

# TAKE 5

# Microwave Oven Safety

A 5-Minute Safety Training Aid

HS04-024C (09-21)

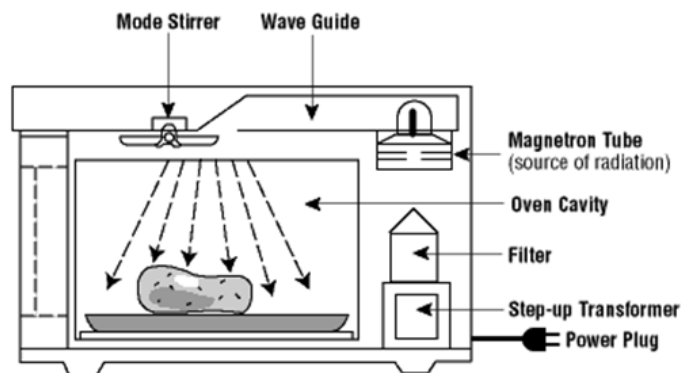
Microwave ovens are used daily in restaurants, cafeterias, breakrooms, kitchens, snack bars, and homes. Some microwave oven users may have safety concerns about exposure to radiation or other hazards when using these ovens. The following information can answer these questions about microwave energy and help users keep microwave ovens in safe working condition.



## How do microwave ovens work?

Microwave ovens contain an electron tube called a *magnetron*. The magnetron produces radiofrequency (RF) electromagnetic radiation waves, which are shorter than standard radio waves. These short, “*micro*” waves cook food by vibrating water molecules in the food. The vibration causes friction, which, in turn, produces heat. (This explains why ingredients with higher water content, such as vegetables, cook faster in microwave ovens.)

As illustrated below, when the magnetron tube produces radiation, a *wave guide* transfers the microwave energy to the oven’s cavity. Once inside the oven’s cavity, a metallic element known as a *mode stirrer* helps spread the microwave energy, so food cooks evenly.



## Are microwave ovens safe?

The use of microwave ovens began in the mid-1950s.<sup>1</sup> Since that time, no credible evidence shows that microwave ovens are in any way harmful to human health when in normal use. In addition, there is no information to suggest that microwaves

cause food or the appliance to become radioactive.<sup>2</sup> According to [Electrical Safety First](#), a leading not-for-profit electrical consumer safety advocate group, “the risk of injury from microwave [oven] radiation is effectively non-existent.”

However, the improper use or maintenance of microwave ovens can cause some dangers, primarily fire or electric shock. Below is a list of some of the most pressing health and safety questions and potential hazards related to microwave ovens.



### **Do microwave ovens leak radiation?**

Yes, microwave energy may leak when using a microwave oven; however, there are strict limits on the amount that can be released from a microwave oven during its lifetime. Everyday items like laptops and computers leak electromagnetic radiation, too. Yet, none of these items pose a known health risk as long as they are correctly used and maintained.<sup>3</sup>

In microwave ovens, old or faulty door seals are the most common cause of microwave radiation leaks. Mechanical abuse, a build-up of dirt, or wear and tear from continued use are most often the cause for damaged door seals. Also, microwave radiation may leak from hinges or latches when the interlock system – the switch that stops the magnetron tube from creating energy when the oven door opens -- is damaged. However, these microwave radiation levels are far below the amount known to harm people. In the worst-case scenario, microwave oven radiation would result in a mild warming effect, if anything.<sup>4</sup>



### **Can metal objects go in the microwave?**

Metal does not let microwaves pass through like plastics and ceramics. So, microwaved meals in a metal dish cannot heat up correctly. Also, thinner metals, such as foils, can act as an antenna that creates sparks, potentially causing the microwave oven to catch on fire. Therefore, never put metal objects or dishes with metal rims in a microwave oven.



