

States of Matter

You can skate on solid water. You can put solid water in your drink to make it cold. We call solid water ice.

You can swim in liquid water. You can drink it. You can take a shower. You can water plants with it. You can fill your dog's dish with it.

When water is a gas, it is called water vapor or steam. It is what clouds are made of. You see it as steam from a tea kettle. You can see it going up from a bowl of hot soup. Water vapor will not stay in your dog's dish.

All matter can be a solid. It can be a liquid. It can be a gas. These are the states of matter.

Matter can change from one state to another. It may melt. It may evaporate (ee-VAP-uh-rate). It may freeze. However, that never changes the molecules. They stay the same. Water molecules are always the same. They are the same as ice, water, or vapor.

Most things get bigger when they heat up. The molecules shake more. They push each other away. Molecules act one way in solids. They act a different way in liquids. They act one more way in gases. They move most in gases. Then they are the farthest apart. They move less in solids. They are packed close and tight.

Solids

Solids are made of molecules. They are packed close together. They don't move around. They just shake. Solids keep their shape. They don't flow or ooze. Their molecules don't move like that. It is hard to pinch solids. Their molecules are already close together.

Liquids

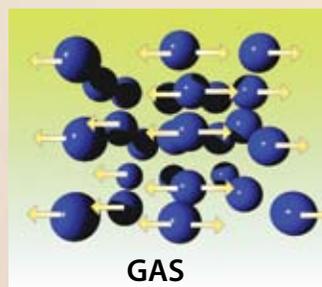
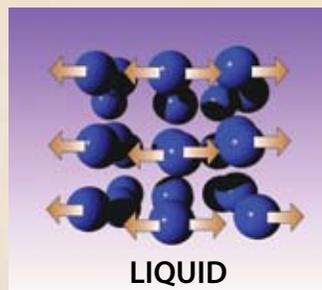
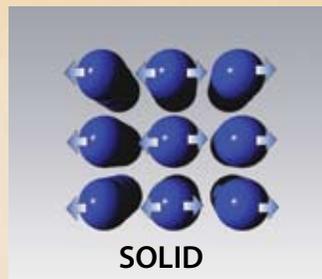
Liquids are made of molecules. Then they are farther apart. They move around. Liquids flow. They change shape. They spread out. They make puddles. Liquids fill the bottom of cups and bowls. A liquid always takes up the same amount of space. It won't get any bigger.

Gases

Gases are made of molecules. Now they are very far apart. They move all over the place. They spread out in all directions. A gas fills all the space in a can. It is easy to squish a gas. Its molecules are far apart. They have lots of space to squeeze into.

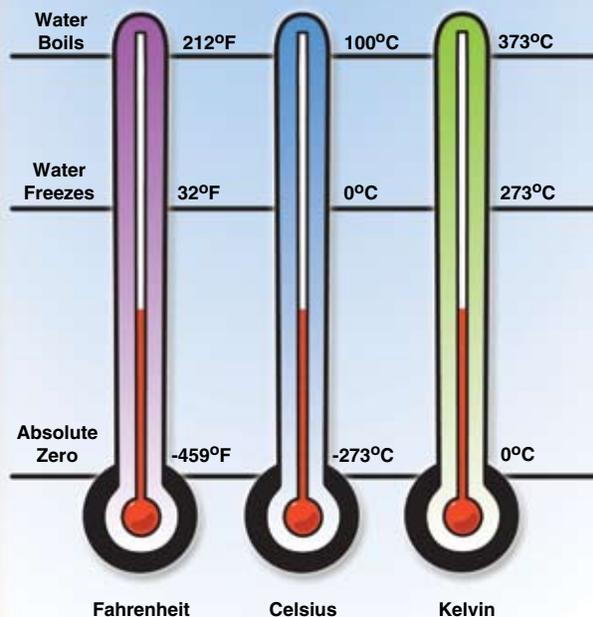
Cool Down!

You can cool things down by taking heat away. It takes energy away. The molecules slow down. You can go down to -273 degrees Celsius (SEL-see-uhs). This is very cold. This is the coldest anything can get. It is called absolute (AB-so-loot) zero. Molecules barely shake. No more energy can be taken away. Everything is a solid.



