Dairy and Food Process & Products Technology
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Lecture – 53
Ice Cream

So, after cheese another product we shall discuss; that is also very popular. And this Dairy and Food Process and Products Technology under lecture number 53 Ice cream right. Ice cream is also one very popular dairy product all over the world. And it will be very very good to say that our ice cream consumption in our country is very much bigger very very less. Whereas, in developed countries ice cream is profoundly used right it is really in very very good quantity they consume, per capita consumption is very high whereas, in our country per capita consumption does not come into any whole number right.

Because of many many of course, many many reasons for that primarily because of the cost. So, I can may not be available throughout all these factors are there, but it is also very very popular and very energy or it gives it is almost a complete food. So, if someone is a hungry and it requires lot of energy for some reason, then a ice cream can give a supplement for that right.

So, it is a one another very very popular dairy product and we shall discuss in detail of the ice cream manufacture and along with that, it may take couple of lectures may be may not be possible in the one two lectures maybe a 3rd lecture could be required; that transportation which we will cover not only a for ice cream that will cover along with ice cream all frozen foods so how they are transported. In typically in our country typically frozen food is primarily associated with ice cream right. In all these big stores for storages they are mainly for ice cream, which are I said the other day there are two types of cold storages, one is the above 0 and another is below 0.

Above 0 there is also primarily for potato very biggerly for other fruits and vegetables. Primary lead is associated with potato and in sub 0 again it is primarily associated with ice cream and other frozen products like fish meat, they are not so much in our country right. Generally at least I have not come across so many in numbers in our country; however, it is getting developed today or tomorrow see more in numbers we will come

up and not only ice cream, but also other frozen products could be stored in those big big warehouses right. So, if we look at a ice cream what it is made of right.

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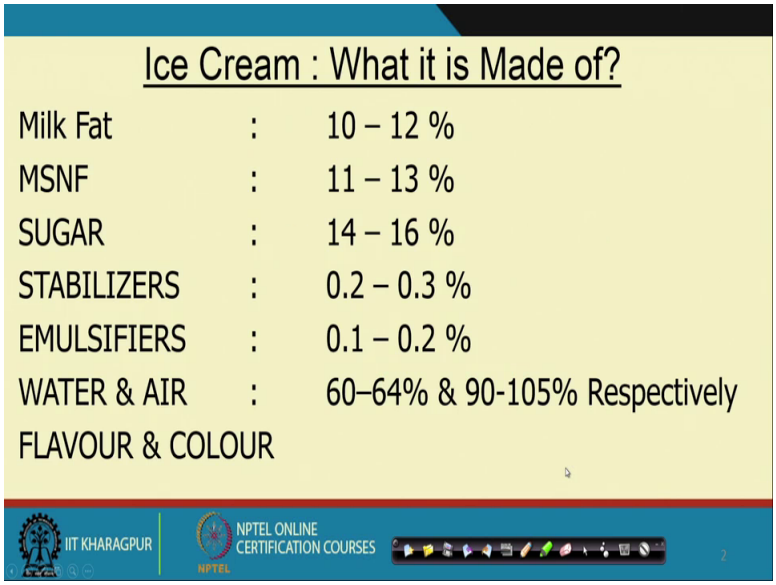

Ice cream, what it is made of? It is made of primarily milk fat, milk solid not fat, sugar, stabilizers, emulsifier, water, air and flavoring and coloring compounds right. So, and the composition ranges between 10 to 12 percent of fat, 11 to 13 percent of sugar, solid not fat. Sugar is around 14 to 16 percent, stabilizer 0.2 to 0.3 percent and emulsifier 0.1 to 0.2 percent. Around 60 to if you add up all these, you will see the total solid comes to around 36 to 40 percent. So, remaining is water around 60 to 64 percent of water and around 90 to 105 percent of air.

This is primarily we will also talk about why so much of air and why not that we will talk about afterwards. And some flavoring and coloring materials they are added. This flavoring and coloring material which are added this is primarily dependent on the company. Because that is the secret of the company normally it is not divulge a because how much flavour how much color is given that is the secret of the company.

