

The Science of Snow

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Once winter arrives in Alberta, snow seems to be one of the most popular subjects discussed in coffee shops, grocery lines and with neighbours. It can blow, blizzard, squall and drift. You can shovel it, ski on it and sculpt it.

Over the years, many adjectives have been developed to describe the “white stuff” – fluffy, sticky, slushy and powder, a favourite of skiers everywhere. But, snow is actually not white, but made up of ice crystals with numerous tiny surfaces that are transparent, like glass. As snow accumulates, most light reflects off the ice crystals with their many surfaces making it appear white.

Ice crystals begin as dust particles floating in a cloud. Water vapor condenses on the particle and the droplets freeze into a crystal. The crystals almost always are a symmetrical, hexagonal structure, having six sides.

As the ice crystals transform, they take on six basic shapes: columns, needles, plates, dendrites (a crystal that develops in a tree-like form), columns with plates and irregular. The different shapes form as a result of movement through different temperatures and are dependent on water saturation. Snowflakes are formed as these ice crystals agglomerate, or gather together in a cluster as they fall through and below clouds. Snowflakes can be formed from two snow crystals or hundreds!

Snow rises before it falls. As the ice crystals develop into a snowflake, it is light enough for rising air to push it upward. As more ice crystals accumulate on the growing flake, it becomes heavy enough to fall. Snow is formed high in the atmosphere, not near the earth’s surface. This is why it can snow even when the temperature is above freezing.

It is a commonly held belief that no two snowflakes are alike. Given the random way snowflakes are formed and the changes in temperature and humidity on its way to the ground, identical flakes would be highly unlikely. However, there are no known scientific reasons that would prevent identical snowflakes from forming and new research seems to indicate there may be similarities in smaller crystals.

Though we often think “cold” when we think of snow, snow actually is an excellent insulator. Blankets of snow act as the earth’s thermal insulator and protect plant life from subfreezing conditions. Farmers also rely on snow to provide water for crops as it melts in the spring.

Snow can also be used as an artist’s medium. Many beautiful sculptures are created across Canada. The largest snowcastle in the world is constructed every year in Kemi, Finland. Using a different design each year, the castle has been as large as 20,000 square metres! Visit <http://www.snowcastle.net>.

If you want to become a snowflake scientist, join NASA's (National Aeronautics and Space Administration) Global Snowflake Network where they are recruiting volunteers to document the shape of snowflakes around the world! Go to <http://education.gsfc.nasa.gov/how>.

If you don't want to participate, but are still interested in the beauty and composition of snowflakes, you may want to view photographs by Wilson "Snowflake" Bentley. Bentley is the first known photographer of snowflakes and part of his collection can be viewed at <http://www.bentley.sciencebuff.org/index.htm>. He photographed over 5000 snowflakes in his lifetime.

2007 was also International Polar Year, a scientific programme involving thousands of scientists, studying the Arctic and the Antarctic from March 2007 to March 2009. Visit <http://www.ipy.org/>

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