Name: _____ Date: _____

# Why Frozen Seawater Is Not Very Salty

Circle group

If you freeze a glass of salty water, the ice is less salty than the water. The same thing happens in the cold polar seas. Sea ice is frozen seawater, but it has much less salt than the sea under it.

Here is why. When water freezes, its tiny parts lock into a neat pattern. Salt does not fit well in that pattern. Most of the salt is pushed out and stays in the water nearby. Some is trapped in tiny pockets of very salty water, called brine, inside the ice. Salt also makes water freeze at a colder temperature than fresh water.

The salt that is pushed out is important. Salty water is heavy, so the cold, salty water sinks below the new ice. This sinking helps to stir the ocean. It moves water from the top down toward the deep.

Sea ice changes as it gets older. The pockets of brine can drain through narrow paths and drip back into the sea. Old ice can be fresh enough that explorers have melted it for drinking water. New ice is too salty to drink.

## Questions

**1. How does sea ice compare with the seawater under it?**

_____

_____

**2. What happens to most of the salt when seawater freezes?**

_____

_____

**3. What is brine in this passage?**

_____

_____

**4. Why does the water under new ice sink?**

_____

_____

**5. How does the sinking salty water help the ocean?**

_____

_____

**6. Why is old sea ice less salty than new ice?**

_____

_____

## Words to know

brine: very salty water

polar: near the very top or bottom of the Earth

## Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

# Why Frozen Seawater Is Not Very Salty

Triangle group

If you freeze a glass of salty water, the ice that forms is less salty than the water it came from. The same thing happens in the cold polar oceans. Sea ice is made of frozen seawater, yet it holds much less salt than the sea beneath it.

The reason lies in how ice crystals grow. As water freezes, its molecules lock into a neat pattern, and salt does not fit well into that pattern. Most of the salt is pushed out and stays in the liquid water nearby. Some of it is trapped in tiny pockets of very salty water, called brine, inside the ice. Salt also lowers the temperature at which water freezes, so seawater must get a little colder than fresh water before it turns to ice.

The salt that is pushed out has a big effect. Water with extra salt is heavier, so the cold, salty water sinks below the new ice. This sinking helps to stir the ocean and carry water from the surface toward the deep.

Sea ice also changes as it grows older. Over time the pockets of brine can drain through narrow channels and drip back into the sea. Ice that has survived for years can be fresh enough that explorers have melted it for drinking water, while ice that has just formed is still too salty to drink.

## Questions

**1. How does sea ice compare with the seawater beneath it?**

_____

_____

**2. What happens to most of the salt when seawater freezes?**

_____

_____

**3. What is brine in this passage?**

_____

_____

**4. Why does the water under new ice sink?**

_____

_____

**5. How does the sinking of salty water help the ocean?**

_____

_____

**6. Why is older sea ice less salty than brand new ice?**

_____

_____

## Words to know

crystals: tiny solid shapes with a neat repeating pattern
molecules: the tiny pieces that make up water and other things
brine: very salty water
channels: narrow paths that liquid can flow along
polar: near the very top or bottom of the Earth

## Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

Name: _____ Date: _____

# Why Frozen Seawater Is Not Very Salty

Square group

If you freeze a glass of salty water, the ice that forms is noticeably less salty than the water it came from. The same phenomenon occurs in the frigid polar oceans. Sea ice is composed of frozen seawater, yet it contains far less salt than the sea that lies beneath it.

The explanation lies in the way ice crystals grow. As water freezes, its molecules lock together into a tidy pattern, and salt does not fit comfortably into that arrangement. Most of the salt is therefore pushed out and remains in the liquid water nearby, although some of it becomes trapped in tiny pockets of extremely salty water, called brine, inside the ice. Salt also lowers the temperature at which water freezes, so seawater must become slightly colder than fresh water before it turns to ice.

The salt that is expelled has an enormous effect. Water containing extra salt is heavier, so the cold, salty water sinks below the newly formed ice. This sinking helps to stir the ocean and carries water from the surface down toward the depths.

Sea ice also changes as it grows older. Over time, the pockets of brine can drain through narrow channels and trickle back into the sea. Ice that has survived for several years can become fresh enough that explorers have melted it for drinking water, whereas ice that has only just formed is still far too salty to drink.

## Questions

**1. How does sea ice compare with the seawater that lies beneath it?**

_____

_____

**2. What becomes of most of the salt when seawater freezes?**

_____

_____

**3. What does the word brine refer to in this passage?**

_____

_____

**4. Why does the water below newly formed ice sink?**

_____

_____

**5. In what way does the sinking of salty water help the ocean?**

_____

_____

**6. Why is ice that has lasted several years less salty than brand new ice?**

_____

_____

## Words to know

crystals: tiny solid shapes with a neat repeating pattern
molecules: the tiny pieces that make up water and other things
brine: very salty water
channels: narrow paths that liquid can flow along
polar: near the very top or bottom of the Earth

## Talk together (every group has these)

1. Find one fact that every group read. How did your sheet say it?
2. What did your sheet tell you that you think another group's did not? Ask them.
3. What is one question about this topic that none of the sheets answered?

# For the teacher: Why Frozen Seawater Is Not Very Salty

Each student sheet carries a shape, not a level. The same topic and facts, written three ways.

### Circle: Why Frozen Seawater Is Not Very Salty

Easier · 185 words · Flesch-Kincaid grade 4

1. It has much less salt.
2. It is pushed out and stays in the water nearby.
3. Very salty water trapped in tiny pockets in the ice.
4. The salt pushed out makes it heavy.
5. It stirs the ocean and moves water from the top toward the deep.
6. Its pockets of brine have had time to drain back to the sea.

### Triangle: Why Frozen Seawater Is Not Very Salty

This passage · 227 words · Flesch-Kincaid grade 6.4

1. It holds much less salt.
2. It is pushed out and stays in the liquid water nearby.
3. Very salty water trapped in tiny pockets inside the ice.
4. The salt that was pushed out makes it heavier.
5. It stirs the ocean and carries surface water toward the deep.
6. Its brine pockets have had time to drain back into the sea.

### Square: Why Frozen Seawater Is Not Very Salty

Harder · 237 words · Flesch-Kincaid grade 8.9

1. It contains far less salt.
2. It is pushed out and remains in the liquid water nearby.
3. Extremely salty water trapped in tiny pockets inside the ice.
4. The expelled salt makes it heavier.
5. It stirs the ocean and carries surface water down toward the depths.
6. Its brine pockets have had time to drain back into the sea.