

The Science of Ice Cream: Why Salt Makes It Cold

Bloom's Level: Analyze

Standard:

NGSS MS-PS1-4 — Chemical Reactions and Properties

NGSS.MS-PS1-4 — Conducting Investigations on Mixtures

TEKS §112.18(b)(5)(C) — Investigate Mixtures and Solutions

STUDENT EDITION



The same chemistry that keeps roads ice-free in winter is what turns a bag of cream and ice into a frozen dessert — freezing point depression at work.

The Science of Ice Cream: Why Salt Makes It Cold

A Bag, Some Ice, and a Little Chemistry Magic

Imagine shaking a bag of ice and salt for ten minutes and pulling out homemade ice cream. No freezer. No electricity. Just chemistry. It sounds like a trick, but the science behind it is real — and it explains phenomena far beyond your kitchen. The same principle that turns your bag of ice into a frozen treat also keeps roads safe in winter, prevents car engines from overheating, and explains why the ocean stays liquid even in freezing temperatures. That single concept is called **freezing point depression**, and once you understand it, you'll start seeing it everywhere.



The same chemistry that keeps roads ice-free in winter is what turns a bag of cream and ice into a frozen dessert — freezing point depression at work.

What Is Freezing Point Depression?

Pure water freezes at 0°C (32°F). That's a fixed property of water — under normal conditions, it doesn't change. But when you dissolve a substance like salt into water, something interesting happens: the freezing point drops below 0°C . The water now needs to get colder than usual before it can freeze.

Why does this happen? When salt dissolves in water, it breaks apart into charged particles called **ions**. These ions spread throughout the water and physically interfere with water molecules trying to lock together into ice crystals. Think of it like trying to build a brick wall while someone keeps tossing extra objects into the mix — the structure can't form as easily. The water molecules need extra energy removed — meaning the temperature must drop further — before they can form a solid. The more salt you add, the lower the freezing point drops.

Comparing Pure Water vs. Salt Water

Substance	Freezing Point
Pure water	0°C (32°F)
Ocean water (~3.5% salt)	-1.9°C (28.6°F)
Heavily salted ice water	-21°C (-5.8°F)

Examine the pattern: as salt concentration increases, the freezing point decreases significantly. Notice also that the relationship is predictable and measurable — a key feature scientists look for when analyzing chemical mixtures. This isn't random. It's a consistent, quantifiable effect that scientists can calculate in advance, which is what makes it so useful in real-world applications.

Why Does the Ice Cream Bag Get So Cold?

Here's where it gets fascinating. When you mix rock salt with ice, the salt begins dissolving into the thin layer of liquid water on the ice's surface. This creates a salt-water solution with a freezing point below the current temperature of the ice. To reach that new, lower freezing point, the mixture must absorb heat from its surroundings — including from the cream mixture inside your bag.

This heat transfer is what makes the bag feel shockingly cold. You're not just cooling the cream; the salt-ice mixture is actively pulling thermal energy away from it.

Compare the temperatures directly: a plain ice-water mixture sits around 0°C, while a salt-ice mixture can plunge to -10°C or lower. That difference — more than 10 degrees — is the engine driving your ice cream experiment. Without the salt, the ice simply wouldn't be cold enough to freeze the cream at all.

The Chemistry of Creaminess: Fat, Air, and Ice Crystals

Temperature alone doesn't make great ice cream. Examine the difference between homemade and store-bought ice cream and you'll notice something: store-bought is smoother. Why?

Two factors explain this:

1. **Ice crystal size** — The faster cream freezes, the smaller the ice crystals that form. Smaller crystals produce a smoother texture. Industrial freezers cool cream extremely rapidly, producing tiny crystals. Your shaking bag cools more slowly, creating slightly larger crystals and a coarser texture. This is a direct cause-and-effect relationship between freezing rate and final texture.
2. **Air incorporation** — Shaking the bag whips air into the mixture. Fat molecules in the cream surround air bubbles and stabilize them, creating a light, scoopable structure. Commercial ice cream is churned continuously, incorporating even more air — sometimes up to 50% of its volume.