However, some flavours some colors are required and that is why we say normally ice cream is not possible to manufacture in house right, because you have seen one of the major component is air right. So, there is a saying between the workers of the ice cream industry and the cold drinks industry they fight like this that, one says that you only feed

people [FL] that is air and the other say that you earn money only selling the [FL] that is water right. So, this is the fight between them.

So, major one is air and since at home when you prepare ice cream this incorporation of air is not possible not feasible; that is why at home when you prepare that is not the ice cream, but air some frozen product frozen dessert that can be said, but not the ice cream right. Now with these constituents what does they do right, What the constituents do.

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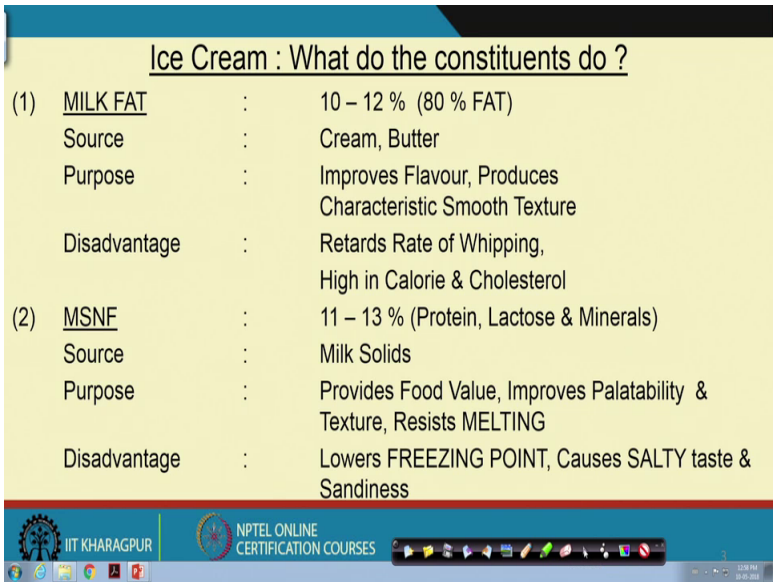

So, milk fat is that is the source is your cream or butter, it is around 10 to 12 percent and out of which 80 percent is fat. And the purpose is to improve the flavour and it produces characteristics smooth texture. I hope you have taken butter and when you take butter; obviously, you feel that there is a very smooth smelling in your mouth right in your mouth you feel that there is a smooth smelling. And this smooth smelling is primarily because of the fat right and that is why when you are making ice cream this adds up to the smoothness of the texture of the product that is ice cream right.

But everything has some advantage and some disadvantage. So, if you only talk about advantage that is not desirable. So, it also has some disadvantages like it retards whipping rate and also it makes high calorific value and maybe it is adding cholesterol to your blood stream. Of course, the other day I also said that, nowadays that cholesterol concept is getting also a little change, but even then the calorific value is very high. So, if the calorific value is very high because of the fact then because now all over the world

that people are becoming conscious about the self physic and in that people are now consuming fat less so that is one of the disadvantage. The other one which we said it retards the whipping ability right here lies the answer to that which you said that you will not be able to produce at home ice cream.

Because this whipping ability is not possible or whipping is not possible at home. You will say that when you are making ah omelet from egg that time you beat for a longer period. And there also you are incorporating air right, air is being introduced into that. That is why it becomes fluffy that omelet becomes a little fluffy but only that much. Here you need 100 percent air, so that much incorporation of air by beating is not possible right. And this fat is retarding that whipping ability so that is one disadvantage of the fat which you are adding right. Next is milk solid not fat which is around 11 to 13 percent generally it comes from the protein or lactose or minerals all put together is for being milk solid not fat.

And the source is source is from the milk solids that is dry milk, skim milk; where fat is already removed. Purpose is it provides food value improves palatability and texture it, but it also resists melting right. So, this resists melting sometimes it may be good, sometimes it may be bad, it depends on how you are looking from which a side which angle you are looking into it. Resist melting may be helpful when you are keeping it for storage that time if the melting is resisted, then you are better off that ice cream product can be kept for longer period, if the resistance is there for melting.

