

STEM *Sims*™

Making Clouds



Making Clouds

**Do you need an idea for a scientific study?
Try out one of our ideas or make one of your own.**

Clouds come in many different shapes and forms. These include clouds made of ice and others of liquid water. Take the following brief quiz to see how much you already know about clouds. See the bottom of page 4 to check your answers.

1. About how much does an average cumulus cloud weigh?
 - a. 100 pounds
 - b. 10,000 pounds
 - c. 100,000 pounds
 - d. 1,000,000 pounds
2. Which type of cloud is made of ice instead of liquid water?
 - a. cumulus
 - b. stratus
 - c. cirrus
 - d. cumulonimbus
3. Some human activities can cause clouds to form high in the sky.
 - a. true
 - b. false
4. Which term means to see things in other objects, such as the hand in the cloud in the image below?
 - a. paranoid
 - b. pronates
 - c. pareidolia
 - d. permeable
5. Why are most clouds white?
 - a. they are made of cotton
 - b. they reflect sunlight
 - c. they are in the gas phase
 - d. they are in the vapor phase



All Three Phases

Most people can tell the difference between solids, liquids, and gases simply by looking at the substance. Solids retain their shape, while liquids take the shape of their containers. Most gases however are hard to see and to investigate their properties. Are you ready to see a substance in all three phases in the same place at the same time? Get started now.

Materials

one small piece of dry ice
one small metal pan
one pair of tongs
water

Caution: Dry ice is solid carbon dioxide. The temperature of dry ice is below $-79\text{ }^{\circ}\text{C}$ or $-109\text{ }^{\circ}\text{F}$. Remember that water freezes into ice at $0\text{ }^{\circ}\text{C}$ or $32\text{ }^{\circ}\text{F}$, so the dry ice is much colder than ice made from water. Touching dry ice can result in frostbite and severe skin damage. Do not store any remaining dry ice. Make sure to use all the small piece of dry ice in the experiment. Conduct this experiment in a well-ventilated area.

Procedure

1. Make sure that you get permission before conducting this experiment.
2. Use caution with the dry ice. Never touch the ice directly, only use tongs to handle the dry ice.
3. Fill the metal pan about halfway with tap water.
4. Carefully pick up the piece of dry ice with the tongs.
5. Place the dry ice in the pan of water.
6. Observe and record your results.



Questions

1. Describe where the dry ice in the gas phase was visible.
2. Describe where the dry ice in the liquid phase was visible.
3. Propose a reason why ice made from water could *not* be used for this experiment.

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Cloud Types

Most people enjoy looking up at the clouds in the sky. Some people are experts at the types of clouds and the altitudes of the different cloud types. Cloud types also depend on the phase of water that make up the clouds. The following presents information on the different cloud types and their locations in the atmosphere. Use this information to become a cloud expert.

Low Level Clouds below 2,000 meters

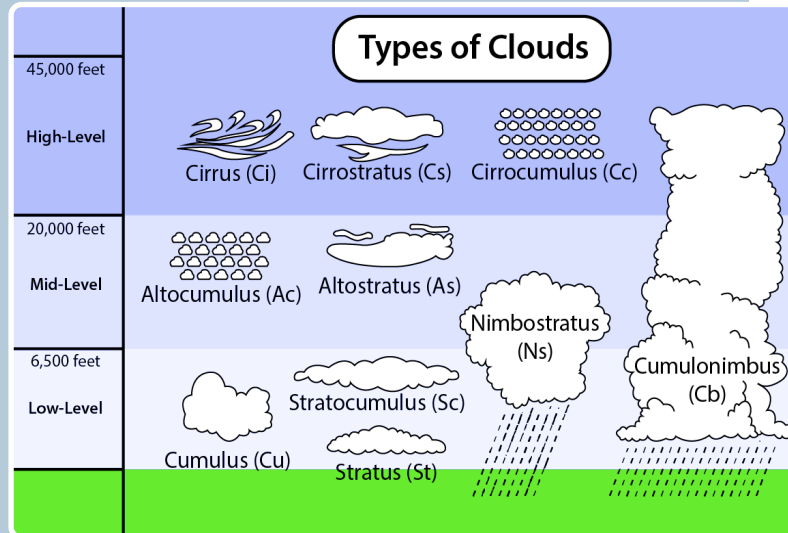
Cumulus are clouds that resemble cotton balls. They are usually associated with fair weather. The water concentration in the cloud changes with increasing altitude. The bottom of the cloud typically has a zero concentration of water droplets. The bottom of the cloud is usually darker than the top of these clouds since light cannot easily move through the cloud to reach the bottom due to the higher water droplet concentration in the cloud's middle section. Stratus clouds are uniform horizontal hazy clouds that are gray or white. Their appearance resembles above ground fog. These clouds are associated with stable weather and often accompanied by a light drizzle. Stratocumulus clouds have a large, rounded shape and dark coloration.

Mid-level Clouds up to 6,000 meters

Altostratus clouds have a small, rounded shape, similar in appearance to stratocumulus clouds. However, altostratus clouds are smaller than stratocumulus clouds. Nimbostratus clouds are dark, horizontal layers associated with a steady rain, snow, or sleet without the presence of stormy-type weather. Altostratus clouds are thin sheets of dark clouds that consist of water droplets and ice that cover the entire sky. These clouds are often signal the approach of a warm front.

High-level clouds up to about 12,000 meters

Cirrus clouds are very white and wispy. Often these clouds look like hair blowing in the wind. These clouds are made up of ice crystals and often signal the coming of rain or stormy weather. Cirrostratus clouds are very thin and are transparent to most light. These clouds often indicate that rain will follow in a couple of days. Cirrocumulus clouds appear as small round puffs at very high altitudes. These clouds are associated with fair weather but can indicate the approach of storms. Cumulonimbus clouds are so large that they stretch from low levels up to 12,000 meters. These clouds are often associated with thunderstorms that appear during the warm summer months.



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Answers: Page 2 Answers: 1) d, 2) c, 3) a, 4) c, 5) b. Page 3 Answers: All Three Phases 1) The bubbles that were rising in the liquid water are carbon dioxide gas. 2) The cloud formed above the liquid water are carbon dioxide liquid droplets. 3) No. Unlike carbon dioxide, water cannot go directly from the solid to the gas phase at normal room conditions.

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