Real-World Connections: Beyond the Kitchen

Freezing point depression shows up in critical real-world applications. Differentiate how the same underlying principle operates across these very different contexts:

- **Road safety:** Cities spread salt on icy roads to lower the freezing point of water, preventing ice from forming at typical winter temperatures.
- **Antifreeze:** The liquid in your car's radiator contains ethylene glycol, which depresses the freezing point of water so engine coolant doesn't freeze in winter.
- **Ocean science:** Because salt lowers seawater's freezing point, polar oceans remain liquid even when air temperatures drop below 0°C, supporting entire ecosystems.

In each case, the mechanism is identical: dissolved particles disrupt the formation of ice crystals, requiring a lower temperature to freeze. The context changes; the chemistry doesn't.

Bringing It Together

Freezing point depression is a single chemistry concept with enormous reach. By analyzing how dissolved particles interfere with ice crystal formation, you can explain homemade ice cream, winter road treatment, antifreeze, and ocean behavior — all from the same underlying principle. The ability to recognize one pattern and connect it across multiple systems is exactly what scientific thinking looks like. Once

you learn to spot it in chemistry, you'll find it hiding in the world around you, one salty bag of ice cream at a time.

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Lesson Objective

In this lesson, you will investigate how dissolving substances like salt into water changes its freezing point — a process called freezing point depression. You will analyze data comparing the properties of pure water and salt-water mixtures to explain why adding salt makes ice colder and how this principle applies to real-world situations like road safety and antifreeze. By the end, you will be able to use evidence from observations and data tables to explain the relationship between dissolved particles and changes in the physical properties of a mixture.



When rock salt mixes with ice, it creates a super-cold solution that can drop well below 0°C — cold enough to freeze cream into ice cream.

Standard: NGSS MS-PS1-4 — Chemical Reactions and Properties; TEKS §112.18(b)(5)(C) — Investigate Mixtures and Solutions

Bloom's Level: Analyze

Bloom's Goal: Students will analyze patterns in data comparing the freezing points of pure water and salt-water mixtures to explain how dissolved particles cause freezing point depression.

Explanation: Analyzing requires students to break down information, identify cause-and-effect relationships, and recognize patterns across multiple examples. In this lesson, students examine how increasing salt concentration produces a predictable and measurable drop in freezing point, then connect that pattern to real-world applications such as icy roads, antifreeze, and ocean science.

Application Questions

Read each question carefully, then use evidence from the article to write a thoughtful response that analyzes the science behind freezing point depression.

1. A student claims that adding more salt to the ice-cream bag will always make better ice cream because it will get colder faster. Using evidence from the article, analyze whether this claim is fully supported, partially supported, or not supported. Explain your reasoning.

Think about: Consider what the article says about how salt affects freezing point AND what factors determine ice cream texture. Does colder always mean better in this case?

2. The article describes three real-world uses of freezing point depression: road salting, antifreeze, and ocean science. Analyze how the underlying chemistry is the same in all three situations, even though the contexts are very different. What specific evidence from the article supports your analysis?

Think about: Look for the common mechanism the article describes across all three examples. What is actually happening at the particle level in each case?

3. A plain ice-water mixture sits at about 0°C, while a salt-ice mixture can reach -10°C or lower. Analyze why this temperature difference matters for the ice cream experiment. What would happen to the outcome if you used plain ice water instead of salt ice, and why?

Think about: Think about what the article says about heat transfer and the freezing point of the cream mixture. What temperature does the ice need to reach to actually freeze the cream?

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Data Table & Analysis

Study the data table below, which compares the properties of different water-based mixtures. Then answer the three analysis questions using evidence from the table and what you have learned about freezing point depression.

Experiment: Students investigated how dissolving different substances in water affects the freezing point of the resulting mixture. The data below was collected by measuring the freezing points of various solutions and observing their real-world applications.