But the reverse you consider you have taken a chunk of ice cream through some spoon put it in your mouth. And I hope you have also tested ice crystals during your childhood so we have put it in your mouth and the ice cube is not getting melted right. If that happens with the ice cream, even not like that because you want the moment you have put the scoop of ice cream with maybe spoon right. So, that you have put in your mouth and it should be melted there.

So, if it is resisting if milk solid not fat is resisting to that, so this is not desirable. So, it depends from which angle you are looking at, but milk solid not fat is resisting the melting that is the advantage. You let us look from this angle now that is the advantage; but there are some disadvantages also. Because from the law of Raoults law you know

that as the concentration of solids were increasing that is lowering the freezing point or depression of freezing point or increasing the boiling point occur that is by Raoults law.

So, here you are adding milk solid not fat, so that is increasing the solid content so the corresponding freezing point also will be lowered. So the moment you were your freezing point is getting lowered, so more quantity of refrigeration may be required, so that is adding to your cost that is the disadvantage right. So, disadvantage is that is lowering freezing point and causes salty taste and sandiness. This salty test because of the minerals present in the lactose; in the milk solid not fat right. So, then it is the, what it does? The what do the constituents do? If these are the some milk solid not fat so other constituents are like this.

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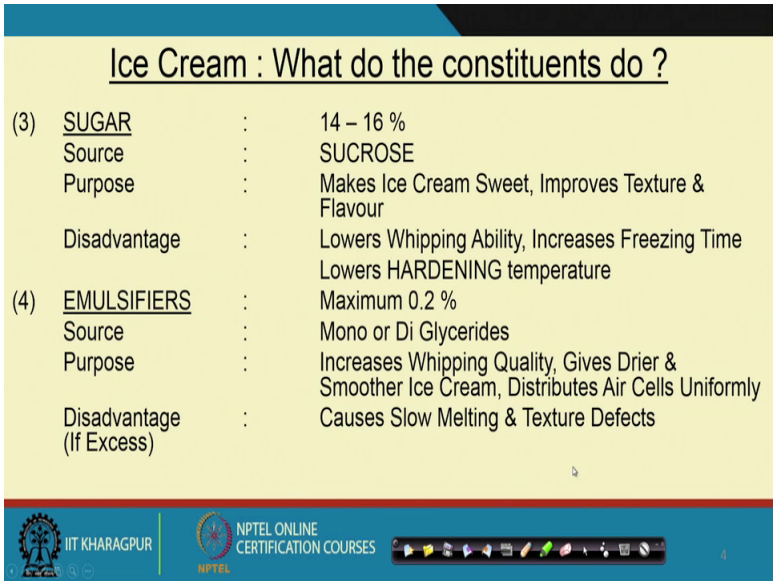

Sugar; sugar it is around 14 to 16 percent and the source is from the sucrose which you come which you take every day. That sugar which you call [FL] or whatever right that is the sucrose that is the source right. Now, it is purpose is to make ice cream sweet also it improves some flavor. When sugar is added it also adds, it also it is like that it is addendum it is improving the flavour right. But it also has some defect or disadvantage that it lowers the whipping ability that is again like the earlier one this is also whipping ability is lowered. So, that means that to incorporate air you have to have more energy or you have to struggle for that, and also increase the freezing time. Because again from that Raoult's law it comes into that sugar is the solid.

So, the moment solid content is going up, so increase the freezing time and as well lowering of the freezing point right. Also the another disadvantage is that it lowers the hardening temperature another new term has come hardening temperature. Now, I hope many of you have gone to different walls and seen that softies are available in different counters right. You go and give money and they give you softy maybe in cones or cups or whatever but that is very soft. Now if you want to bring that softy for your relative maybe mummy or sisters or brothers; from that point to your house maybe it will take some half an hour to 1 hour or couple of hours.

So, that time this softy should not melt but since it is soft, it has flow ability and since it is in the atmosphere outside hour. So, it will melt you will not be able to bring it back to her home right. So, that is one disadvantage that you cannot transport the ice cream to or softy from one place to other place. Now in order to transport it from that production point to warehouse unless it is hard, you can handle if it is soft you cannot handle unless it is hard which you can handle you will not be able to transport.

