Beer (Introduction , Types, Productions & Storage)

Beer

Beer is defined as a fermented, alcoholic beverage made from barley, wheat, rice, etc. & flavored with hops.

History

There is evidence that the brewing process was established in Babylon in 6000 B.C. Egyptian improved upon the process & Roman started for the commercial purpose. The

Normans carried the process to England when they conquered it. In England, the beer-drinking house (Pub) originated. These houses were represented by signboards of King Head or Red Rooster. The term beer covers drink like ale, lager, stout, etc. The addition of hops started in the middle of the 16th century. The beer gets it to name from Anglo Saxon word called "BEER" which means barley. An interesting fact is that generally beer making countries does not produce quality wine and vice-verse.

Ingredients of Beer

Grain – Mainly the barley (Botanical name- Hordium Vulgare) is used but can be produced from wheat, rice combination of grains. The small amount of other grain (Up to 35%) added along with the barley is termed as **"adjuncts"**. The higher adjuncts lower the aroma, flavour, taste and cost and vice versa. German beers are made from 100% barley and production process is governed by law enacted in year 1909 called **REINHEITSGEBOT** means **PURITY COMMAND**. Following are reason for using barley

1. Cheaply available, not used as staple diet.
2. Low in protein content, excess might cause cloudiness.
3. It has protective sheath, which protect grain from contamination.
4. It has two enzymes **CYSTASE** – convert the insoluble starch to soluble starch, **DIASTASE** – convert the soluble starch to sugar

Hops – These are cone or flower, obtained from perennial plant called Hop vine, 5 meter in height, last for around 20 years. Botanical name is **"HUMULUS LUPULUS"** derived from Roman word Lupus Sallctarius which means that "sheep among wolf". Cone or flowers of female species is uses for beer making because it contain a yellow thick substance called **"LUPULIN"** which contain alpha acid called **"Humulones"** which contributes to flavour, antiseptic, and preservative. Cone is called STROBLLE & petals are called **BRACTS**. Cones are light green in colour having 60-80 % moisture content. They are dehydrated in chamber called **OAST HOUSE**. Best hops are Bavarian hops comes from Germany. In India they are produced in H.P. Following are uses of hops.

- Flavour
- Preservative
- Antiseptic
- Aroma
- Clarifying agent

Brand Names of Hops

1. Brewer gold 2. Northern brewers 3.Fuggles 4. Bavarian hops

5 Saaz 6. Secret 7. Perle 8. Progress

9.Tradition 10.Cascade

Yeast – Microorganism cause the fermentation, only seen when massed together, discovered by Anton Van Loeuwenhoeck in 1685 & in 1857 Louise Pasteur explained the function of yeast in detail.