Mixture / Substance (N/A)	Solute Concentration (% by weight)	Freezing Point (°C)	Freezing Point (°F)	Real-World Application (N/A)
Pure water	0%	0	32	Baseline reference
Ocean water	~3.5%	-1.9	28.6	Supports polar marine ecosystems
Heavily salted ice water	High (near saturation)	-21	-5.8	Homemade ice cream making
Salt-ice mixture (road treatment)	Moderate	-10 or lower	14 or lower	Preventing ice on winter roads
Ethylene glycol antifreeze solution	Varies by mix	Below 0	Below 32	Car radiator coolant in winter
Plain ice-water mixture (no salt)	0%	0	32	Insufficient for freezing cream

1. Analyze the pattern in the data table between solute concentration and freezing point. What happens to the freezing point as the concentration of dissolved particles increases? Use at least two rows of data as evidence to support your answer.

2. Compare the freezing points of a plain ice-water mixture and a heavily salted ice-water mixture. Why is the salt-ice mixture able to freeze cream inside a bag when plain ice water cannot? Use the data and your knowledge of freezing point depression to explain.

3. The table shows that ocean water, road salt treatment, and antifreeze all involve dissolved substances lowering the freezing point of water. Analyze how the same chemical principle — freezing point depression — explains each of these three real-world applications differently, even though the underlying mechanism is identical.

Hypothesis Builder

Read the experimental context below. Then complete each component to build a scientific hypothesis about freezing point depression. Use evidence from what you know about dissolved particles, temperature, and mixtures to guide your answers.

A student wants to investigate how the amount of salt added to ice affects the temperature of the ice-water mixture. She sets up three cups: one with plain ice and water, one with a small amount of salt added, and one with a large amount of salt added. She measures the temperature of each mixture after five minutes using a thermometer. She predicts that adding more salt will cause the mixture to reach a lower temperature.

Independent Variable

What is the one factor the student is deliberately changing in this experiment? Identify the independent variable and describe how it is being changed.

Dependent Variable

What is the student measuring or observing as a result of the change she made? Identify the dependent variable and explain how it will be recorded.

If

Write the 'If' part of your hypothesis by stating what the student is changing. Begin with the word 'If' and describe the independent variable.

Then

Write the 'Then' part of your hypothesis by predicting what will happen to the dependent variable. Begin with the word 'then' and describe the expected outcome.

Because

Write the 'Because' part of your hypothesis by explaining the scientific reasoning behind your prediction. Use what you know about dissolved particles, ions, and ice crystal formation to support your claim.

Claim-Evidence-Reasoning (CER)

Read the phenomenon below carefully. Then complete each component of the Claim-Evidence-Reasoning (CER) framework by responding to the guiding prompt. Your responses should demonstrate scientific thinking and connect to what you have learned about freezing point depression and mixtures.

Phenomenon: A student conducting an ice cream experiment measures the temperature of a plain ice-water mixture and finds it sits at 0°C. When rock salt is added to the ice, the temperature of the mixture drops to -10°C. The cream mixture inside the bag freezes into ice cream, but the plain ice-water mixture without salt fails to freeze the cream at all.

Claim

What scientific claim can you make to explain why adding salt to ice caused the cream mixture to freeze? State your claim in one or two complete sentences without using evidence yet.

Evidence

What specific data or observations from the experiment and the article support your claim? Identify at least two pieces of evidence, including temperature measurements or information about how dissolved particles affect freezing point.

Reasoning

Explain how your evidence connects to your claim using scientific concepts. How does the behavior of ions in a salt-water mixture cause the temperature to drop low enough to freeze the cream? Use what you know about freezing point depression and particle behavior to justify your reasoning.

Independent / Dependent Variable Analysis

Read the experimental scenario below carefully. Then, for each variable component, respond to the guiding question using evidence and scientific reasoning. Your answers should demonstrate that you can identify and distinguish between the different parts of a controlled experiment.