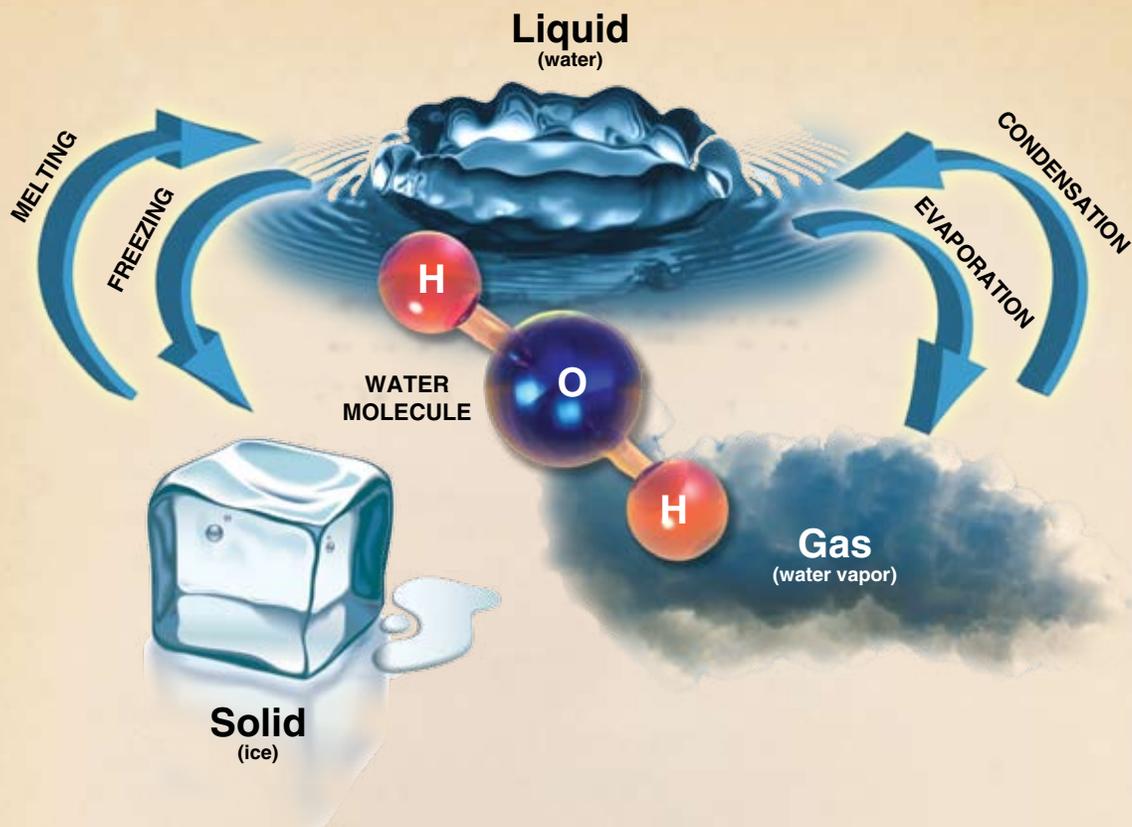
Absolute Zero

Thermometers compare Fahrenheit, Celsius, and Kelvin scales.



Comprehension Question

How are ice, water, and steam alike?
How are they not alike?



States of Matter

When water is solid, you can skate on it. You can put it in your drinks to make them cold. We call this ice.

When water is a liquid, you can swim in it. You can drink it. You can take a shower. You can water plants with it. You can fill your dog's bowl with it.

When water is a gas, it is called water vapor or steam. This is what clouds are made of. You see it as steam from a tea kettle. You can see it rising off a bowl of hot soup. Water vapor will not stay in your dog's bowl.

All matter can be a solid, a liquid, or a gas. These are the states of matter.

Things can change from one state of matter to another. For example, they may melt or evaporate (ee-VAP-uh-rate). However, changing the state won't change the molecules. They stay the same. Water molecules are the same whether they are ice, water, or vapor.

Most things expand when they heat up. This is because the molecules vibrate more. They push away from each other. Molecules act differently in solids, liquids, and gases. The most active molecules are in gases. They are also the farthest apart. The least active are in solids. They are the closest together.

Solids

Molecules in a solid are packed together. They are packed close. They only move by vibrating. That is why solids keep their shape. They don't flow. It is hard to squish solids. Their molecules are already close together.