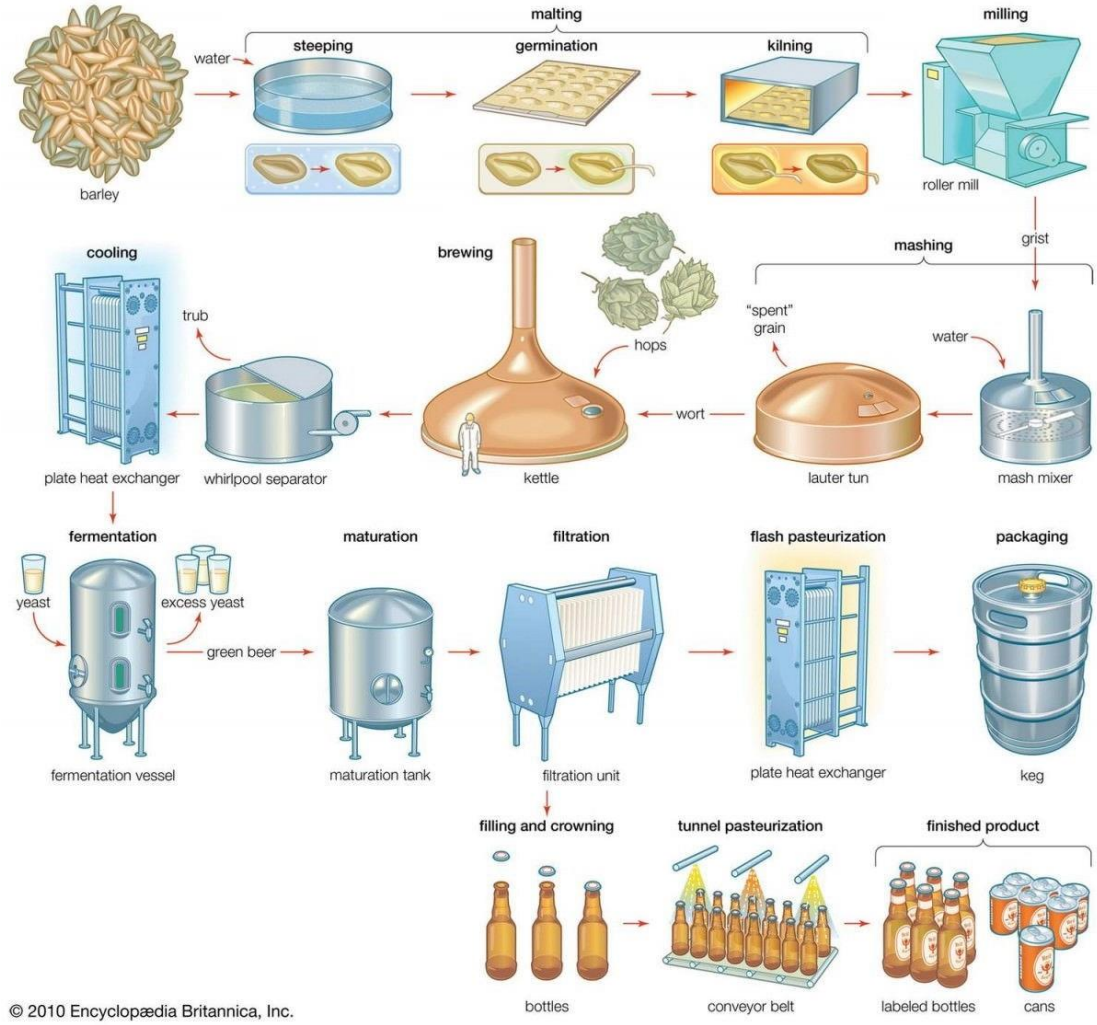
- **Saccharomyces Cerevaciae** – Top fermenting yeast work at 15 –19 ^{0}C & settle at top of wort & carries the fermentation. Hence top-fermenting beer is drunk at 15- 19 ^{0}
- **Saccharomyces Carlsbergenecs** – Bottom fermenting, settle in bottom of wort & work at 2-6 ^{0}C hence these beers are taken at 7-10 ^{0} Emil Hansen developed this yeast in 1883 by isolating the first single cell of yeast in Carlberg brewery of Denmark

Water – The body of beer consist of 90% of water. The quality and mineral content affect the character of brew. Liquor is term given for water by brewers. Water contains six main salts namely bicarbonate, sodium, chloride, calcium, magnesium and sulphate. The proportion of these will affect the flavour and colour of finished product. High level of carbonate will produce acidic mash, which will reduce the extraction of sugar from malts, too much sulphar will give bitterness in brew and magnesium is an essential ingredient for yeast. The uses of the water are in steeping of grain, flavour, provide body and bulk to the beer

Sugar – Sugar is not the main ingredient but can be added for the following purpose (used in the form of sucrose)

- To speed up the fermentation.
- To reduce the bitterness.
- To give colour in the form of caramel.
- To cause secondary fermentation.

FLOW CHART OF BEER MAKING



The process of Beer making

Steeping – The grains are soaked in huge tank of water (Six tonnes of barley and 6800 litres of water) at 10 ^{0}C for 2 to 3 day. Some producer change water in between to provide dry resting period & grain gets the air also.