Scenario: A 7th-grade class wants to investigate how the amount of salt added to an ice-water mixture affects the temperature the mixture can reach. Students prepare four identical cups, each containing 200 mL of crushed ice and 50 mL of water. They add different amounts of table salt to each cup: 0 grams, 5 grams, 15 grams, and 30 grams. After stirring each cup for two minutes, students use a digital thermometer to measure and record the temperature of each mixture. All cups are made of the same material and are kept in the same room throughout the experiment.

Independent Variable

What is the one factor the students are deliberately changing across the four cups, and why is it considered the independent variable in this investigation?

Dependent Variable

What outcome are the students measuring to determine the effect of their manipulation, and how does this variable respond to changes in the independent variable?

Control Variables

Identify at least three factors that must be kept the same across all four cups. Explain why keeping these factors constant is essential for the investigation to produce valid results.

Operationalized Definition

How would you precisely define and measure the dependent variable in this experiment so that another student could replicate the procedure and collect data in exactly the same way?

Hypotheticals

Read each scenario carefully, then analyze the situation to answer both questions using what you know about freezing point depression and chemical mixtures.

Scenario 1: A city engineer is preparing for a winter storm where temperatures are expected to drop to -15°C . She has two options: spread plain water on the roads to create a protective layer, or spread a heavily salted brine solution. She knows that a heavily salted ice-water mixture can reach a freezing point as low as -21°C , while plain water freezes at 0°C . She must decide which option will keep the roads safer.

a) Using evidence from what you know about freezing point depression, explain why the heavily salted brine solution would be more effective than plain water at preventing ice from forming on the roads at -15°C .

b) If the engineer used a lightly salted solution instead of a heavily salted one, how would you predict the freezing point would change, and what does that tell you about the relationship between the amount of dissolved salt and the freezing point of a mixture?

Scenario 2: Two students are making ice cream using the bag method. Student A uses plain ice with no salt, while Student B adds a large amount of rock salt to the ice. After ten minutes of shaking, Student A's cream mixture is still liquid, but Student B's has frozen into ice cream. Both students used the exact same cream recipe and shook their bags for the same amount of time.

a) Analyze why Student B's cream froze while Student A's did not, using your understanding of how salt affects the temperature of an ice-water mixture and how heat transfer works in this experiment.

b) Student B notices that her homemade ice cream has a slightly grainy texture compared to store-bought ice cream. Based on what you know about ice crystal formation and freezing rate, what can you conclude is the most likely cause of this difference in texture?

Multiple Choice

Read each question carefully and choose the best answer from the four options provided.

1. A student dissolves different amounts of salt in separate cups of water and records the freezing point of each mixture. What pattern in the data would best support the concept of freezing point depression?

- A. As salt concentration increases, the freezing point decreases.
- B. As salt concentration increases, the freezing point increases.
- C. The freezing point stays the same regardless of how much salt is added.
- D. The freezing point decreases only when the salt is completely dissolved.

2. When salt is added to ice, the mixture reaches temperatures as low as -21°C . Which explanation best analyzes why this temperature is so much lower than 0°C ?

- A. Salt releases stored cold energy when it contacts ice.
- B. Salt ions interfere with water molecules forming ice crystals, requiring more energy to be removed before freezing can occur.
- C. Salt absorbs heat from the air and transfers it directly into the ice.
- D. Salt increases the density of water, which automatically lowers its temperature.

3. In the ice cream bag experiment, the cream mixture freezes because heat transfers from the cream to the salt-ice mixture. Which evidence best supports this conclusion?

- A. The bag feels warm to the touch after shaking.
- B. The salt-ice mixture reaches temperatures well below 0°C , which is cold enough to absorb thermal energy from the cream.
- C. The cream contains fat, which releases heat when it solidifies.
- D. Shaking the bag creates friction that cools the cream.

4. A student compares two ice cream samples: one made with a salt-ice mixture and one made with plain ice water. The sample made with plain ice water never fully froze. What is the most likely reason?

- A. Plain ice water contains too many impurities to freeze cream.
- B. Plain ice water at 0°C is not cold enough to lower the cream's temperature below its freezing point.
- C. The cream mixture requires heat to be added, not removed, in order to freeze.
- D. Plain ice water evaporates too quickly to stay in contact with the cream.