Liquids

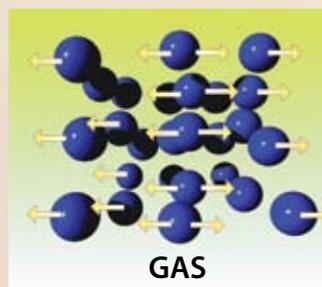
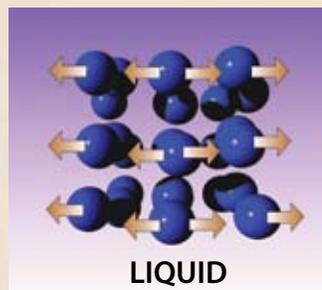
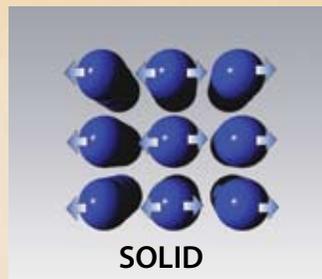
Molecules in a liquid are farther apart. They can move past each other. Liquids flow and change shape. They spread out to make puddles. Liquids fill the bottom of any container they are in. It will still take up the same amount of space. It won't get any bigger.

Gases

Molecules in a gas are far apart. They can move all over the place. A gas spreads out in all directions. A gas fills all the space in a container. It is easy to squish a gas because the molecules are far apart.

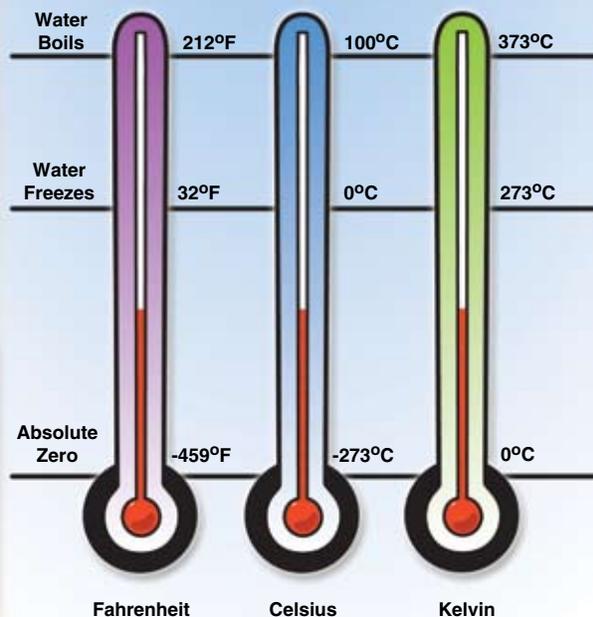
Cool Down!

When you cool something, you take energy from it. The colder it is, the less its atoms move. At minus 273 degrees Celsius (SEL-see-uhs), it is very cold. Molecules vibrate as little as possible then. This is the coldest anything can get. It is called absolute (AB-suh-loot) zero. No more energy can be removed from a thing when it is this cold. It is so cold that everything is a solid.



