Microwavability of Polypropylene

Microwave ovens use radio waves at a specifically set frequency to agitate water molecules in food. As these water molecules get increasingly agitated they begin to vibrate at the atomic level and generate heat. This heat is what actually cooks or re-heats the food.

The chemical structure of polypropylene makes it transparent to microwaves and because it does not absorb microwave energy and has a relatively high softening point, polypropylene is considered to be a suitable resin for the production of microwave food reheat containers such as bowls, dishes and related food containers. Such containers must withstand temperatures up to ≈ 230 F and should be sturdy, rigid in shape, and capable of supporting its contents before and after heating in the microwave. The more fat content in a foodstuff, the hotter the foodstuff can become during the microwave process. Microwave heating of high fat foods to high temperatures can contribute to localized hot spots in the polypropylene container which can lead to heat distortion problems with the food container. High fat content foods like chili, barbecue sauces, tomato-based and / or carotene-based sauces can severely stain and may eventually cause pitting along the inside surface of the food container.

Although essentially no microwave energy is absorbed by polypropylene, fillers and colorants used in polypropylene based containers are not necessarily transparent to microwaves. The Food and Drug Administration (FDA) establishes regulations and testing standards for the food containers. The container manufacturer's test results must show the nature and levels of the packaging material, the components used, the possibility of migration, and any potential health hazards associated with the components. FDA approval of a product ensures that the product is safe for use as a food contact surface, and that it complies with all industry standards.

The suitability of a polypropylene container for use in a microwave oven is then based on the microwave reaction of additives or colorants, its thermal stability and chemical resistance at maximum use temperature. Maximum use temperature depends on the contents of the container when microwaved. Chemical resistance based on the composition of the contents, maximum exposure to the container (time and surface contact), the thickness of the container, and residual stresses imposed during the conversion process are all factors that may significantly affect the suitability of polypropylene containers used for reheating foods. Always test a container for worst-case-scenarios.

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