

LESSON

20

What is relative humidity?

Key

Try this: Fill a large pan with water. Then place a sponge into the pan. What happens? The sponge soaks up the water—but not all of it. The sponge soaks up water until it is “full.” Then it cannot soak up any more. We say the sponge is saturated [sach-uh-RAYT-ed].

The air is like a sponge. Air also can hold water. Water in the air is in the form of gas. Water in gas form is called **water vapor**.

The amount of water vapor in the air does not stay the same. Sometimes the air has only a small amount of water vapor. Sometimes it has a lot.

The air only can hold so much water vapor. When there is more than that, there is precipitation.

The amount of water vapor air can hold depends on the temperature. Warm air can hold more water vapor than cold air. The higher the temperature, the more water vapor the air can hold.

Relative humidity [hyoo-MID-uh-tee] tells us how “full” the air is with water vapor.

Relative humidity compares

- the amount of water vapor in the air with
- the amount the air can hold.

Relative humidity is written as a percent (%). For example:

- (a) The relative humidity of saturated air is one hundred percent (100%). Saturated air has all the water vapor it can hold.
- (b) The relative humidity is 50% when the air holds only half the water vapor that it can.

Relative humidity can be very low. It can reach near zero percent. But it can never be at zero percent. Even the driest air has some water vapor.

STUDYING RELATIVE HUMIDITY

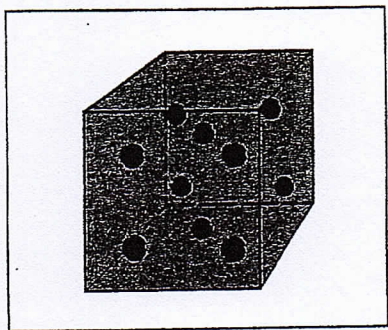


Figure A

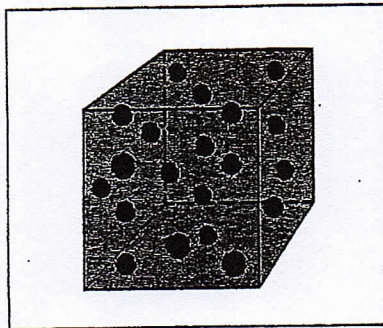


Figure B

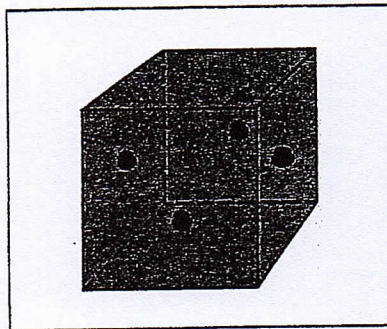


Figure C

Each cube stands for a part of the air. The temperature of each is 24° C (75° F). The balls stand for water vapor. You know that there are other gases in the air. Only water vapor is shown.

Write the letter of the correct cube in the blank.

1. Which air has the least water vapor? C
2. Which air has the most water vapor? B
3. Which air is the driest? C
4. Which air is the dampest? B
5. Which air has the highest relative humidity? B
6. Which air has the lowest relative humidity? C
7. What do you think? Which air may have rain soon? B

MATCHING

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

Column A	Column B
<u> b </u> 1. water vapor	a) can hold less water vapor
<u> e </u> 2. percent	b) gas
<u> c </u> 3. saturated	c) filled up
<u> a </u> 4. cold air	d) can hold more water vapor
<u> d </u> 5. warm air	e) part of one hundred

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.

saturated
less
100%

water vapor
small amount
more

damp
relative humidity
large amount

- Water in the gas form is called water vapor.
- Dry air has a small amount of water vapor.
- Moist air has a large amount of water vapor.
- Cold air can hold less water vapor than warm air.
- The higher the temperature, the more water vapor air can hold.
- The lower the temperature, the less water vapor air can hold.
- Air that holds all the water vapor it can is called saturated air.
- Saturated air feels very damp.
- The amount of water vapor in the air compared to the amount it can hold is called relative humidity.
- The highest relative humidity is 100%.

UNDERSTANDING PERCENTAGES

One hundred percent (100%) is a full amount of anything. For example:

- 100 parts of 100 is 100%
- 50 parts of 50 is 100%
- 2 parts of 2 is also 100%

Fifty percent (50%) is one-half of anything. For example:

- 50 parts of 100 is 50%
- 25 parts of 50 is 50%
- 1 part of 2 is 50%

Now see if you can figure out these percents.

1. 100% of 20 is 20%
100, 20, 120

2. 50% of 20 is 10%
20, 70, 10

3. 25% of 20 is 5%
5, 25, 45

4. 10% of 20 is 2%
2, 20, 10

RELATIVE HUMIDITY

Each cube in Figures D–H stands for a part of the air. The temperatures are the same. Each ball stands for one part of water vapor.

In this example, you can assume that twenty parts of water vapor make each cube saturated. Twenty parts of water vapor is all that the air can hold at this temperature. With twenty parts of water vapor, the air has 100% relative humidity.

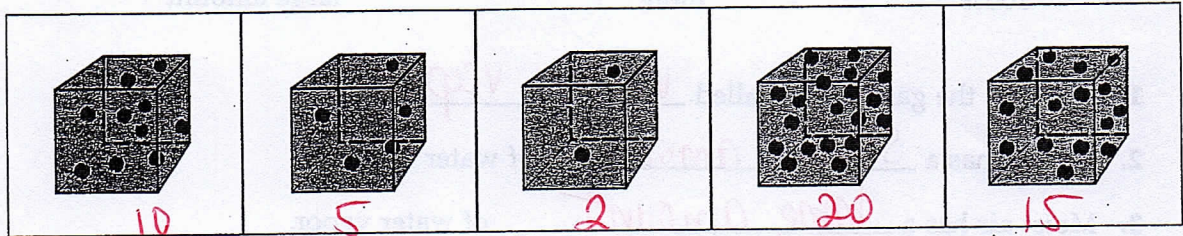


Figure D

Figure E

Figure F

Figure G

Figure H

Study each diagram. Then answer these questions. (Use Figure letters.)

1. a) Which cube of air is saturated? G

b) What is the relative humidity of the air in this cube? 95% (19/20)

c) Can this air hold any more water vapor? 1 molecule / yes

2. Which air has 20 = saturated

a) 50% relative humidity? D

c) 25% relative humidity? E

b) 75% relative humidity? H

d) 10% relative humidity? F

3. Which air is the driest? F

4. Which air is the dampest? G

5. Which air can hold these many more parts of water vapor?

a) 18 F

c) 10 E/F/D

b) 5 D/E/F/H

d) 15 F/E

DO YOU REMEMBER?

Air has many other gases. When more and more water vapor is added, it makes the other gases spread out more.

This makes the air pressure lower. If you do not remember, look back to Lesson 11.