### **Can plastic containers go in the microwave?**

Only use containers in the microwave oven labeled “microwave safe.” Never use foam trays or storage bags not intended for microwave use to prevent damage or injury from melting plastic. Also, be aware that some microwavable plastic containers list a maximum exposure time. Any flammable or combustible material, even plastic or foam containers, can reach a flashpoint and catch fire or explode when heated too long. Always check the manufacturer's label. If in doubt, use a suitable ceramic container instead.



### **Can a cup of water boil in a microwave?**

Boiling a cup of water in a microwave oven can cause it to explode. Because microwaves vibrate water molecules, a cup of water can over-heat past the boiling point even during standard

microwave time settings. Therefore, when the cup of water is disturbed or moved, the heat may release by erupting violently.

To warm water in a microwave, only heat the minimum amount needed and monitor it until at the desired temperature. It is best to use a kettle on the stove when heating water to the boiling point.



### **Can other objects cause microwaves to spark?**

Any food that has splattered or dripped in the microwave can continue to cook, causing sparks inside a microwave. In addition, vapors from flammable drippings, such as grease, can concentrate under heat in a closed microwave causing sparks or a fire. Therefore, keep all microwave oven surfaces clean and the device maintained in good working order.

Another possible ignition source is faulty or damaged electrical wiring. Always follow the manufacturer's instructions when installing, maintaining, or repairing microwave ovens.



### **Do microwave ovens affect pacemakers?**

Microwave ovens interfered with some early models of pacemakers. However, improvements in the shielding and filtering of modern pacemakers and microwave ovens have reduced or eliminated these concerns.<sup>5</sup> Nevertheless, anyone with a pacemaker who gets dizzy or experiences discomfort around a microwave oven should immediately move away from the oven and consult a health care professional.



### **What are some safety tips for microwave ovens?**

#### *Safety tips for microwave oven maintenance:*

- Use only a qualified service person to make repairs.
- Remain aware of the risks of electric shock when making repairs.
- Ensure that no damage occurs to the door or door seals during maintenance.
- Do not bypass the door interlocks.

#### *Safety tips for microwave oven use:*

- Keep the microwave oven vents clear and avoid storing objects on top of the appliance.
- Always follow the manufacturer's instructions.
- Clean the microwave oven after each use to avoid a build-up of grease and dirt.
- Do not use an extension cord with a microwave oven.
- Use and maintain a working smoke detector.

- Check the door seal, the inside surfaces of the door, and the oven cavity for damage or grease.
- Repair or replace any microwave not in good working condition.
- Never use a microwave if the door is bent, warped, or damaged.
- Do not disable or bypass any safety locks.
- Do not insert an object through an opening or around the door seal.

## References

- <sup>1</sup> Priya Ganapati. "Oct 25, 1955: Time to Nuke Dinner," Wired, October 25, 2010, <https://www.wired.com/2010/10/1025home-microwave-ovens/>. Accessed September 16, 2021.
- <sup>2</sup> Harvard Medical School. "Microwave Cooking and Nutrition." Website. <https://www.health.harvard.edu/staying-healthy/microwave-cooking-and-nutrition>. Accessed September 16, 2021.
- <sup>3</sup> U.S. Food and Drug Administration. "Microwave Oven Radiation." Website. <https://www.fda.gov/radiation-emitting-products/resources-you-radiation-emitting-products/microwave-oven-radiation>. Accessed September 16, 2021.
- <sup>4</sup> Electrical Safety First. "The Dangers of Microwaves." Website. <https://www.electricalsafetyfirst.org.uk/guidance/product-safety/microwaves/>. Accessed September 16, 2021.
- <sup>5</sup> Canadian Centre for Occupational Health and Safety, "Microwave Ovens and their Hazards." Website. [https://www.ccohs.ca/oshanswers/phys\\_agents/microwave\\_ovens.html](https://www.ccohs.ca/oshanswers/phys_agents/microwave_ovens.html). Accessed September 16, 2021.



[www.txsafetyatwork.com](http://www.txsafetyatwork.com)

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