Combination of cooking methods

Braising

Braising is a combined method of roasting and stewing in a pan with a tight fitting lid. The meat should be sealed by browning on all sides and then placed on lightly fried bed of root vegetables. Stock or gravy is added which should cover 2/3rd of the meat. Flavourings and seasoning are added and allowed to cook gently.

Many food preparations are made not by single method but by a combination of cooking methods.

Vermicelli payasam : Roasting and simmering.

Vegetable curry : Sauteing and simmering.

Upma : Roasting and boiling.

Meat cutlet : Boiling and deep frying.

Vegetable pulav : Frying and simmering.

Mutter paneer : Frying and stewing.

Microwave cooking

Electromagnetic waves from a power source magnetron are absorbed by the food and food becomes hot at once. Thus, microwaves do not require any medium of transfer of heat in cooking. The microwaves can be absorbed, transmitted or reflected. They are reflected by metals and absorbed by food when food is kept in the cavity of the microwave oven for cooking. The microwaves generated by the magnetron strike the food and metal walls of the oven. Microwaves that strike the metal walls are reflected and bounced back, so they disperse throughout the oven and accomplish uniform heating of the food.

Cooking with microwaves differs radically from conventional cooking methods because the heat is generated inside the food rather than being transferred to the exterior of the food by conduction, convection or radiation.

The energy of these electromagnetic radiations excite the water molecule in food which

bear a positive electrical charge in one position and negative charge in other position of the molecule (dipole). When the electric field of the microwave interacts with the water dipole, the water molecules begin to vibrate very rapidly in food around 2,450 million times a second. This vibration produces friction that creates heat within the food as microwaves are able to penetrate.

The efficiency of microwave cookery depends heavily upon the constitution of the food being cooked. Different components of the food will interact with the microwave radiation at varying rates.

The most important material in any food is water. It is the major constituent of the cellular material and many foods contain over 70% of their normal weight as water. It is the water in cellular organic matter that converts microwaves to heat energy with great efficiency and rapidity whereas other components such as starch, cellulose and protein are nowhere near as efficient. Least effective as an energy converter is fatty tissue which contains a very small amount of moisture. Microwave cooking can be done on paper dishes, plastics, glass, chinaware and ceramics because these materials transmit the waves through them without absorbing them like water. Aluminium foil can also be used. But brown paper bags, stainless steel vessels, metal twist ties, conventional thermometers cannot be used.

After cooking in a microwave oven washing dishes is much easier as food does not stick to the sides of these vessels and the paper dishes can be thrown away. Cleaning the oven involves only wiping it dry with a damp cloth.

Microwave cooking enhances the flavour of food because it cooks quickly with little or no water and thus preserves the natural colour of vegetables and fruits. Leftovers from the previous days dinner can be heated in a minute and reused for breakfast or lunch, precooked processed foods available in Indian markets like tikkas, kababs, dhals and chicken curry can be on the table in minutes.

Following the instructions supplied by the manufacturers, home makers can make a cake in 8 minutes and chicken tikkas in about the same time. Stuffed capsicum are ready in 6 minutes only. Some microwave ovens have an infrared lamp fitted into the oven cavity so that exterior colouring can be included while the microwave heating is occurred.

An alternate method that is currently being developed in domestic microwave ovens is to lengthen the cooking time by reducing the microwave output. In this way the longer cooking time allows some surface colouring to occur so that the appearance of the food matches the conventional product more closely. The increase in cooking time (2-4 fold) still allows a significant saving over conventional cooking time.

An essential difference between microwave and conventional cooking is done by time rather than temperature in microwave cooking.

Practical hints in using microwave oven

- Do not use the oven for home canning or the heating of any closed jar. Pressure will build up and the jar may explode.
- Small quantities of food or foods with low moisture content can dry out, burn or catch on fire.
- Do not dry meats, herbs, fruits, and vegetables in the oven.
- Do not attempt to deep fry in microwave oven. Cooking oils may burst into flames. Microwave utensils may not be able to withstand the temperature of the hot oil and could shatter.
- Do not heat eggs in their shell in microwave oven. Pressure will build up and the eggs will explode.
- Potatoes, apples, egg yolks and whole vegetables must be pierced before microwave –cooking to prevent bursting.
- Over cooking of vegetables like potatoes cause dehydration and fire.
- Heated liquids can erupt if not mixed with air. Do not heat liquids in microwave oven without first stirring.
- Do not use paper towels or clothes which contain a synthetic fibre woven in to them. The synthetic fibre may cause the towel to ignite.
- Do not use paper bags or recycled paper products in the microwave oven.
- Do not heat narrow mouthed containers as the liquid boil over even after cooking has stopped.
- Do not leave open unattended while in use.
- Both bone and fat affect cooking. Bones may cause irregular cooking. Meat next to the tips of bones may overcook while meat positioned under a large bone such as a ham bone may be undercooked. Large amounts of fat absorb microwave energy and the meat next to these areas may get over cooked.
- If the food is wrapped, the wrapper should be perforated or otherwise allow for steam to escape to prevent it from bursting.
- As the quantity of the food increases so does the cooking time. Place thin parts towards the centre of the dish and thick pieces towards the edge. Thin pieces cook more quickly than thick pieces.
- For even cooking place in the oven equal distances apart. When possible, arrange foods in a circular pattern.
- When removing plastic wrap covers, as well as any glass lids, be careful to remove them away from you to avoid steam burns.
- Less tender cuts should be cooked in liquid.

