



Food Production Operations



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About the Tutorial

Food Production Operations is an activity of preparing food products on mass scale and all the operations pertaining to it. This tutorial introduces you to various cereals and pulses as well as culinary seeds, spices, nuts, and herbs. It also introduces you to various equipment, cooking methods, menus, and Indian cookery.

This tutorial teaches basic terms used in food production. After going through this tutorial, you will find yourself at a moderate level of expertise of retail management basics from where you can take yourself to next levels.

Audience

This tutorial has been prepared for beginners to help them understand the basics of Food Production Operations. It is going to be quite useful for the ones who are keen on making a career in Hospitality and Tourism. For all other enthusiastic readers, this tutorial is a good learning material.

Prerequisites

We assume the readers of this tutorial have a passion for food, cooking, and creativity. The reader must also possess a strong desire to pursue culinary arts as a career. Creativity, punctuality, and excellent interpersonal skills are a plus.

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Part 1 – Introduction

1. FPO – Introduction to Cookery

Cooking is like painting or writing a song. Just as there are so many notes or colors, there are only so many flavors – it's how you combine them that sets you apart.

...Wolfgang Puck, American Chef, Restaurateur, and Occasional Actor.

Food Production and its related operations are integral elements of hospitality management, hotel management, and restaurant businesses. It requires a skilled staff who can produce a wide variety of quality foods.

In addition, the culinary staff of a hotel or a restaurant is also required to produce food in a large quantity. Let us start with understanding the basic term 'Cookery' in detail.

What is Cookery?

Cookery is an art and science of preparing food for consumption by using heat. Cookery is an age-old practice. A primitive human must have found a piece of meat or vegetable cooked in the bushfire by chance. He must have found it edible, chewable and easy to consume. Probably, he even must not have cooked deliberately until he knew how to create fire.

The simplest method of cooking was holding a piece of meat or vegetable in the fire directly, which is still in practice, with a little sophistication. From the age-old cooking practices to cooking for fine dining, cookery has come a long way with the evolution of humans, their skills, diverse cultures, and the equipment. Today, cookery is an inseparable part of our lives that rules our tongues and hearts.

Why Cook Food?

We can have some foods in the raw form too, such as salads and fruits but we need to cook certain foods such as beans and meat to make them edible.



In addition, if we eat some vegetables without cooking, they can transfer harmful bacteria or substances into our bodies. For example, uncooked beans contain anti-digestive enzymes. Uncooked capsicum (Bell Pepper) contains **Capsaicin** that can create burning of stomach lining. Cooking helps to destroy unwanted substances present in the food and unwelcomed effects of consuming it.

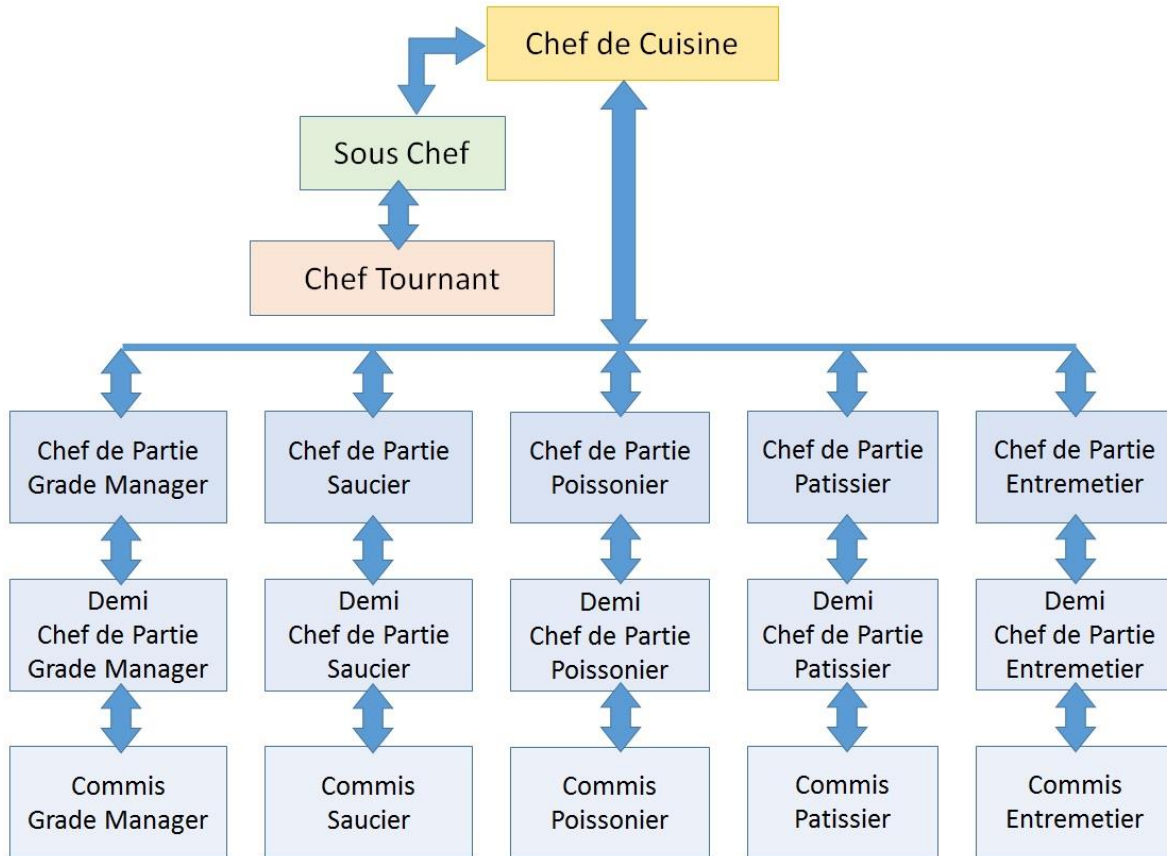
There are many reasons behind cooking food. Some of them are:

