Frequently Asked Questions and Answers to The MTA website

Q. Does the process of microwaving food alter the molecular structure in any way?
A. No! Microwaves are very low energy level electromagnetic waves. Their quantum energy level is lower than that of visible light, for example. As a result, they are classified as non-ionizing, i.e. they are not energetic enough to break bonds and thereby alter food molecules. All they can do is heat. I suggest to consumers that they put their hands near a light bulb to feel the heat. I have put my hand in high-energy microwave tunnels, in excess of 10 kilowatts, at least 10 times more power than a home microwave oven, and I continue to play the piano. Cooking or heating food does change the molecular structure of the food (for example, when baking a cake the starch gelatinizes; or with ordinary cooking of meats, the proteins denature), but not in the harmful way any one would worry about.

Q. If so, are their any toxins of any sort produced by the process?
A. No - see the answer above.

Q. Is the nutritional value of the food altered in any way?
A. Any cooking procedure alters the vitamin content of a food. Vitamin C, for example, is extremely sensitive to heat and is partially or wholly destroyed by cooking. The question is whether microwave cooking is harsher on the nutritional content than other cooking methods. **The answer is no** if the cooking is done properly. For example, when cooking fresh vegetables, no water should be added, and the vegetables cooked for a short time.
Numerous reliable university and other nutritional studies have shown this type of microwave cooking to be better than steaming especially for vegetables and this is generally considered the best way to cook them. However, using too much water will leach the water soluble vitamins, such as vitamin C, from the food and reduce the nutrition value - that is what happens with simple boiling of vegetables in water on top of a stove.

Q. If there is any alteration to the structure of the food, will this condition improve either partly? Or wholly after a period? If so how long should food be left to 'recover' before consumption.
A. Not necessary - see above.

Q. Most manufacturers suggest leaving the food for 1 minute before serving.

Is this just to allow heat equalization? or is it to allow the molecular structure to recover as well?
A. Heat equalization.

Q The paint is peeling/flaking in my oven. Must I buy a new one?
A. It is always difficult to give specific advice when the oven cannot be viewed. If the paint is unable to enter the food then this should be ok. However, if there is any sign of rusting or pitting in any part of the oven a microwave engineer should be called or the oven replaced.

Q. I have a domestic microwave oven and the door has a 1.5"crack in the plastic between the top corner and the glass window. When tested close up (1 cm) with an emissions tester, the detector flickers at the door seal next to this damaged corner. Does this mean the microwave is unsafe or is it normal to get a small amount of leakage? When tested at more than 1 cm distance no leakage is recorded.
A. It is always very difficult to determine potential faults without seeing the oven in question, but from your description it seem very unlikely that the oven is leaking energy above what is normal. The International safety standard requires use of an Approved microwave leakage detector to be placed 5cm (IE 50mm - usually via the spacing cone on the instrument) away from the source to be measured, and for a 275ml cold water test load to be placed in the cavity prior to switch on.
Under these conditions the oven should not exceed 50W/m^2 (5mw/cm^2). An empty oven should not exceed 10mw/cm^2. All ovens emit very small (usually less than 0.5mw/cm^2) amounts of microwave energy and it may be this that is causing the meter to flicker. Microwave energy is subject to the inverse square law, which explains how the energy decays with distance as you have experienced.

Q. Should I always use special microwave cookware in my microwave oven, or can I use plastic? My father (83) is having difficulty getting ordinary china plates out of his microwave because they get hot and he can't hold them. Would melamine plates be safe to use in a microwave and would the rim stay cooler so that he could hold them?
A. There is no problem with putting plastic into the microwave, though the cheaper it is, the more likely it is to bend and if there are any edges, they could cause weak spots after continued use (e.g. Tupperware type cereal bowls, that have a base joint) - always put bowls of that sort on to a plate, just incase the bottom falls out!!

Try looking at Lakeland plastics web site, they have lots of plastic plates on their catalogues - that actually say microwaveable - therefore they are guaranteed for use in a microwave oven, but one should always take care.

Q. Is microwaved food good for you?
A. Quick answer YES! Cooking with microwave energy really is the safest, most environmentally friendly and convenient cooking method known in the western world today. It produces perfectly cooked nutritious food in a realistically short time, but in order to produce excellent results EVERY time, the user must understand a little about how microwaves actually cook food.

Q. Can I defrost and re-heat a lasagne that is in a metal container in the microwave oven? Or use foil in a microwave, as it has been used in some of the recipes in the recipe section of the MTA's website.
A. Yes, it is perfectly safe - stand the shallow metal dish/tray on a non metallic plate/dish on the metal turntable and you will get perfectly evenly cooked food.

Q. Your fact sheets states that food can be covered with microwave cling film. Can you tell me: What type of film is this & can film come into contact with food when in a microwave?
Any cling film is quite ok to use these days - I have found that there is no problem with the film covering the food - and I have been doing this for in excess of 25 years now - so no problem - carry on using your normal cling wrap - but the more expensive ones stick better to the sides of the cooking container.

Q Where can I find more information regarding the microwave food labeling scheme?
A. A short explanation is given in the MTA book, The Wave Machine which can be purchased from the website. MAFF produced a free leaflet entitled Foodsense, The New Microwave Labels (1989), (PB0779). This may still be available or at a local library. For testing purposes, the specification is available to purchase from the Campden and Chorleywood Food Research Association, Chipping Campden, Gloucestershire, GL55 6LD UK. Entitled Guideline 14. Guidelines on the Verification of Reheating Instructions for Microwaveable Foods June 1997.