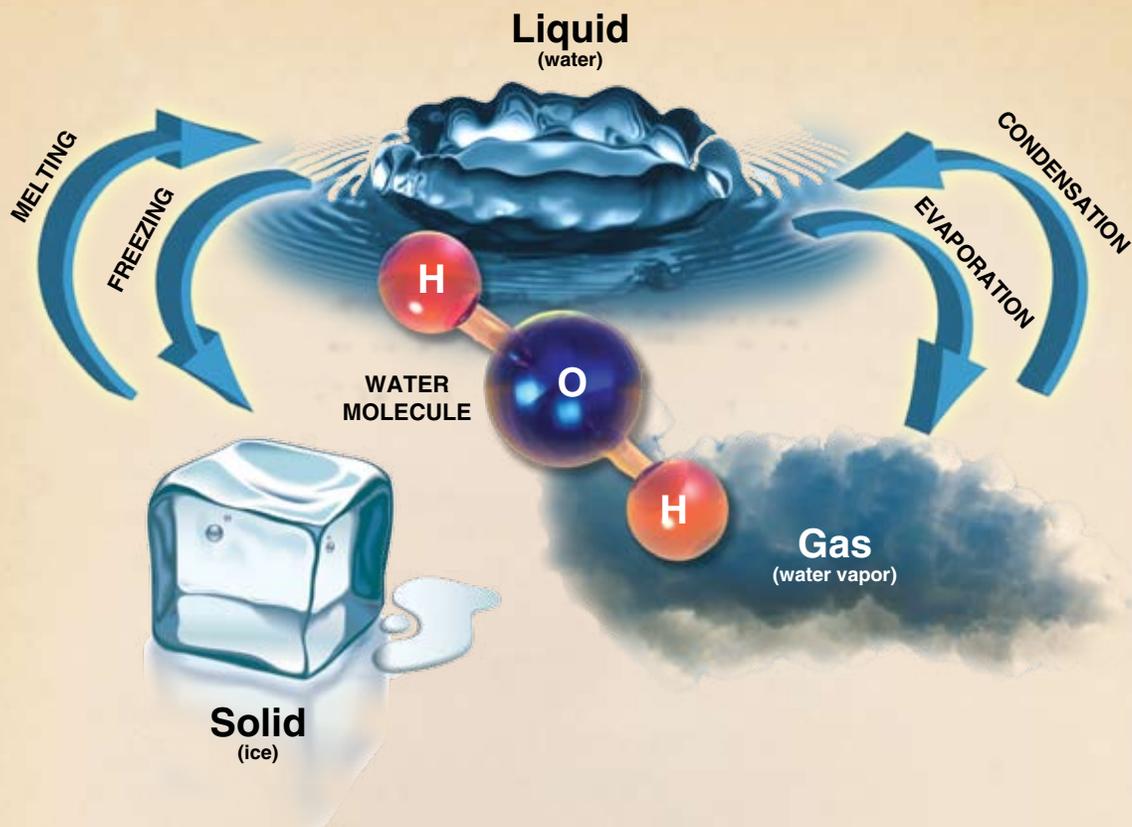
Absolute Zero

Thermometers compare Fahrenheit, Celsius, and Kelvin scales.



Comprehension Question

Describe the differences between solids, liquids, and gases.



States of Matter

When water is solid, you can skate on it. You can put it in your drinks to make them cold—we call this ice. When water is a liquid, you can swim in it, drink it, take a shower in it, or water plants with it. You can fill your dog’s water bowl with it. When water is a gas, it is called water vapor; it is the stuff that clouds are made of. Water vapor would never stay in your dog’s water bowl. You see it as steam from a kettle or rising off a bowl of hot soup.

There are three states of matter: solid, liquid, and gas. All matter can exist in any and all of these states.

Substances change from one state of matter to another at different temperatures. For example, they may melt or evaporate (uh-VAP-uh-rate). However, changing the state won’t change the molecules. Water molecules are still water molecules whether they are ice, water, or vapor.

Most substances expand when they heat up. This is because the molecules vibrate more and push away from each other. The amount molecules move is different for solids, liquids, and gases. The most active molecules are in gases, where they are the farthest apart. The least active are in solids, where they are packed closest together.

Solids

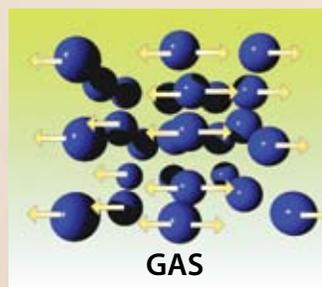
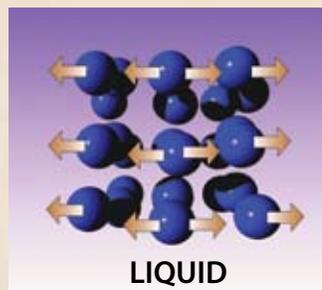
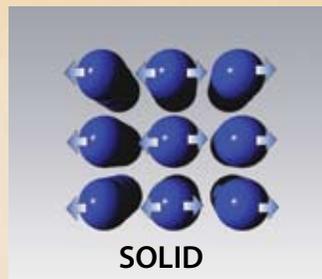
Molecules in a solid are packed together closely in fixed positions. They can only move by vibrating in these positions. That is why solids keep their shape and don't flow. It is hard to compress solids because their molecules are already close together.

Liquids

Molecules in a liquid are farther apart and can move past each other easily. Liquids can flow and change shape. They can spread out to make puddles. A liquid will fill the bottom of any container it is in. It will still keep the same volume; it won't get any bigger.

Gases

Molecules in a gas are far apart compared to solids or liquids. They can move freely, and will fill all the space in a container. It is easy to compress a gas because the molecules are far apart.