- To make the food digestible.
- To kill any harmful bacteria present in it.
- To make appearance of the food pleasant.
- To change its physical and chemical form.

Let us now see the organization of the Kitchen Department.

Kitchen Staff (Brigade de Cuisine)

The kitchen staff (brigade de cuisine) needs to work harmoniously to avoid possibility of any error. The kitchen staff is organized in the following way:



The responsibilities of kitchen staff are as follows:

Role	Responsibilities
Chef de Cuisine	Main cook. Overall management of kitchen and staff, supervising, creating new recipes, and training apprentice.
Sous Chef	Deputy cook. Takes charge in the absence of Executive cook.
Chef Tournant	Has skills and knowledge of every section. Takes charge as and when required.
Chef Grade Manager	Prepares all cold savory food.
Chef Saucier	Prepares sautéed items.
Chef Poissonier	Fish and Seafood cook. Prepares sea food dishes.
Chef Pâtissier	Pastry cook. Prepares cakes, breads, and pastries.
Chef Entremetier	Hot appetizers cook. Prepares soups and stocks.
Commis	Junior cook.

Design Considerations of a Commercial Kitchen

Since a large quantity and variety of food is produced in the professional kitchens, various designs are considered before setting up a kitchen. The food production managers must consider the following factors with respect to the kitchen.

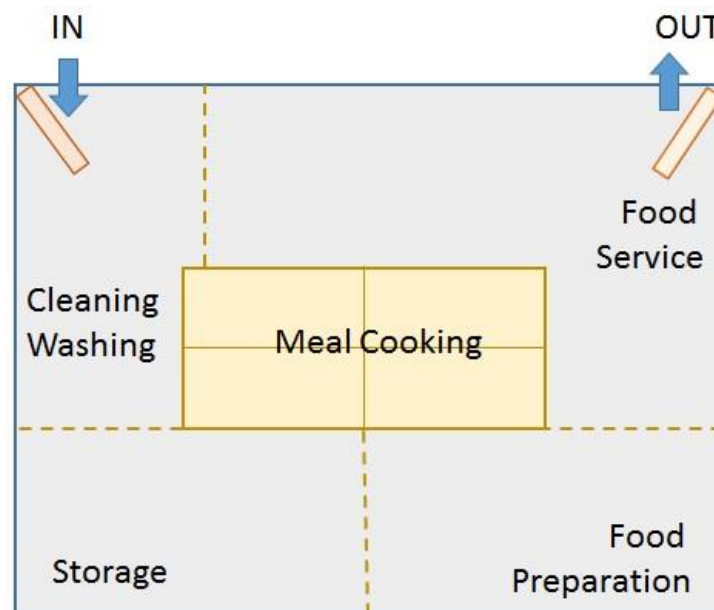
- Restaurant menu and service types
- Heating, ventilation, and air conditioning
- Employee workflow
- Storage, food production, cleaning, and service space
- Equipment
- Drainage and plumbing
- Communication among employees
- Safety of employees and property

Typical Layouts of a Commercial Kitchen

Some typical layouts of a commercial kitchen are given below.