Malting – Grains are taken to malt room, which is very hard; grains are spread to depth of 15 – 30 c.m to allow grain breath while sprouting. Grains are constantly stirred for uniform breathing & to prevent sprout getting entwined. This process goes on for 6 – 15 days at 12 – 21 ^{0}C.

Germination – During this process the insoluble starch gets converted to maltose & dextrin & rootlets, known as "malts culms" appears. Both the enzymes, **CYSTASE** – convert the insoluble starch to soluble starch, **DIASTASE** – convert the soluble starch to sugar. Now the grain is referred as **Green malt**.

Kilning = In this process the grains are spread on a perforated, tilted floor with a furnace underneath. Grains are dried & temp. maintained is 49 ^{0}C. The extant to which grain should heated is decided by the type of beer produced.

Types of Malts

- Pale malt- for light ale 65 degree Celcius
- Crystal malt- for pale ale 85 degree Celcius
- Chocolate malt- for dark beer 225 degree Celcius

Sieving- It is done to remove malts culms which sold as cattle feed.

Grinding- The grains are roughly broken which are known as **GRIST** through roller mill.

Extraction of sugar- This can be done by two methods

- **Infusion-** The process of infusion takes place in huge tank called "mash tun". The grist is introduced to mashtun along with water . The mixture is heated up to 63 degree Celcius for 2 hrs. Then mechanical racks present inside the tank stir the mixture. The result in the formation of hot sweet liquid called as Wort is filtered through finely slotted plate in the bottom of mashtun, known as under back. This process of infusion was carried out for top fermenting beers in olden days.
- **Decoction-** This process is carried in tank called "LATEUR TUN". The grist is heated up to 70 degrees Celcius At this temp some amount of wash is taken out & cooled then added back to tank. This is carried out for 4 to 5 times & takes out 4 to 5 hrs.

Brew Kettle- From the under back the wort is pumped into a vessel called "BREW KETTLE" which is pressurized. In this vessel hops (191-907 gms/100litre, depending upon the type of beer) & sugar is added. The mixture is boiled for 2 hrs. This will sterilize mixture.

- **Hop Back-** The wort along with hops is transferred to vessel called hop back, which is having slotted plates forming a filter bed. The content is allowed to stand for 40 min. to allow hops to make a filter bed. The wort is recycled through a bed till the time it gets clear & transparent which 15 min. Then wort is cooled. Hops are sold as garden fertilizer. Generally wort treated with infusion method is passed by hop back where as wort treated with decoction is passed by hop extractor.
- **Hop Extractor-** This is machine, which rotates, due to centrifugal force the hops are thrown to sides of wall of inside tank. Then hops are taken out.

Fermentation- Fermentation is process which converts the sugar into alcohol & CO_2. CO_2 is stored in a different tank. This process takes 7–14 days. During the first fermentation a thick layer of yeast is formed which protect the beer. After fermentation the beer is racked in reception vessel.

- **Para Flow-** This is an arrangement in which the temp. of Wort is brought down to required level depending upon the type of fermentation. This arrangement is an enclosed box with cold water flowing in an opposite direction through several plates or tubes to separate Wort.

Lagering/ Maturation- After fermentation beer is aged or lagered. Lagering takes place in stainless tank at close to freezing point. Lagering matures beer & mallow its flavour.

Finning- It the process of clarification in which protein like egg shell, ox blood, gall bladder of sturgeon fish is added.

Carbonation- CO_2 is added& stored in barrels and kegs.

Bottle & Cans- Beer for bottling or canning is also treated in a same as for kegs & then runs to refrigerated tank for conditioning where it stays for weeks & then filtered under pressure & then goes for bottling.

Pasteurization- In this process the beer is heated up to 60-66 C for less than 20 min, which kill the bacteria, & remaining yeast, which might have allowed further fermentation.