5. Cities apply salt to roads before a winter storm to prevent ice from forming. Which statement best analyzes how this practice connects to the concept of freezing point depression?

- A. Salt generates heat when spread on roads, which melts any ice that forms.
- B. Salt dissolves in water on the road surface, lowering the freezing point so water does not freeze at typical winter temperatures.
- C. Salt makes road surfaces rough, which prevents water from pooling and freezing.
- D. Salt absorbs moisture from the air, keeping the road surface dry.

6. Polar oceans remain liquid even when air temperatures drop below 0°C . Which factor best explains this observation?

- A. Ocean water moves too quickly to freeze at 0°C .
- B. The depth of the ocean traps heat from Earth's core, preventing freezing.
- C. Dissolved salts in seawater lower its freezing point below 0°C .
- D. Sunlight reflected off polar ice keeps the surrounding water warm.

7. A student notices that homemade ice cream has a coarser texture than store-bought ice cream. Based on the article, which analysis best explains this difference?

- A. Homemade ice cream contains more fat, which creates larger clumps.
- B. Store-bought ice cream uses more salt, which produces smaller ice crystals.
- C. Homemade ice cream freezes more slowly, allowing larger ice crystals to form, while industrial freezers cool cream rapidly, producing smaller crystals.
- D. Store-bought ice cream is made with pure water, which freezes more smoothly than cream.

8. Antifreeze added to a car's radiator contains ethylene glycol dissolved in water. How does this mixture protect the engine in winter, and what principle does it demonstrate?

- A. Ethylene glycol generates heat when mixed with water, warming the engine coolant.
- B. Ethylene glycol dissolves in water and lowers the freezing point of the coolant, preventing it from freezing in cold temperatures — demonstrating freezing point depression.
- C. Ethylene glycol thickens the water so it flows more slowly and is less likely to freeze.
- D. Ethylene glycol raises the boiling point of water, which keeps the engine from overheating in summer only.

9. A scientist tests three solutions: pure water, ocean water (3.5% salt), and heavily salted water. She records freezing points of 0°C , -1.9°C , and -21°C respectively. What conclusion can be drawn by analyzing this data set?

- A.** The relationship between salt concentration and freezing point is random and unpredictable.
- B.** Only heavily salted solutions show a measurable change in freezing point.
- C.** There is a consistent, predictable relationship: higher salt concentration produces a lower freezing point.
- D.** Pure water and ocean water freeze at the same temperature because the salt difference is too small to matter.

10. Road salting, antifreeze, ocean science, and ice cream making all rely on the same underlying chemistry. Which statement best analyzes what these applications have in common?

- A.** They all use sodium chloride as the dissolved substance to lower temperature.
- B.** In each case, dissolved particles disrupt ice crystal formation, requiring a lower temperature to freeze the solution.
- C.** They all involve heating a substance to change its physical state.
- D.** Each application works by increasing the concentration of water molecules to prevent freezing.

True / False

Read each statement carefully. Decide whether the statement is True (T) or False (F) based on what you have learned about freezing point depression, mixtures, and chemical properties. Write T or F for each item.

1. When salt dissolves in water, it breaks apart into ions that interfere with water molecules trying to form ice crystals.

True False

2. Adding more salt to water raises the freezing point, meaning the water freezes at a higher temperature than pure water.

True False

3. A salt-ice mixture can reach temperatures as low as -21°C , which is significantly colder than a plain ice-water mixture at 0°C .

True False

4. In the ice cream bag experiment, the salt-ice mixture cools the cream by absorbing thermal energy from the cream mixture inside the bag.

True False

5. The freezing point of ocean water ($\sim 3.5\%$ salt) is exactly the same as the freezing point of pure water at 0°C .

True False

6. Faster freezing of cream produces smaller ice crystals, which results in a smoother texture in the final ice cream product.

True False

7. Ethylene glycol is added to car radiator fluid to raise the freezing point of the coolant so it freezes more quickly in cold weather.