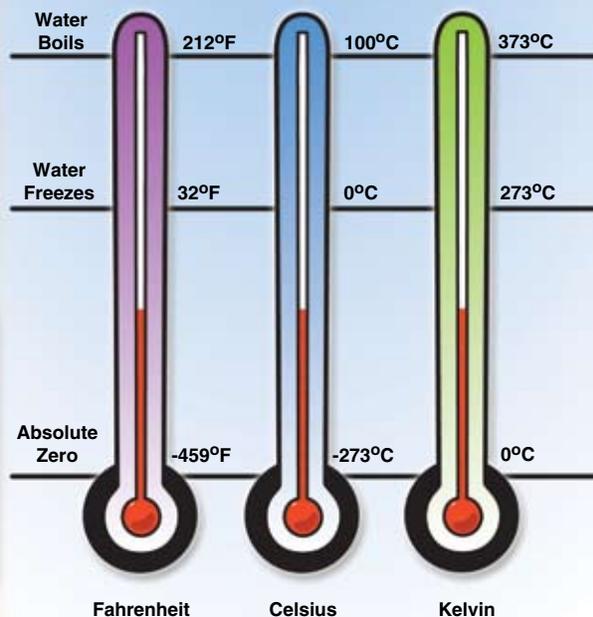


Cool Down!

When you cool something, you take energy from it. The colder it is, the less its atoms move. At minus 273 degrees Celsius (SEL-see-uhs), it is very cold. It is so cold that nearly everything will be a solid. Molecules vibrate as little as possible. This is the coldest anything can get. It is called absolute (AB-suh-loot) zero. No more energy can be removed from something at absolute zero.

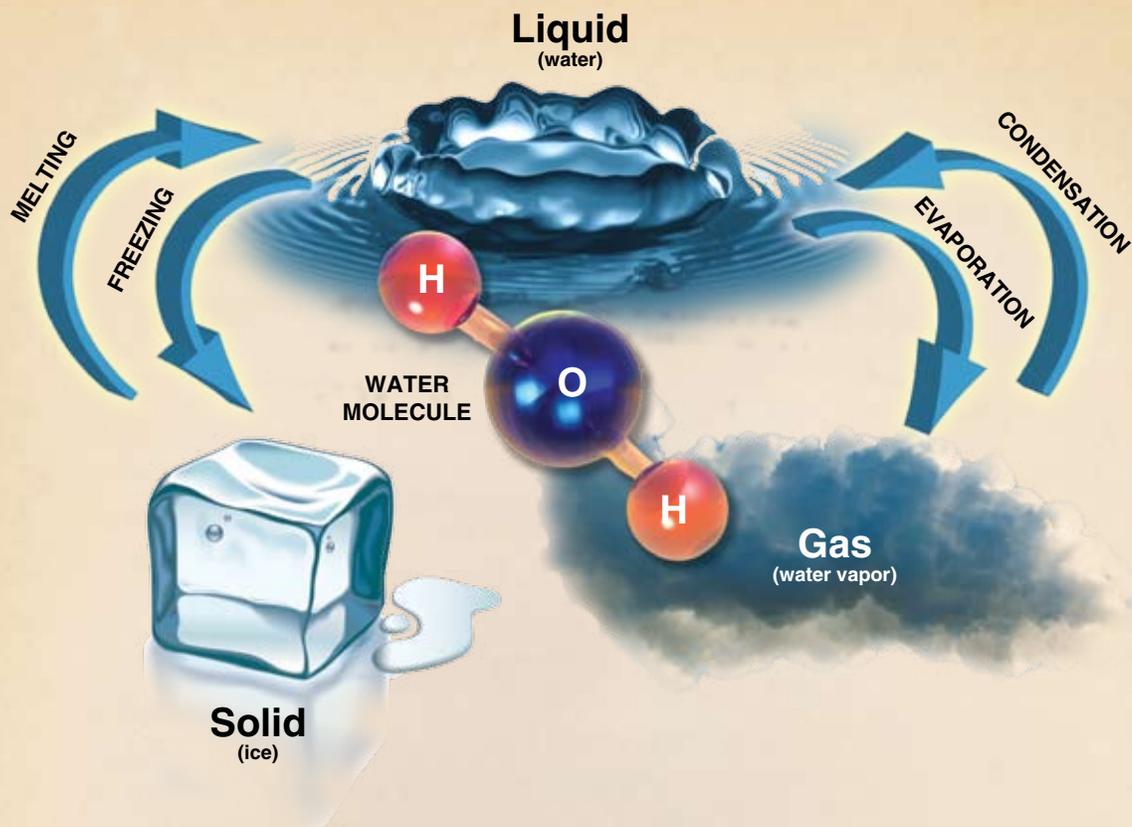
Absolute Zero

Thermometers compare Fahrenheit, Celsius, and Kelvin scales.