Few terms related to Beer

- **Draught (Draft) Beer-** These beers are generally not pasteurized because many people think that pasteurization kills authentic taste of beer. These beers are directly served from the container & should be kept refrigerated.
- **Dry Hoping -** From the racking back the beer runs into wooden casks in which small amount of hops already been added. This is known as dry HOPING, which gives beers delicate aroma, flavour & assist in conditioning.
- **Primings** – Sugar solution are added to take away extra dryness, bitterness & promote secondary fermentation, which gives sparkle to beer.
- **Kegs**– Beer, which is sold in kegs, is given dry hoping & primings to take away extra dryness and then filtered.

Storage – Ale beer should be stored in dark place at 10-12 C & lager beer to store at 4-5C & bottle should be kept in horizontal position.

Life span

- Bottle beer – 6 months
- Canned beer- 1 year
- Draught beer – 48 hrs after being tapped.

Beer Container

Container	Gallons
Pin	4.5
Firkin	9
Keg	10
Kilderkin	18
Barrel	36
Hogs head	54

1 gallons = 4.554 litre.

Types of Beer

Bottom fermenting beer

- **Lager** – This is a generic name for any bottom fermenting beer. Lager came from German word "Lagern" (to store) & applied to bottom fermenting beer because they are at low temperature for long period. Lager was traditionally stored in cellars or caves for completion of fermentation. They are bright gold to yellow in colour with a light to medium body & are well carbonated
- **Pilsner**-The golden colour lager from czech republic, hops emphasis on palate, aged in wooden casks & alcoholic strength is 5%v/v.
  - **Brands Name** – EB Special, Jever, Pilsner Urquell.

- **Munchen** – This is a dark brown with malty flavor from Munich with 4.5% v/v.
- **Dortmunder** – This is golden color beer with balancing the flavor of maltiness & happiness with 5.2% v/v.
  - **Brands Name** – DAB, Kronen, DUB

- **Bock** – Originally it was the designation for strongest beer in Germany brewed in a city called Eisbeck. German bock has had an alcoholic strength of 6.25%v/v.
  - **Brand Names** – AASS Bock, Einbecker

- **Dopple bock** – Doppel bock is a separate classification. The German dopple bock has a minimum of 7.5% v/v alcoholic strength. The strongest will go up to 13.2% v/v made by Eisbeck method & there name generally finished with ator like salvator, kulminator, maximator, etc.
  - **Strong Beer** – The strongest beer in the world in KULMINNATOR (13.2% v/v from Germany). It is Eis bock type of beer. Eis means ice indicating that beer is frozen during production resulting in freezing of water content of beer. Frozen water is removed thus increasing beer alcoholic strength. Britain & Belgium produces strong beer with an alcoholic strength of 10%v/v. Top fermenting beer generally produced with an alcoholic strength of 3.5-6% v/v. Bottom fermenting beer generally produced with an alcoholic strength of 5-8% v/v. Most Indian beer is of 5% v/v in alcoholic strength. A beer with 3% alcoholic strength is an ideal thirst quencher.

- **Diat Pils Beer** – This is a low carbohydrate beer for diabetics. All sugar present in beer is converted to alcohol so alcoholic strength of this beer goes up to 6% v/v.
  - **Brand Names** – Holsten Pils lager

- **Light Beer** – This is low-calorie beer from the USA & Britain with 4%v/v.
  - **Brand Names** – Miller,

- **Steam Beer** – A highly carbonated beer, deep brown colored with the aromatic flavor of cloves, orange peel, peach & tangy bitter taste with a dry finish. The name steam originated from final "KRAUSENING" stage of fermentation in which partially fermented wort is added to speed up the fermentation which produces extra froth, termed as steam. It has it origin in San Francisco & California during the gold rush.
- **Rauchbier** – A bottom-fermented, intense smoky flavor beer from Germany (Franconia). The malt is dried on the beechwood

Top fermenting Beer

- **Ale**– A vague term for any top-fermenting beer but originally produced in Britain with defining the character of top fermentation with 4% v/v. its has a darker color than lager beer with more hops, aroma with less of carbonation. Ale is usually bitter to taste with a slight tanginess. In Britain, it is referred to as "Bitter".
  - **Brand Names** -Natural, Founder, Greenmantle.

