http://www.cooksinfo.com/microwave-ovens

Microwave Ovens

These ovens can be used for melting, thawing, reheating, softening and cooking. They are mostly used for thawing, heating leftovers, and (in North America, at any rate), popping popcorn.

Those who dismiss microwave cooking as too "high tech" or "mechanical" don't realize that the same amount of mechanics and engineering now go into regular stoves.

Convection microwaves are ovens that are combination convection ovens / microwave ovens, so that they can be used either as a microwave or a small oven, or to first to cook something quickly, then brown it. Countertop models are very popular in the UK, to the point where it's becoming hard to find microwaves that don't have convection added to them, but in North America, such combination ovens are still very rare (as of 2011), mostly only found as part of a unit that also includes a draw fan, and meant to be built in and mounted over top a stove.

For lab use, you can buy top loading microwaves.

Microwaves are good for:

- most vegetables -- both steaming and braising them;
- melting ingredients such chocolate, butter and lard;
- softening ice cream and butter (if you're careful);
- making small batches of preserves such as jams or jelly;
- heating jams for glazes;
- making quick steamed puddings, though the flavour is never as nice as steamed ones that allow the flavour of the pudding's ingredients time to marry;
- slowly simmering sauces on low power.

How a Microwave Oven Works

Electromagnetic waves such as microwaves go from a positive value to zero to negative and then back to zero. The microwaves pass through food, and as they do, they pass through the molecules that make up food. Most molecules have a positive charge at one end, a negative one at the other. As the radio waves pass through a food molecule, the negative part of the molecule rotates to align itself to the positive charge of the wave, and then as the radio wave changes to negative, the molecule rotates again, the positively charged end this time being attracted to the negative charge. This in effect causes the molecules in the food to rotate, which causes them to have kinetic energy, which they get rid off as heat.

The next part is dependent upon the assumption that all foods have some water in them, even if we're not aware of it. The heat is picked up by the water in the food, and that heat is transmitted to other things making up the food item. To assist in this, the microwave oven frequency is tuned specifically to the length of the Oxygen-Hydrogen bonds in water.

Because the moisture in food is the first thing that gets heated in a microwave, it's ready to start escaping from the food right from the start. This can mean that food cooked or heated in a microwave can get drier than when using other heating or cooking techniques. Consequently, it's best to cover food to keep the moisture in: ideally, in such a way that allows a bit of the moisture to escape so that the food surface doesn't go overly soggy from trapped moisture on it.

megahertz (2.5 gigahertz.)

At this frequency, radio waves get absorbed only by fat, sugar and water. This makes the process very energy efficient, because the radio waves will heat only the food: not the air, nor the cooking vessels. They will not get absorbed by such thing as glass, ceramic or most plastics, and they are reflected by metal.

In conventional cooking, the heat migrates from the outside to the inside. The air is also hot in conventional oven cooking, so that as moisture evaporates, it causes browning and crispiness on the surface. In microwave heating, everything gets heated all at once, both outside and inside. Heat inside the food migrates out, though of course in some thick places the microwaves might not make it all the way to the middle. In fact, the microwaves only penetrate 1/4 to 1/2 inch (1 to 2 cm) in. So in effect, it's only the outside of things that get heated. This is why you have to stir soup or sauces halfway through, as the centre will still be lukewarm. If you made up a ball of mashed potatoes with an ice cube at its centre, and zapped it for a minute or two, then took it apart, you'd find the outside of the mashed potato hot, and the ice cube still an ice cube. Consequently, you could say that in effect, microwave cooking ends up being "outside in" cooking anyway.

The bottom line is that microwave ovens can heat food irregularly. If you have several dishes or a big bowl of soup in a Microwave Oven, you have to stir the food about a bit at intervals. This is why the turntable carousels in microwave ovens became popular, to move things around and help even out the unevenness.

When placing food on a microwave turntable, place it a bit off centre so that it will actually travel through different parts of the oven -- if you just place it in the centre, it will just spin in one place, which won't do as good a job in heating the item evenly.

Microwave Oven Parts

Magnetron tubes are still in use to produce the microwaves, though the current holy grail amongst product developers is to replace its use with transistors. This would both reduce the weight of the oven, enabling portable ones to be made, and reduce the amount of electricity used. It might also mean that transistors could be placed around the inside of the oven, to allow more uniform cooking.

The magnetron tube is usually housed in the side of the oven where the control panel is, above the control panel. These tubes are about $10 US (2006 prices) of the manufacturer's cost in producing the machine. The tubes should provide 10 to 15,000 hours of normal household use (10 to 15 years.)

The microwaves enter the actual oven chamber through top vents (called the "waveguide section") on that side. The fan at the top of the microwave, called a "mode stirrer", is designed to stir up and distribute the microwaves evenly. The idea is that the microwaves are directed out at the fan, which then distributes them throughout the microwave.

Microwave oven doors have glass windows with metal screen in it. The metal screen reflects the microwaves back in.

One of the most common things to go wrong with a microwave is breaking the glass plate that sits on top

Microwave Heating Power

Precise temperature control per se is missing in a microwave.

Instead, cooking calculations are based on time, and energy output of the oven.

Sadly, energy outputs per microwave oven vary wildly. In microwave ovens for home use, the figure ranges from 300 to over 1,200 watts (as of 2006.) In commercial ones, the power is about 2,000 watts.

In general the ranges are based on bringing to a boil at high power 1 cup (8 oz / 250 ml) of water whose starting temperature is 75 F / 24 C:

Time	Category	Wattage range
3 to 4 minutes	Low wattage	400-650 watt
2 to 3 minutes	Regular wattage	650-850 watt
Less than 2 minutes	High wattage	850-1000 watts

It can be hard to know what the wattage output is on a Microwave Oven if it doesn't say on it and you've lost the booklet or your Microwave Oven is a hand-me-down. Here is a simple test that should be accurate within 50 to 75 watts:

- Put 1 litre (34 oz) of water into a microwave-safe jug or container. (Ideally, the water will be somewhere around 70 F / 21 C -- it doesn't matter if it is somewhat over or under.) Record the starting temperature in Fahrenheit;
- Zap on high in the microwave for exactly 2 minutes and 3 seconds -- 2:03;
- Measure the temperature that the water is now;
- Subtract the end temperature from the temperature that you started with;
- Multiply that result by 19.4.

When you lower the power on a microwave through its user interface, it doesn't mean that you lower the "heat of the microwaves." Rather, it means that the microwave generation is cycled on and off. For instance, 40% power means that the microwaves are only being generated for about 40% of the cooking time.

For instance, the thaw setting of a Microwave Oven operates at a low power setting. It cycles the microwaves being emitted off and on, to allow the warmth being generated on the outside to migrate inside, instead of just blasting the outside and cooking it.

In Europe, there has been since 1992 a standard Microwave Oven rating scheme, based on heating 350g of water. Ovens get assigned a heating category ranging from A to E. This allows people to give you more precise cooking directions in recipes for your microwave. As of 2006, there is no such similar standard anywhere in sight for North America.

The energy output in microwave ovens actually drops after 10 to 15 minutes of usage.

One advantage of Microwave Ovens is particularly apparent in summers: the heat they cause to be

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