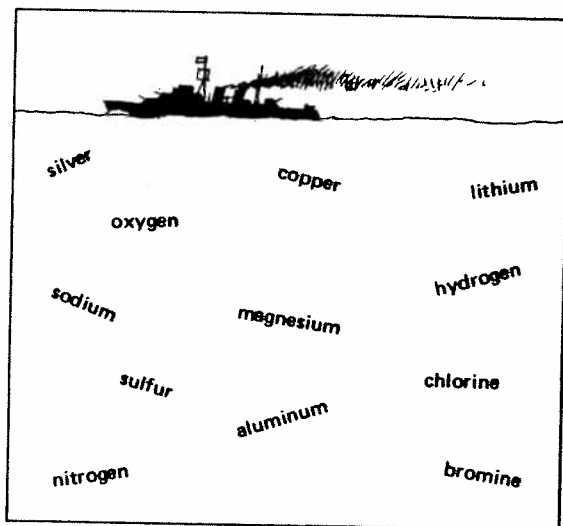


Figure C

The oceans have more than just salt. Sea water has *enormous* amounts of other substances too. In fact, every known element is found in sea water.

CRYSTALS

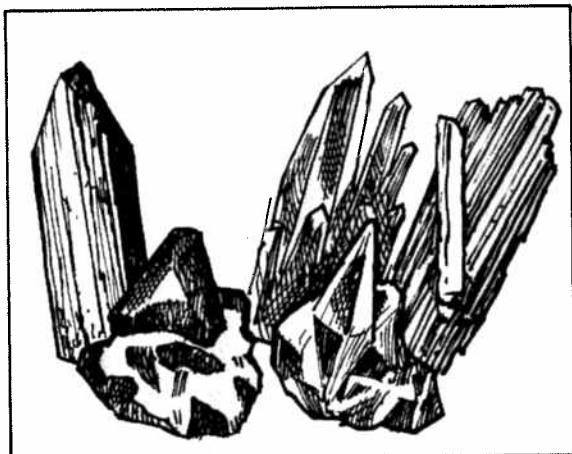


Figure D

Some of the many crystal forms

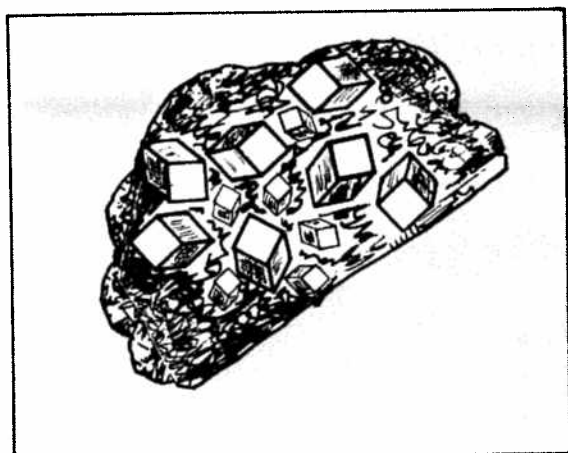


Figure E

Salt crystals

A solute may have a definite shape when it dries up. It is its *natural* shape.

We call this natural shape its *crystal form*.

There are many crystal forms. Figure D shows a few.

Different solids have different crystal forms.

Crystal form helps us to identify solids.

Salt crystals might look round to the naked eye. But they are not round.

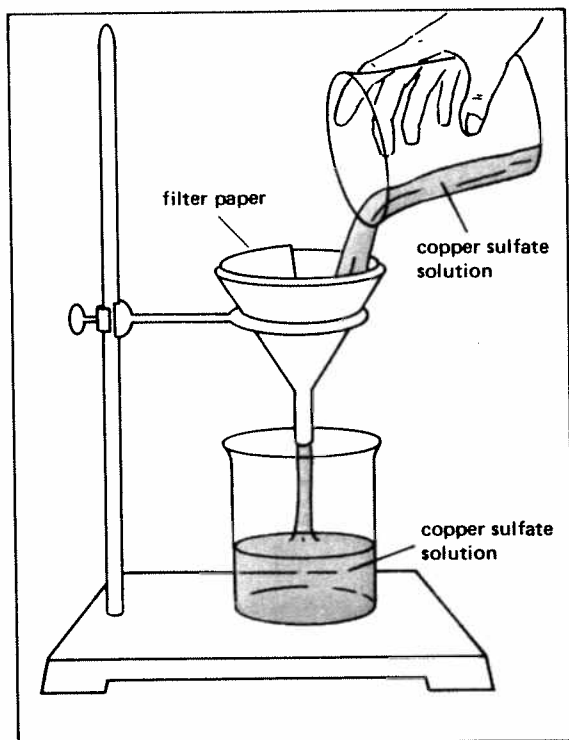
This is what salt crystals look like through a microscope.

