Microwaving *and Polystyrene Foam*

Microwave ovens help make life today more convenient, and because they are so efficient, they reduce our energy needs. The plastic packaging in which we receive much of our food and beverages provides sanitary benefits, convenience and energy savings. Because plastic packaging protects so well, it also reduces food waste.

There are plenty of stories surrounding microwaves, and some have attained "urban legend" status –"everyone" knows they're true, even though there is no proof. Once the science behind microwaves is understood, it is clear that polystyrene plastic cups or containers may be used appropriately in microwaves, as long as they are not overheated.

What does a microwave oven do?

- Interacts with water molecules in food or beverage.
- Through this interaction, cooks or reheats food or beverage *directly* (without the delay or increased energy needs of heating the container) and *then* the liquid or food transfers heat to the container.

How does a microwave work?

Typically, microwaves agitate polar molecules (molecules that have magnetic properties), like water, into very rapid motion. The collisions between these rapidly moving molecules create frictional heat, first within the water, which is then transferred to the entire food or beverage contents. Since polystyrene foam cups or containers themselves do not contain water within their structure, they are "transparent" to the microwaves. The microwaves pass right through. The container's temperature changes only because of the increasing heat of the liquid or solid they contain.

How does a microwave work compared to conventional methods?

With the conventional method of heating water, the container (a metal teakettle, for example) absorbs the stove's heat, and then transfers it to the water it contains. By contrast, a microwave heats the water *first*, which then transfers its heat to the container.

What does a microwave oven *not* do?

- Interact in any significant way with a plastic container used in the oven, because the container itself has no water molecules.
- Chemically change the food or destroy vitamins, other than the normal changes which take place with any means of cooking or heating.
- Irradiate the food.

What about overheating?

- Most of our foods and beverages have a very high water content. Water's boiling point is 212°F (100°C) at sea level and 1 atmosphere of pressure. Food with a high sugar or fat content (or both) can raise the boiling temperature to over 212°F (100°C).
- Heating food or beverages in a totally-enclosed container can raise the boiling point. Always use a vented lid.
- The much-publicized phenomenon of "superheating" water in a microwave, which can occasionally cause an explosive release of the contents, usually occurs only in containers with an exceedingly smooth cellular structure, such as glass or glazed ceramics. Polystyrene foam cups or containers do not have that structure.
- If cooked or heated too long, some foods can soften the container, leading to a mess in the microwave oven and danger of burns from hot food or liquid.

Microwave best practices

- Remember, the microwave heats the food or beverage first, and then the food or beverage heats the container.
- Don't use more heat or time in the microwave than you need. Be sure to evaluate the proper time and power level for your use. It only takes a short time to reheat or warm food that already has been cooked.
- Be careful not to heat too long, as you may soften your container and burn yourself on its contents.
- Melted polystyrene containers won't hurt you if you eat a bit of them, but they won't taste very good.
- Follow package directions, particularly for cooking.
- Use a microwave with a turntable so your food heats more evenly.

Sources

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