Island Layout

In this type of layout, the cooking ranges, ovens and other cooking equipment are placed together at the center of the kitchen. The other sections are placed along the wall in order to follow a concentric design. Any section can be an island depending on the requirements.

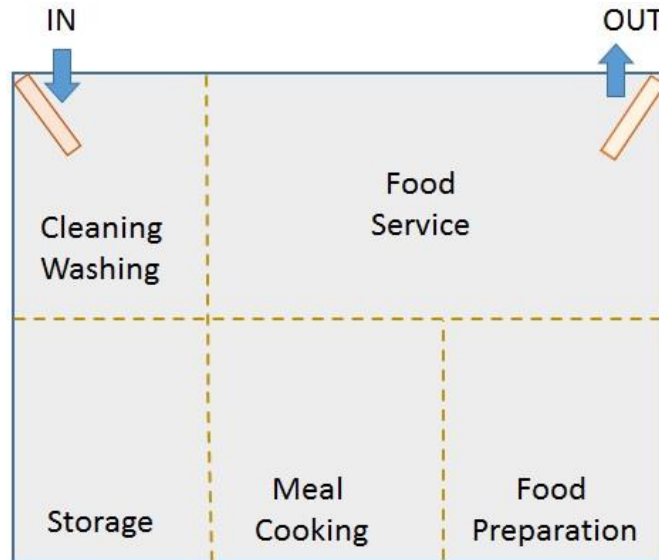


It is an open layout that favors staff communication. It also leaves an adequate open floor space for cleaning. This layout is followed in large kitchens.

Zonal Layout

The total kitchen space is divided into different zones for various activities. The principle equipment are located along the walls. This layout follows an appropriate order.

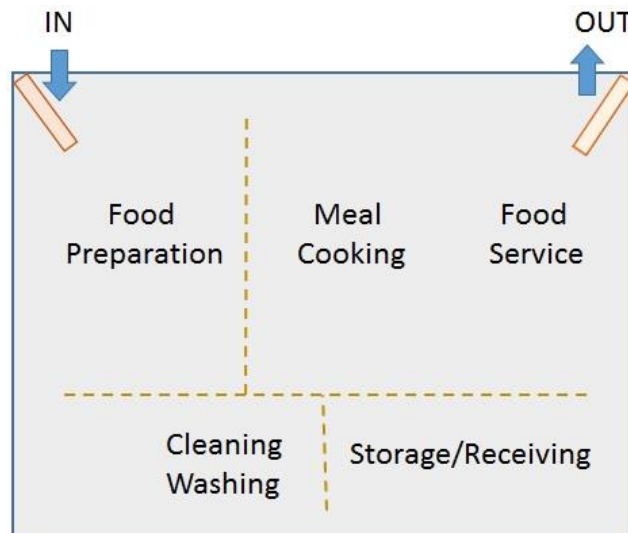
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In this layout, staff communication and supervision are easy as the central space is completely open.

Assembly Line Layout

In this layout, kitchen equipment is organized in a row. The food preparation space is kept at one end and the service space at the other. The areas for cleaning/washing and storage/receiving are behind the assembly line to keep them separate from the main busy space. This allows the cooks to send the food quickly down the line. This layout provides very high efficiency, and excellent communication and workflow.



This layout is very effective in case of the establishments with a limited menu with large momentum.

Terms Used in Food Production Operations

Here are some common terms used in the domain of Food Production and Operations:

Term	Meaning
Bacteria	Unicellular organisms that can be harmful or useful to our body. They multiply very fast.
Blanching	Putting food substance into hot water for some time and transferring into cold/running water to halt the cooking process.
Calorific Value of Fuel	The amount of heat generated in Kilocalorie or Kilojoules by the complete combustion of 1 Kg of fuel.
Chhonk	A cooking and seasoning technique used in the cuisines of India, Bangladesh, and Pakistan. In this process, oil or ghee is heated in a pan and whole spices, curry leaves, and sometimes minced ginger or garlic are fried briefly in it to liberate their essential flavors. The chhonk is then poured on stews, cooked beans, or lentils.
Chopping	Cutting quickly with heavy blows of knife into fine pieces without paying attention to the shape of the resulting food.
Commodity	Valuable material used or traded.
Consumer	A person who buys goods for family or personal use.
Curing	A food (meat, fish and vegetables) preservation and flavoring process by the adding salt, nitrates, or sugar. It also involves smoking, drying, or cooking.
Dicing	Cutting into square pieces.
Grating	Making small particles or stripes by rubbing against a rough surface or a surface with many sharp-edged openings.
Kneading	Making flour dough into a uniform compound by pressing, folding, and stretching.
Maillard Reaction	A chemical reaction between amino acids and reducing sugars that gives the browned food its desirable flavor when cooked around 140°C to 165°C
Marination	The process of soaking foods in a seasoned liquid of acidic properties before cooking. It helps to add flavor.
Mashing	Reducing to soft pulpy mass by applying pressure.
Mincing	Cutting into very small pieces such as mutton mince (<i>Keema</i>).
Organic Food	Food made without using preservatives, chemicals or artificial colors.
Peeling	Removing the skin of moist food item, say potatoes, and carrots.
Poaching	Cooking egg without shell in boiling water. Cooking in small amount of liquid.

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Popsicle	Color and flavorful ice candy with a stick to hold.
Praline	A confectionary containing cream, sugar, and nuts.
Rotisserie	Mechanically rotated stainless steel rods that are positioned near heat source. They hold meat to cook in the ovens evenly.
Roux	Flour and fat cooked together and used to thicken soups.
Shelling	Removing shells of peas, beans, oysters, and mollusks.
Shredding	Cutting into small stripes.
Sifting/Sieving	Putting flour through sieve in order to separate fine particles from coarse ones.
Simmering	Cooking liquid food just below boiling point.
Spikelet	A unit of grass flower.
Stirring	Moving solid/liquid food in the circular motion.
Tandoor	A cylindrical clay oven used in Indian cookery.
Tempering	Unwanted filling of griddle plate with grease.
Thawing	Bringing a frozen food item to room temperature.

2. FPO – Kitchen Equipment & Fuel

Good kitchen equipment is expensive but most items last a lifetime and will pay for themselves over and over again.

...Delia Smith, English Cook and TV Personality.

Commercial kitchen equipment need to produce food for a large number of consumers. It needs to be robust, durable, and easy to operate. The equipment should consume less electricity, improve the productivity of food production operations, and must be eco-friendly. Last but not the least, it should serve its purpose effectively.

Most kitchen equipment are operated electronically. There is a wide range of cooking, cutting, baking, and cleaning equipment available for the kitchen staff.

Let us introduce ourselves to some typical kitchen equipment.

Commercial Food Production Equipment

Here are some basic food production equipment.

Burners

They are used for cooking, boiling, and steaming. They often operate on Liquid Petroleum Gas (LPG). Now induction burners and hot plates are available, which operate on electricity. They come with open top, mesh top, or flat top.



Cooking Ranges

Cooking range is the most versatile equipment operating on either LPG or electricity. The name implies, it can perform a range of functions such as cooking, frying, boiling, grilling, and baking. It comes in two basic versions:

- **Restaurant range** – Less expensive, good for less food volume, and is stand alone.
- **Heavy duty range** – Expensive, suits a large volume of food production, and can be banked with other ranges using a battery.



Cooking ranges come with multiple burners usually 4 to 8, depending upon the volume of food to be handled.

Ovens

They are used for cooking, baking, roasting, and browning. They operate either on LPG or electricity. There are various oven models such as **Rack** with the option of rotating or steady racks, **Deck**, and **Tunnel** depicting their shape and working style.



Rack Oven



Deck Oven



Electric Tunnel Oven



Direct Fire Tunnel Oven

- **Rack oven** – It contains a set of stacked racks often placed equidistant, one above the other in a tall stainless steel frame. This oven is good to produce large volume of food items such as breads, cookies, and croissants.
- **Deck oven** – It contains racks or rotisseries that can cook various meats such as chicken, duck, lamb, etc. simultaneously and evenly. They also come in baking deck and pizza deck variants. The number of decks are generally up to four.
- **Tunnel oven** – It comes in direct heat and indirect heat variants. It is suitable for high temperature baking.

There are myriad number of ovens available in the market, which vary according to the energy they consume, the manner of heating food, sizes, and shapes.

Griddles

They are flat plates made of iron, stainless steel, or aluminum, which transfer heat to the food. Griddles are prone to heat loss when the plate is partially unused.