Q Can you give guidance as to the different cooking times for different

power for outputs?
A. See the front home page of the MTA's website – for an energy conversion chart

Q. The oven light has failed. Will this make a difference to my oven?
A. No, it only reduces the viewing facility. However, always use a microwave engineer to replace it.

Q.Why does a cup of water heated in a microwave oven sometimes explode?
A. Bob Shiffmann, R.F. Shiffmann Associates, Inc. , provides the answer here:
Answer: The reason this occurs is because of a phenomenon known as "superheating". Water boils at 100ºC, at sea level, but superheating occurs because water requires points of nucleation within it in order to boil. These nucleation points can be particles of dust, scratches or imperfections in the container, all providing tiny bubbles of gas coming out of solution as the water heats, and that causes boiling – it effectively relieves steam pressure. Superheating occurs if these nucleation points are not present. In the early 1980's my lab measured temperatures as high as 116ºC in microwaved water samples
Here's a homework assignment. Fill a small saucepan about halfway with water from the tap and heat it on your stove. Watch it carefully: as it becomes hot and you'll notice lots of small bubbles along the sides and bottom of the pot. Finally, when the water gets hot enough, these bubbles break away and rapidly rise to the surface, growing as they go, to make the water "boil".
What you have been observing is that water usually contains a great deal of dissolved air, and air trapped in imperfections in the sidewalls. It is these sidewalls that are the hottest areas due to conductive heat transfer from the stove. As the temperature of the water increases, the solubility of this air decreases so it comes out of solution, and either evaporates from the surface, or moves into the trapped air bubbles. The bubbles are held to the sides and bottom of the pot by means of interfacial tension. It is only when there is enough air in the bubbles that they are buoyant enough, and have enough energy, to break these interfacial bonds and rise to the surface. As they rise, they expand and coalesce. This is because bubbles need to grow to relieve their internal pressure, which increases as the temperature increases. Coalescence is another way in which bubbles relieve that pressure. At the same time, the water temperature remains fixed at 100ºC.
Now consider what happens when you put water inside a microwave oven.

Remember that, unless the material of the container is glossy, it will remain somewhat cool, especially because the cool air in the microwave oven. Therefore, the water adjacent to the walls of the bowl will be cooler than the interior portions of the water. (That's just the opposite of the temperature profile described in the previous paragraph). That being the case, the interior of the water will become hotter than that near the walls. If there are no means of nucleation to cause boiling, the water temperature will exceed 100ºC. That also means that any bubbles that form along the walls will take longer to grow in order to become buoyant and overcome their interfacial tension. Now, unless the water is highly aerated (as it is when you get cloudy water coming out of the tap) or there is something like a spoon in the cup that will serve as a bubble nucleating site, it is possible for the interior zone of the water to keep on heating past its boiling point since there are no bubbles in the area to control that temperature: the water becomes superheated.
Often this water looks perfectly still until the container is moved, which jostles one or more bubbles which now encounter temperatures well above 100ºC in the microwave oven – Vol. 9(4),1988.

Q. Where can I find the history of the microwave oven
A. See Lewis Napleton's book "Look it Cook"' – which is available from most libraries and good book stores.

Q. I thought that we should not place metal inside microwave ovens because it will damage the oven? In the boil an egg in a microwave instructions, in the recipe section of your website, the egg is wrapped in cooking foil. How does the oven survive this metal inside??
Metal is fine in the microwave oven - if used correctly, i.e. a shallow metal dish (say for cooking a frozen lasagne in..) if put on a microwave proof plate, will cook much more evenly than if cooked from frozen in a plastic tray. Foil wrapped around the ends of chicken drum sticks, for the first half of the cooking time prevents them from over cooking, as the foil prevents the microwaves from penetrating into the bone, it can then be removed half way through the cooking time, so that the whole drum stick is cooked thoroughly at the same time, without any 'hot spots' appearing.
Why do manufacturers put metal trivets in the ovens ??
I think what people think of is the sparking that occurred in the past, when a piece of china was into the oven that had a gold or silver painted edge on it. As the cup or plate turned on the turntable and went near the sides of the oven walls, it produced sparks as the metal paint disintegrated.

Foil wrapped around an egg, then placed in a cup of water, will cook the egg, by the usual conduction method - i.e. the heat from the boiling water will penetrate through the foil - it has been tried and tested many times - so have a go - and let me know how you get on...

Q. Can you please advise me what to do if I wish to make 4 individual steamed puddings instead of one big one? For how long do I cook them?
A. Cook individual sponge puddings in a tea cup - or something of similar size - place approximately 2 tablespoons of mixture into a greased cup - cook for approximately 1 1/2 - 2 minutes in a microwave oven with 750 watts. Top should be slightly moist when pudding comes out of the oven - but cover with a saucer - and leave to stand for 2 minutes or so, before turning out to serve.
- Please also see our recipes section on the MTA's website - last year we presented some great recipes for various types of steamed sponge puddings - all the information you will need is there.

Q.Is it true that microwave cookery destroys all vitamins in food?
A. NO – See answers to other questions above!