How would you describe their shape? _____

FILL IN THE BLANKS Fill in the correct answer for each of the following.

1. The most common solute found in the ocean is _____.
2. When a solute _____ up, it has a natural shape.
3. The natural shape of some solids is its _____ form.
4. Different solids have different _____ forms.

CAN FILTERING SEPARATE A SOLUTE FROM A SOLVENT?



What You Need 2 beakers
copper sulfate solution
funnel
filter paper
ring stand

What You Need To Know

Filter paper is like a very fine strainer. It has tiny holes. Things larger than the holes get trapped. Things smaller than the holes pass right through.

What To Do

Set up the materials as in Figure G. Pour in the solution.

Figure G

What You Saw and Learned

1. The solute _____ left behind in the filter paper.
was, was not
2. The solvent _____ left behind in the filter paper.
was, was not
3. The solute particles are _____ than the holes in the filter paper.
larger, smaller
4. The solvent particles are _____ than the holes in the filter paper.
larger, smaller
5. A liquid solution _____ be separated by filtering.
can, cannot
6. The parts of a liquid solution are _____.
the size of molecules, larger than the size of molecules
7. Filter paper holes are _____.
the size of molecules, larger than the size of molecules

COMPLETING SENTENCES Complete the sentences with the choices below. One of these may be used three times. One other word may be used twice.

filtering
gas
solute

larger
heated
crystal form

solvent
molecules

1. The parts of a liquid solution are the _____ and _____.
2. The _____ is always a liquid.
3. In evaporation, a liquid changes to a _____.
4. When a liquid solution evaporates, only the _____ changes to a gas.
5. The _____ stays behind in its solid form.
6. Evaporation happens faster when a solution is _____.
7. The natural shape of a solid is called its _____.
8. The parts of a liquid solution are the size of _____.
9. Filter paper holes are _____ than the size of molecules.
10. Liquid solutions cannot be separated by _____.

TRUE OR FALSE Write T on the line next to the number if the sentence is true.
Write F if the sentence is false.

1. _____ All solutes are solids.
2. _____ You can see dissolved solids.
3. _____ Evaporation changes a liquid to a gas.
4. _____ Water can change to a gas.
5. _____ Only heated liquids evaporate.
6. _____ The natural shape of a solid is called its crystal form.
7. _____ Filter paper is like a strainer.
8. _____ The holes in filter paper are very tiny.
9. _____ The holes in filter paper are smaller than molecules.
10. _____ Filtering separates the parts of a liquid solution.

MATCHING Match the two lists. Write the correct letter on the line next to each number.

- | | | | |
|----------|--------------|----|--|
| 1. _____ | evaporation | a) | speeds evaporation |
| 2. _____ | heat | b) | smaller than the holes in filter paper |
| 3. _____ | molecules | c) | natural shape of solids |
| 4. _____ | filter paper | d) | liquid changes to a gas |
| 5. _____ | crystal form | e) | has very tiny holes |

WORD SEARCH The words in this list are hidden in the groups of letters. Try to find each word. Draw a line around each word. The spelling may go in any direction: up-and-down, across, or diagonally.

SOLUTE
UNIVERSAL
IODINE
TINCTURE
MISCIBLE
PROPERTIES
BOILING
VAPOR
GLASS
LIGHT

B	O	N	N	I	E	U	D	O	I	S	U
E	P	I	D	B	G	S	H	V	E	O	N
E	R	T	E	N	I	D	O	I	T	G	E
I	O	U	G	A	R	Y	T	L	A	G	S
K	P	E	T	U	E	R	P	O	U	Y	O
N	A	I	G	C	E	M	L	I	N	T	R
A	V	I	D	P	N	T	H	G	I	L	E
R	B	B	O	I	L	I	N	G	V	M	T
F	L	R	D	O	N	A	T	J	E	I	R
N	P	H	E	I	L	S	E	L	R	L	E
E	H	T	L	A	G	L	A	S	S	L	U
M	M	I	S	C	I	B	L	E	A	Y	N
A	B	O	L	I	O	S	S	A	L	P	I