Grill top, Gas operated



Flat top, Electric

They are mainly used for preparing breakfast items such as omelets, scrambled eggs, patties, sandwiches, burgers, and pancakes. Normally, the residual grease needs to be wiped out occasionally from the surface to prevent tempering. In case of steel griddles, caramelization occurs if the surface is not kept clean. Teflon surface griddles are more durable and efficient.

Pans and Cooking Spoons

There are a wide range of pans, pots, and spoons used for cooking.

- **Pans:** Depending upon the type of cooking, the cook selects a pan. The pans serve the purpose of shallow frying, boiling, and stir frying.
- **Pots:** The pots are used for cooking and preparing stocks. They are generally accompanied with lids. The steamer is used to prepare steamed food such as rice, momos, and idlis (fluffy rice dumplings). There are two variants: shallow and deep.



- **Spoons:** The spoons help to check the thickness of liquids, tenderness of solids, stir, and turn the food in the pots and pans. Various spoons used during cooking are skimmer, turner, masher, ladle, fork-spoon, and utility spoon.



Kettles

The kettles are used for cooking, warming, and storing food. They are two layered pots- one inside the other with a gap in between for steam. They are usually jacketed, agitator tilting for better view and food handling. The kettles also have a product discharge valve that provides an efficient transfer of kettle product to a service area without damaging delicate food items.



Deep kettles are best for soups, gravies, spaghetti sauces, pie fillings, and puddings as the quality of these food items remains the same irrespective of their volume and frequent stirring. Lentils, beans, and pasta can be cooked in deep kettles.

The shallow kettles are best for cooking and warming stews, patties, steamed vegetables, where this kettle offers better view and less food handling.

Vegetable Cutters/Choppers

The cutters or choppers are used in cutting, dicing, shredding, and slicing vegetables in various shapes and sizes. They are also used to cut bread into small pieces for puddings or soups. The handheld cutters are used for cutting fruits, salads, etc. for presentation.

Cutters are made of either plastic or stainless steel. Some cutters come with single or multiple wheels with zig-zag or plain edge. Some cutters have round small bowl-like shape to cut round pieces of fruits.



Mixers

The overhead motor vertical mixer is most commonly used in commercial food production units. Mixers are used for mixing and blending. There are broadly two types of mixers: table mounted and floor mounted.



Mixers have the following standard accessories:

- **Flat beater:** Mashing and beating foods of medium consistency such as boiled potatoes.
- **Wire whipper:** whipping cream, eggs, frosts and other light foods that contain air. It works on high speed.
- **Dough arm:** It handles heavy and bulky ingredients such as bread dough at low speed.

Cookers and Steamers

Commercial cookers and steamers largely operate on electricity. The cooks use these for cooking rice, lentils, and vegetables.



The steamers are used for preparing steamed food such as Idli (a type of fluffy rice dumpling), momos, and dhokla.

Fryer

Some food items are prepared by immersing them in heated oil in a fryer. There are two basic versions of a fryer: **Electric fryer** and **Gas fryer**. The frying time and oil temperature varies directly with the food type and the size of the fryer. It consists of a fryer basket and heating element and a thermostat controls a fryer.



The fryers are used to fry potato chips, *Pooris* (fried Indian bread), doughnuts, begels, onion rings, shrimp, fish, chicken, okra, and zucchini.

Juicer

Juicers extract juices and pulps from fruits and vegetables. It operates on electricity and speeds up the juice production process. The fruits are added in the juicer from the top. It separates the juice and left over peels and unused fibers from the fruits. There are three types of juicers:

- **Centrifugal:** It works by crushing fruits. It is quick and yields plain juice.
- **Masticating:** It works longer to yield juice of specified texture and consistency.
- **Twin-gear:** It uses various gears and membranes to yield best quality juice of almost any fruit, carrot, tomato, or leafy vegetables. It also helps to prevent oxidation of the juice.



It is very useful in preparing juices and pulps for breakfast, for meals as appetizers, and for using them in cocktails, mocktails, and smoothies.

Maintenance Equipment in Commercial Kitchen

We will discuss here a few important maintenance equipment used in professional kitchens.

Dish Washer

It can wash multiple dishes and bowls simultaneously. It is an automatic machine but needs human interaction for loading used dishes into dish racks and unloading clean dishes after wash cycle. It eliminates a great effort required for traditional dish washing. There are two basic types of dishwasher:

- **Door-type:** It is large machine. It can clean from 50 to 125 dish racks depending upon the size of the machine.
- **Under-counter:** It is smaller and can fit under the kitchen platform.