True False

8. The same underlying chemical principle — dissolved particles disrupting ice crystal formation — explains road salting, antifreeze, and ocean behavior.

True False

9. Fat molecules in cream play a role in stabilizing air bubbles during the shaking process, contributing to the structure of ice cream.

True False

10. Polar oceans freeze completely in winter because salt water has a higher freezing point than pure water.

True False

Vocabulary

Study each term and its definition below. These words are key to understanding the science of freezing point depression and chemical mixtures. As you read, look for how each term connects to the others.

freezing point depression

A property of mixtures in which dissolving a substance into a liquid causes that liquid to freeze at a lower temperature than it normally would.

Explain in your own words:

ions

Charged particles that form when a substance like salt dissolves and breaks apart in water, interfering with ice crystal formation.

Explain in your own words:

dissolve

To mix a substance completely into a liquid so that it spreads evenly throughout and forms a solution.

Explain in your own words:

solution

A mixture in which one substance is completely dissolved into another, such as salt dissolved in water.

Explain in your own words:

ice crystals

The organized, solid structures that water molecules form when they lock together as water freezes.

Explain in your own words:

heat transfer

The movement of thermal energy from one object or substance to another, such as when a salt-ice mixture pulls warmth away from cream to freeze it.

Explain in your own words:

concentration

The amount of a dissolved substance present in a given amount of liquid, which affects how much the freezing point changes.

Explain in your own words:

thermal energy

The total heat energy contained in a substance, which must be removed from cream for it to freeze into ice cream.

Explain in your own words:

antifreeze

A liquid added to a car's cooling system that contains dissolved compounds to lower the freezing point of water and prevent engine damage in cold weather.

Explain in your own words:

air incorporation

The process of whipping air into a mixture during freezing, which gives ice cream a lighter, scoopable texture.

Explain in your own words:

Exit Ticket

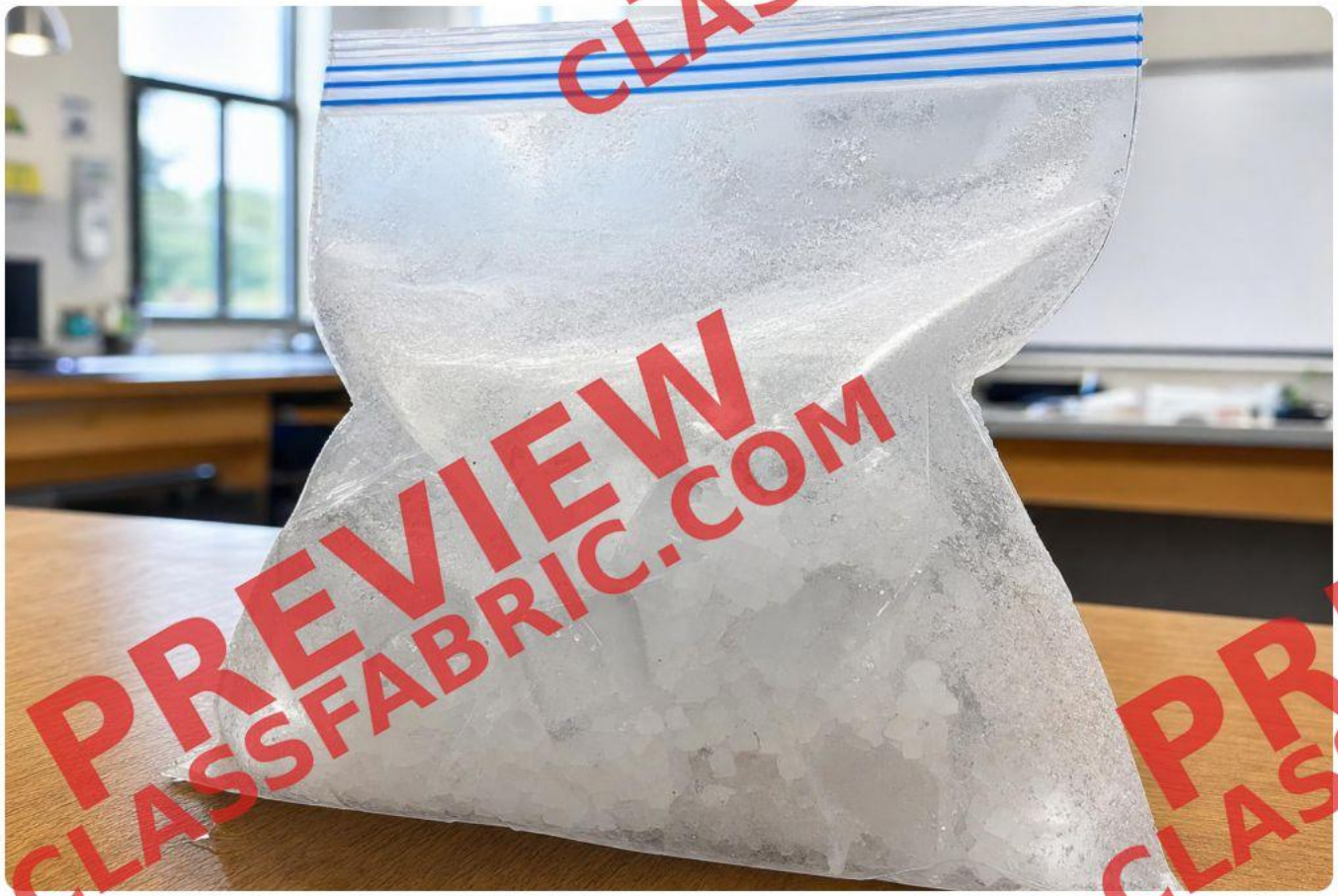
Answer both questions in 1-2 sentences each using what you learned in today's lesson. Be specific and use evidence from the article to support your answers.

