Grilling is a fast, dry method of cookery which uses the intense heat radiated by an:

electrical element,

gas flame,

glowing charcoal or an open wood fire.

The heat source can be either above or below the food (or both) and the heat, in the form of infra-red waves, is transferred to the surface of the food. Infra-red waves penetrate only about 1 mm into food (whereas microwave radiation penetrates about 40 mm/l½ in.)

Heat is transferred from the surface to the centre of the food by conduction. (If the food comes into contact with hot grill bars, which is almost certain to happen, there is also some conduction at the surface.)

It is important that the grill is preheated so that it reaches the high temperatures necessary for efficient infra-red radiation.

Grilling cooks fast because:

very high temperatures are used

the food can be positioned close to the heat source

the energy passes from the heat source almost instantly, without having to be carried in a liquid or through much air.

How much heat the food absorbs depends on the colour of its surface: darker foods tend to absorb the infra-red more easily than light ones (which reflect some of the heat). This is the same effect as a black car getting hotter in the sun than a white car (or why a person in a white shirt stays cooler in the hot sun in the summer than the same person would wearing a black shirt.)

Grilling and radiant heat

When you put your hand near a hotplate or a room radiator or in direct sunlight the glow you feel is the result of infra-red heat radiation.

Infra-red radiation works without any physical contact between the source of heat and the object, but the energy is lost quickly because the rays spread out in all directions, so during cooking the object needs to be quite near the heat source.

The food is placed at a distance from the heat source which will brown the surface as required, while cooking the centre to the degree of doneness required. The best temperature for meat is in the range 150°-200°C (300°-390°F) at a distance of 10 to 15 cm (4 to 6 in.) from a typical overhead grill (which will be at a much higher temperature -around 1,000°C or 1,800°F).

Browning

Browning cannot occur at low temperatures, which is why food that is cooked at boiling point (as in steaming and microwaving) does not brown. When the food is exposed to the radiant heat of a grill, the surface rapidly browns and develops an intense, full flavour. In foods with a high sugar content, the sugar caramelises, first melting and then deepening in colour, and also creating a rich flavour (this is the same mechanism as the browning of toast.

In foods such as cakes, meats, nuts and coffee beans, the carbohydrate part of the food reacts with other parts of it and the result is browning. This is sometimes called the Maillard reaction after the Frenchman who discovered how it happened.

With meats, the browning stage is sometimes called searing. It used to be thought that searing actually sealed the surface of the meat, but this is not the case.

How to control the degree of cooking

In grilling, the radiated heat is very intense and the surfaces of the food brown rapidly. But there is a big difference between the speed of cooking at the surface and inside the food, and it is important that surface browning occurs at about the same rate as the internal cooking.

In an overhead grill this means adjusting the distance of the food from the heat source and in a charcoal grill you might need to move the food to a cooler area after initial browning.

Otherwise it is easy to end up with food that is either charred on the outside and under-cooked or even quite cold on the inside or completely dried out, tough (even tender meat will toughen in these conditions) and burnt.

Choice of food for grilling

Only certain types of food are suitable for the intense dry heat of grilling.

In general they should be tender items which are:

of good quality

small (large joints of meat must be cut into thin slices or steaks)

regular in shape to ensure even cooking.

Meat should have a reasonable fat content - veal escalopes, for example, are so lean that they will just dry out.

Tough cuts of meat are unsuitable for grilling, because the temperatures are too high, the conditions too dry and the time too short for the connective tissue to be converted into gelatin.

Tomatoes and mushrooms grill successfully, particularly if they are first brushed with oil, but vegetables with a low moisture content will rapidly dry out and shrivel.

Other meanings of the term

Grilling is also an ambiguous term that can mean:

Double-sided Frying

This would be done in a sandwich cooking device, similar to a waffle iron but preferably without the square bumps. The George Foreman Grill works fairly well. The procedure is sometimes also known as toasting, as in the toasted cheese sandwich.

Broiling (British English usage)

Most British and European ovens are fitted with radiant grills: an overhead gas or electric radiant heating element cooks the food below, which lies on a "grill" or rack (the grill usually rests in a tray that catches drips from the food). The same term is also used to describe the cooking technique where food lying on a rack is cooked by radiant heat from below, as in a barbecue.

If no radiant grill is fitted, this is best done in an electric oven, with the door partly open and only the top heating element in use. Gas ovens often provide a less-effective lower drawer for this purpose.

The same can be achieved outdoors by vertical grilling, using either stacks of charcoals or fires with high flames fed by standing pieces of thin and long burning-wood. The food will then be placed to receive infrared radiation from the side.

Barbecuing

This cooking method uses fire. It is usually done outdoors on barbecue grills over wood, charcoal, or propane fires. In some areas, the term barbecuing is reserved for a slow low-heat cooking process that operates at about 220°F (105°C) and the term grilling is used for a fast high-heat cooking process. In other areas, all barbecuing is considered grilling and all grilling over a fire is considered barbecuing. Barbecuing is traditionally done with hardwoods or fruitwoods, such as hickory, maple, mesquite, and applewood, which gives a nice smoke flavor to the food.

The meats, fish or vegetables may be prepared by marinating or by applying a combination of spices known as a dry rub. Marinated meats can also be ‘mopped’ with the marinade while cooking. A barbecue sauce may be added before, during, or after cooking.

Barbecue also can mean a device for cooking such food, a social event at which such food is served, or any food served with barbecue sauce.

Recipes that use some form of grilling:

Boerewors

Campfire Trout

Grilled Cheese Sandwich

Grilled Peanut Butter Sandwiches

Grilled Vegetable Sandwich

Midwestern Chicken Wings

Hamburger Deluxe

Maple Syrup Planked Salmon