Both dishwashers give sparkling clean dishes.

Glass Washer

It washes and dries almost 2000 glasses per hour. There are two types of glass washers: rotary and pass-through. They are mostly used at bars for washing glasses of various shapes meant for various beverages.



Dish Warmer

It can dry as many as 1800 dishes an hour and eliminates the possibility of contamination caused by conventional drying methods. It conducts speedy washing of dishes. It also keeps the micro organic particles depositing at bay for long time.



Special Equipment in Commercial Kitchen

There are a few special equipment used in commercial kitchen to make the tasks easy.

Nut cracker

It is used to crack the shells of hard nuts such as almonds, walnuts, hazelnuts, pine nuts, palm nuts, and pistachio. Some machines are also capable of shelling watermelon and pumpkin seeds, and peeling peanuts, cashew nuts and almonds.



Shredders

A shredder cuts the fruits and vegetables into string-like fine pieces, which are useful in salads and vegetarian cookery.



Kitchen Knives

Knives are used across various small volume dicing, cutting, slicing, carving, and filleting. There are various knives used for different cutting and carving purposes:

- **Paring knife:** It is used for fine cutting work, removing onion skins, and cutting small fruits.
- **Utility knife:** It is used in general purpose cutting and scraping.
- **Steak knife:** It is used for cutting steaks.

- **Santoku knife:** Originated in Japan, this knife is used for cutting, dicing, and mincing. (Santoku=Three virtues)
- **Chef's General knife:** It is a multi-purpose knife used on multiple commodities such as vegetables, fruits, meat, and poultry.



- **Serrated knife (Bread Knife):** It has a long thin blade with serrated edge that provides sawing-like motion. It is used to slice certain foods with firm skins or outer layers such as bread, tomatoes, and capsicums.
- **Boning/Filleting knives:** They come with a narrow, sharp, and flexible blade and a protruding heel near the handle. They can run along the bones of flat fish or ribs smoothly.
- **Carving knife:** This knife comes with a long, thin and sharp blade to ensure neat and accurate cutting.
- **Slicing knife:** It has a long sharp blade that tapers at the end and helps slicing fruits and vegetables finely.

- **Turning knife:** It is an essential component to present the food in a unique way. This knife has a small curved blade that is used to carve the vegetables into the shape of a container.
- **Cleaver:** It is a butchers' knife. It is very strong and sharp to cut through large pieces of meat such as pork and beef.

Now let us see the fuels typically used in commercial kitchen for cooking.

Fuels and Energy Used for Cooking

Fuel is a prime necessity in cookery. There are various types of fuels used for cooking food. Mainly two types of fuels are used in food production: **Solid fuels** and **Liquid fuels**.

Wood Fuel

It can be acquired from logs, wood chips, and bamboo pellets. Seasoned logs are more popular in commercial kitchen as they contain less moisture. The more the moisture, more is the smoke created while burning.

Though it is easily available, it requires a separate storage space at commercial food production end. Its calorific value is around 3500 Kcal/kg for moist wood and up to 4700 Kcal/kg for dry wood.

Charcoal

It is obtained by slow heating of wood, animal or vegetable remains in the absence of oxygen. Charcoal is easily available and widely accepted as commercial cooking fuel. It produces less smoke than wood fuel. It also requires separate storage space. Its calorific value is around 7500 Kcal/kg.

Solid fuels are useful in direct heating ovens, three stone stoves, tandoor, and barbeques. This fuel can emit carbon or ash particles while burning. Solid fuels give gradual heating. The initial cost is low. It also gives a tempting smoky aroma to the baked/roasted food.

Liquid Propane

It is nothing but LPG, a mixture of propane and butane gases that exist in liquid state at room temperature. The LPG is highly inflammable and burns with a blue flame without emitting smoke, and it can be controlled precisely. Its calorific value is around 1000 Kcal/kg.

Kerosene

It is also a petroleum product used in commercial kitchens for cooking. The liquid fuels produce heat almost instantly. The initial cost can be high. They are convenient to use but risky if proper safety precautions are not followed while handling these fuels.

Electricity

Though electricity is considered as an alternative fuel under energy power, it is the most commonly used heat energy for cooking. Most of the commercial cooking appliances operate on electricity. Electricity provides instant heating. The heat can be regulated as per the requirement. It is easy to access, though the initial cost of wiring may be considerable.

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