- **Porter**– A intense deep color, smoky or fruity bouquet & persistent bitterness. Ralph Harwood in 1722, a London brewer, invented it who named after the porter who enjoyed drinking it.
- **Stout-** A strong version of stout dark beer almost black, with high alcoholic content. It obtains its color from roast barley with less carbonation.
- **Cream Ale**– Sweetish, smooth golden ale from the US. Beer is made by blending of little ale with a larger amount of lager beer.
- **Alt-** This is a German counterpart of ale. Alt means traditional with a bitter taste of old-time, golden color with 4.5% v/v from Northern Germany.
  - **Brand Names**- Diebels, Schlosser, Uerige

Saison – This is a specialty of French-speaking part of Wallonia in Belgium. An orange, highly hopped, brewed in winter & aged in a wine bottle with a wine cork. A solution of yeast & sugar is added in the bottle for secondary fermentation in the bottle to produces CO_2 & served like Champagne.

- **Brand Names**– Sezuens, Saison Regal.

Beer brands

- United States Of America- Anchor, Bull's eye, Black horse, Prior.
- Austria – Gosser, Steffi, Zpfer Urtype
- Australia – Cooper's, Foster, Leopard, Swan.
- Belgium -Duvel, Riva 2000, St. Sixtus, Orval Trappist.
- Brazil-Brahama,
- Britain – Beaver, Stingo, Tolly,
- Canada- Canadian 55, Grizzly, Molson, Iron
- Czechoslovakia- Pilsner
- China- Tsintao, Taiwan, Sunnlik,
- Denmark – Carlsberg, Harboes, Scandia, Tuborg.

- France- Export, Fischer,
- Germany- D.A.B, Einsbeck, Beck's,
- Holland- Skoal, Three Horses, Heineken, Royal Dutch.

- Italy- Crystal, Moretti, Peroni,
- Japan- Asahi, Kirlin, Sappor,
- Mexico- Carta Blanca, Dos Equis, Modelo,
- Scotland- Belhaven, Lorimer, McEwan's, New Castle.

Sake

Sake is an ancient fermented beverage known to have been made since about the third century A.D in China. But it was not until about 600 years ago that sake, as we know it today was produced. Sake is produced in Japan, part of Chine other Asian countries & Hawaii, California. In Chine the similar rice beer is called "Samshu" & Korea "Suk" In ancient times, the making and serving was entrusted to brewer called "Toji" who incidentally has to be virgin.

Production of Sake

Rice polished to perfection. The grains are polished to remove up to 55% of their covering, then they're washed, soaked in cold distilled water for 12- 18 hrs to moisture, steamed for 45 minute in "KOSHIKI" (Rice containing tub), cooled then spread in room called "KOJI" where mold "Aspergillus Oryzae". This mold converts the rice starch into sugar. This rice is referred as "Koji" rice. This rice is added to additional steamed rice & instead of depending on traditional wild yeast modern producer depend upon "Saccharomyces Cerevisiae". The fermentation is carried in vessel "Morani" at 15-16 ^{0}C and the yeast transforms the sugar into alcohol. After 20-25 days fermentation, the mash is filtered to produce fresh sake then matured for 90 -100 days in stainless steel casks then it pasteurized & bottled.

Service– Sake is traditionally served warm at 100- 110 Fahrenheit. At this temp. the heady bouquet (12-17% alcohol) of sake is released. To serve sake in Japanese traditionally, it is decant in ceramic pitcher called "TOKUURRI" then poured in small ceramic cup called " SAKAZUKI"(one ounce). Sake can be served chilled or on the rocks with twist of lemon. Sake can be served with dry vermouth then it is called "SAKINI"