Advantages

- Microwave ovens cook many foods in about 1/4th of the time necessary on a gas burner. There is no wastage of energy.
- It saves time in heating frozen foods. Thawing can be done in minutes or seconds.
- Only the food is heated during cooking. The oven or the utensil does not get heated except under prolonged heating periods.
- Flavour and texture do not change when reheated in a microwave oven.

- Loss of nutrients is minimised. B-carotene and vitamin C are better retained by microwave cooking compared to pressure cooking and saucepan cooking.
- After cooking in a microwave oven, washing dishes is much easier as food does not stick to the sides of the vessels.
- Food gets cooked uniformly.
- Preserves the natural colour of vegetables and fruits.
- No fat or low fat cooking can be made.

Disadvantages

- Due to short period of cooking food does not become brown unless the microwave has a browning unit.
- It is not possible to make chapatti or tandoori roti in it. It cannot cook soft or hard boiled eggs. Deep frying necessary for puris, jalebis, pakoda, vadas cannot be done in it.
- Sometimes unwanted chemicals migrate to food from plastic cookware or food packages. Only "microwave safe" should be used.
- The short cooking time may not give a chance of blending of flavours as in conventional methods.
- The operator should be careful in operating the microwave oven since any exposure to microwave oven causes physiological abnormalities.
- If the food is greater than 80mm the central portion is out of range of the microwave radiationand will only heat by the normal slow process of conduction. It will be relatively uncooked while the exterior accessible to microwave is cooked in minutes or seconds.

Solar cooking

Solar cooker works on solar energy. Solar cooker can directly utilize solar energy or can use reflected solar energy from a large concentration rays surface.

Solar cooker consists of a well-insulated box, inside of which is painted dull black and is covered by one or more transparent covers. The purpose of these transparent covers is to trap heat inside the solar cooker. These covers allow the radiation from the sun to come inside but do not allow the heat from the hot black absorbing plate to come out of the box. Because of this, the temperature of the blackened plate inside the box increases and can heat up the space inside the temperature up to 1400C which is adequate for cooking.

The second type of solar cooker uses a lens or a reflector suitably designed to concentrate the solar radiation over a small area. This cooker is able to provide higher temperatures on its absorbing surface when suitably designed but is usually more expensive than box cooker.Important parts of a simple box type solar cooker are given in figure.

Figure 1 : Parts of a simple/ box type solar cooker 1. Plane mirror, 2.Cooking Container, 3.Glass sheet, 4.Cover, 5.Insulation Material Glass, 6.Outer Box, 7.Handle, 8. Mirror Support, 9. Hinged adjustor and guide.

- **The outer box:** The outer box of a solar cooker may be made of wood, iron sheet or fibre reinforced plastic having suitable dimensions.
- **The inner box:** The inner box can be made from galvanised iron or mild steel or aluminium sheet. All the four sides and the bottom of the inner box which are exposed to the sun are coated with black paint.
- **Mirror:** Mirror is used in solar cooker to increase the radiation input on the absorbing surface. Sunlight which falls on the mirror gets reflected from it and enters the box after passing through the glass covers. This radiation is in addition to the radiation entering the box directly and helps to quicken the cooking process by raising the inside temperature of the cooker. The use of a mirror can enhance the solar radiation input to the cooker by about 50 percent.
- **Cooking containers**: The cooking containers with covers are generally made of aluminium or stainless steel. The containers are painted dull black on the outer surface so that they also absorb radiation directly.
- **Thermal insulation**: The space between the outer box and the inner box is fitted with insulating material such as glass, wool or thermocole. This prevents heat losses from the cooker.

The double glass covers: These covers have length and breadth slightly greater than the inner box and can be fixed in a wooden frame maintaining a small spacing between the two glasses. This space contains air which acts as an insulator and prevents heat to escape from inside. The wooden frame is attached to the outer box by means of hinges. A rubber strip is affixed all around on the edges of this frame to prevent any heat leakage.

Advantages

- It does not require any cooking gas or kerosene or any conventional fuel.
- Simultaneously more than one recipe can be prepared.
- Keeps the environment clean.
- Less expensive compared to conventional source or energy.
- Conserves the conventional source of energy.
- Constant attention is not required.
- Cost of the cooker and maintenance cost is low.
- No smoke and no soot hence cleaning the vessels is easy.

Disadvantages

- Depends on sun and on cloudy and rainy days it may not be possible to use.
- Takes longer time and planning is required.
- Special vessels need to be used.
- Loss of vitamin C is more compared to cooking on gas.