Comprehension Question

Describe how heat determines a substance's state of matter. Use examples.



States of Matter

When water is solid, you can skate on it or put it in your drink to make it cold—we call this ice. When water is a liquid, you can drink it, shower in it, water plants with it... even fill your dog's water bowl with it. When water is in its gaseous state, it is water vapor: you see it as steam from a kettle or rising off a bowl of hot soup. Water vapor would never stay in your dog's water bowl.

Matter exists in three states: solid, liquid, and gas, and it can change from state to state.

Substances change from one state of matter to another at different temperatures. For example, they may melt or evaporate (uh-VAP-uh-rate). However, changing the state never changes the molecules. Water molecules remain water molecules whether they are ice, water, or vapor.

Most substances expand when heated. The molecules vibrate more and push away from each other. The amount molecules move is different for solids, liquids, and gases. The most active molecules are in gases, where they are the farthest apart. The least active are in solids, where they are packed closest together.

Solids

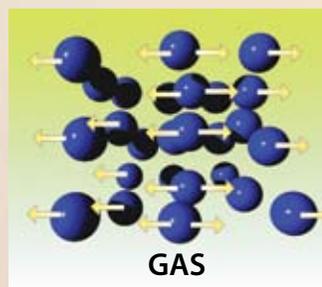
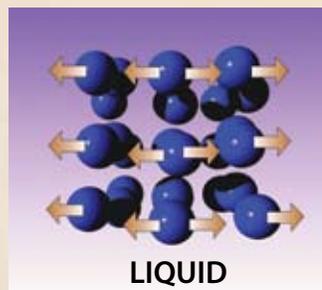
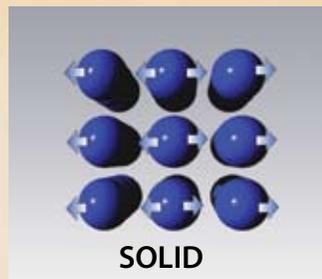
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Liquids

Molecules in a liquid are farther apart, which allows them to move around each other easily. Liquids can flow and change shape, spreading out to make puddles or fill the bottom of any container. While its shape may change, it will always keep the same volume; it can't get any bigger.

Gases

Molecules in a gas are very far apart compared to solids or liquids. They move freely and loosely, and because of this they will fill all the space in any container. It is easy to compress a gas because the molecules are far apart.

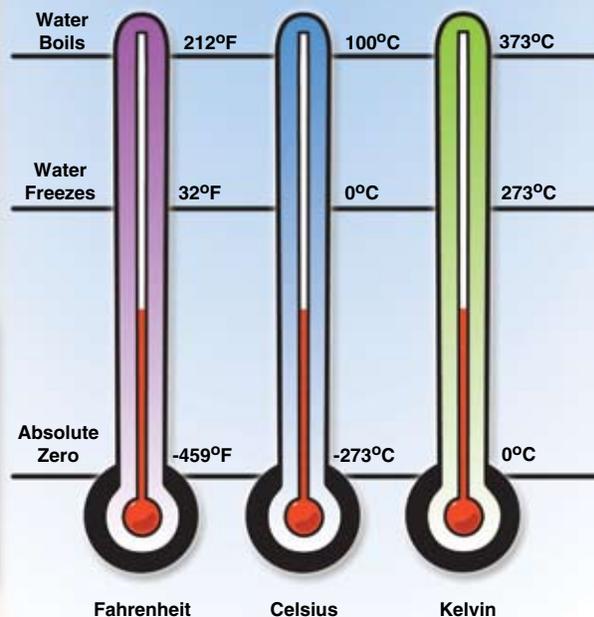


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Absolute Zero

Thermometers compare Fahrenheit, Celsius, and Kelvin scales.



Comprehension Question

Describe the relationship between heat, atoms, and the three states of matter.