Name: _____ Date: _____

How a Microwave Oven Heats Food

Circle group

A microwave oven can warm a bowl of soup in two minutes. Yet the inside of the oven never gets hot. The secret is that it does not heat the air. It sends energy right into the food.

The energy travels as microwaves. These are a kind of electromagnetic wave, like radio waves and visible light. A part inside the oven called a magnetron makes them. The waves bounce off the metal walls and move through the space where your food sits.

Food has water in it. A water molecule has a slight positive charge on one side and a slight negative charge on the other. The microwaves make an electric field that flips back and forth billions of times each second. Water molecules try to line up with the field. So they twist back and forth very fast. All this jostling makes the molecules rub against their neighbors. The rubbing makes heat.

Microwaves reach only about an inch into most foods. The outer layer heats first. Then the heat spreads to the center. Dry foods heat less than moist ones because they have less water. The waves make patterns with hot and cool spots. So many ovens have a turntable that turns the food and heats it evenly.

The glass window in the door has a metal screen with tiny holes. The holes are small enough to keep the microwaves in. But they are big enough to let you see your food. The idea for the oven came in the 1940s. An engineer noticed that radar equipment had melted a candy bar in his pocket.

Questions

1. What kind of wave does a microwave oven use to heat food?

_____

_____

2. What part of the oven makes the microwaves?

_____

_____

3. What happens to water molecules in the microwave field?

_____

_____

4. How far do microwaves reach into most foods?

_____

_____

5. Why does a turntable help food heat evenly?

_____

_____

6. Why do dry foods heat less than moist ones?

_____

_____

Words to know

microwaves: a kind of wave that carries energy and can heat food
electromagnetic: having to do with electricity and magnetism together
molecule: the smallest piece of a substance, made of atoms
jostling: pushing and bumping against others
radar: a system that uses radio waves to find objects

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: _____

How a Microwave Oven Heats Food

Triangle group

A microwave oven can warm a bowl of soup in two minutes, yet the inside of the oven never gets hot. The secret is that it does not heat the air around the food. It sends energy straight into the food itself.

The energy travels as microwaves, a kind of electromagnetic wave, in the same family as radio waves and visible light. A part inside the oven called a magnetron produces them. The waves bounce off the metal walls and move through the space where your food sits.

Food contains water, and a water molecule has a slight positive charge on one side and a slight negative charge on the other. The microwaves create an electric field that flips back and forth billions of times each second. Water molecules try to line up with the field, so they twist back and forth at the same rapid rate. All this jostling makes the molecules rub against their neighbors, and the rubbing produces heat.

Microwaves only reach about an inch into most foods. The outer layer heats first, and the center warms as the heat spreads inward. Dry foods heat less than moist ones because they contain less water. Because the waves form patterns with hot and cool spots, many ovens have a turntable that rotates the food for even heating.

The glass window in the door has a metal screen with tiny holes. The holes are small enough to keep the microwaves inside, but large enough to let you see your food. The idea for the oven came in the 1940s, when an engineer noticed that radar equipment had melted a candy bar in his pocket.

Questions

1. What kind of wave does a microwave oven use to heat food?

_____

_____

2. What part of the oven produces the microwaves?

_____

_____

3. What happens to water molecules in the microwave field?

_____

_____

4. How far do microwaves reach into most foods?

_____

_____

5. Why does a turntable help the food heat evenly?

_____

_____

6. Why do dry foods heat less than moist ones?

_____

_____

Words to know

microwaves: a kind of wave that carries energy and can heat food
electromagnetic: having to do with electricity and magnetism together
molecule: the smallest piece of a substance, made of atoms
jostling: pushing and bumping against others
radar: a system that uses radio waves to find objects

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: _____

How a Microwave Oven Heats Food

Square group

A microwave oven can warm a bowl of soup in a mere two minutes, yet the interior of the oven never becomes hot. The secret is that it does not heat the surrounding air at all. Instead, it transmits energy directly into the food itself.

That energy travels in the form of microwaves, a type of electromagnetic wave belonging to the same family as radio waves and visible light. A component inside the oven called a magnetron generates them. The waves rebound off the metal walls and sweep through the chamber where your food is sitting.

Food contains water, and every water molecule carries a slight positive charge on one side and a slight negative charge on the other. The microwaves produce an electric field that reverses direction billions of times each second. Water molecules attempt to align themselves with the field, so they twist back and forth at the same astonishing rate. All of this jostling causes the molecules to rub against their neighbors, and the friction generates heat.

Microwaves penetrate only about an inch into most foods. The outer layer heats first, and the center warms as the heat gradually spreads inward. Dry foods heat less than moist ones because they contain less water. Since the waves form patterns with hot and cool spots, many ovens include a turntable that rotates the food so that it heats evenly.

The glass window in the door contains a metal screen perforated with tiny holes. The holes are small enough to keep the microwaves safely inside, yet large enough to let you watch your food. The idea for the oven originated in the 1940s, when an engineer noticed that radar equipment had melted a candy bar in his pocket.

Questions

1. What type of wave does a microwave oven use to heat food?

_____

_____

2. Which component of the oven generates the microwaves?

_____

_____

3. What happens to water molecules in the microwave field?

_____

_____

4. How far do microwaves penetrate into most foods?

_____

_____

5. Why does a rotating turntable help food heat evenly?

_____

_____

6. Why do dry foods heat less than moist ones?

_____

_____

Words to know

microwaves: a kind of wave that carries energy and can heat food
electromagnetic: having to do with electricity and magnetism together
molecule: the smallest piece of a substance, made of atoms
jostling: pushing and bumping against others
radar: a system that uses radio waves to find objects

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: How a Microwave Oven Heats Food

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

Circle: How a Microwave Oven Heats Food

Easier · 266 words · Flesch-Kincaid grade 4.4

1. Microwaves, a kind of electromagnetic wave.
2. The magnetron.
3. They twist back and forth fast and rub against their neighbors, which makes heat.
4. About an inch.
5. The waves make hot and cool spots, and turning the food moves it through them.
6. They have less water to take in the microwave energy.

Triangle: How a Microwave Oven Heats Food

This passage · 275 words · Flesch-Kincaid grade 7.2

1. Microwaves, a kind of electromagnetic wave.
2. The magnetron.
3. They twist back and forth rapidly and rub against their neighbors, which makes heat.
4. About an inch.
5. The waves form patterns with hot and cool spots, and turning the food moves it through them.
6. They have less water in them to absorb the microwave energy.

Square: How a Microwave Oven Heats Food

Harder · 288 words · Flesch-Kincaid grade 9.1

1. Microwaves, a type of electromagnetic wave.
2. The magnetron.
3. They twist back and forth rapidly and rub against their neighbors, and the friction generates heat.
4. About an inch.
5. The waves form hot and cool spots, and rotating the food moves it through them.
6. They contain less water to absorb the microwave energy.