1. When salt is added to ice, the temperature of the mixture drops well below 0°C. Analyze WHY this happens at the particle level, and explain how this temperature drop is responsible for freezing the cream in the ice cream bag experiment.

2. A student claims that spreading salt on icy roads, adding antifreeze to a car radiator, and making ice cream in a bag are three completely unrelated processes. Analyze the evidence from the article to either support or refute this claim.



The same chemistry that keeps roads ice-free in winter is what turns a bag of cream and ice into a frozen dessert — freezing point depression at work.



When rock salt mixes with ice, it creates a super-cold solution that can drop well below 0°C — cold enough to freeze cream into ice cream.

The Science of Ice Cream: Why Salt Makes It Cold

CROSSWORD PUZZLE



The Science of Ice Cream: Why Salt Makes It Cold

CROSSWORD PUZZLE

ACROSS

2. A liquid added to a car's cooling system that contains dissolved compounds to lower the freezing point of water and prevent engine damage in cold weather.
4. Charged particles that form when a substance like salt dissolves and breaks apart in water, interfering with ice crystal formation.
7. The amount of a dissolved substance present in a given amount of liquid, which affects how much the freezing point changes.
8. The total heat energy contained in a substance, which must be removed from cream for it to freeze into ice cream.
9. The movement of thermal energy from one object or substance to another, such as when a salt-ice mixture pulls warmth away from cream to freeze it.
10. To mix a substance completely into a liquid so that it spreads evenly throughout and forms a solution.

DOWN

1. A property of mixtures in which dissolving a substance into a liquid causes that liquid to freeze at a lower temperature than it normally would.
3. The organized, solid structures that water molecules form when they lock together as water freezes.
5. A mixture in which one substance is completely dissolved into another, such as salt dissolved in water.
6. The process of whipping air into a mixture during freezing, which gives ice cream a lighter, scoopable texture.

The Science of Ice Cream: Why Salt Makes It Cold

WORD SEARCH

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

FIND THESE WORDS

freezing point depression

ice crystals

thermal energy

dissolve

solution

air incorporation

concentration

heat transfer

ions

antifreeze