So, this soft ice cream is hardened it is typically hard and made solid and that solid you can handle and transport from one place to other place very easily right. So, another disadvantage with the sucrose or sugar is that, it is lowering the hardening temperature. So, if the hardening temperature is lowered it means you have to supply more refrigeration means your price or cost is going up right this is disadvantage. But you cannot avoid you have to have sugar and obviously, this sugar will impart this disadvantage, which you have to overcome right. Then stabilizers, stabilizers are used that you are incorporating air are subsequently. This air should not come out right; in that cold drinks there also you have seen that you know that carbon dioxide is incorporated into the drink.

And carbon dioxide gets solubilized into the drink, when the temperature is low; because this gas absorption is a function of the temperature. The lower the temperature it will be more, the higher thathat is why the drinks you bring you keep it in the freeze or in cold condition so that the carbon dioxide is incorporated and retains. But if it is in outside, then it will come out and stay on this above because you will see in all the cold drinks there is some space headspace. So, that air space is to accommodate the evolved carbon dioxide right. So, here your air is incorporated into ice or ice cream rather, so in that if

air is not retained you will not feel the taste of the ice cream. So, to make it stabilize that stabilizer is added right.

So, function of the stabilizer is to stabilize the product, particularly the air texture air composition air inside that is the primary reason for adding stabilizer. Stabilizers definitely they have; stabilizer coming afterwards ok. Emulsifier is another one which you are adding around 0.2 percent and normally by monosodium glutamate normally by Mono or Di Glycerides or sometimes glutamates are also used Mono or Di Glycerides. This increase the quality whipping quality and gives drier and smoother ice cream distributes air cell uniformly right.

But disadvantage is that, it causes melting and textural defects in the ice cream melting is hampered. So, the same thing when you are putting in your mouth if that is not getting melted, you will feel bad so that is not desirable right, then as we said and as apart from that this emulsifier also helps the fat to be trapped otherwise fat will come up and that will not be because you have also around for 60 percent water. So, that water with the fat they should be together this emulsifier helps to hold the fat in that right.

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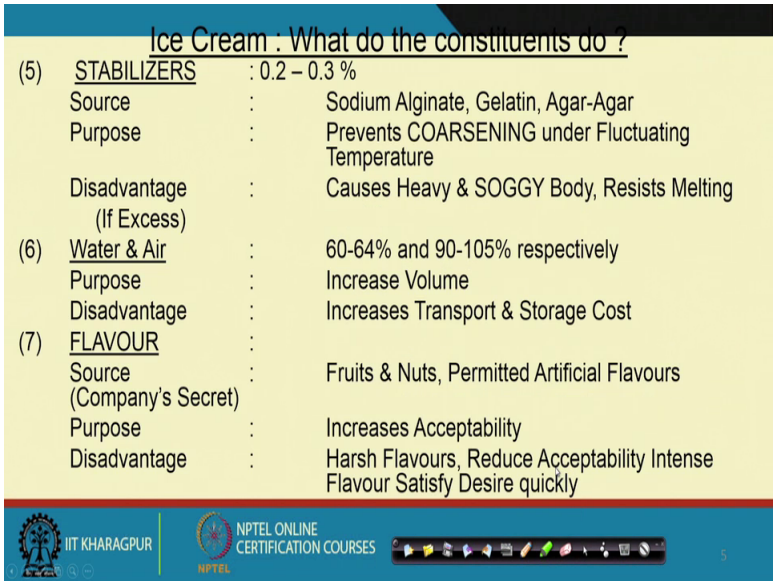

Then stabilizers which we have already said around 0.2 to 0.3 normally sodium, alginate or gelatin or agar agar they are used is purpose is to prevent coarsening under fluctuating condition or fluctuating temperature right. This coarsening I would like to highlight that coarsening is happening that if you keep you in your house number of times you take out

from the deep freeze something and put it back and again bring it outside and putting back, then you will see that you will fill some salty or some sand like test in the product right.

So, here also when ice cream is kept in the different parlors, different shopping malls or shopping centers, the ice cream is kept in a freezer deep freezer suppose to. Where the temperature is supposed to be minus 20 around right. And in most of the cases you see that the top of the container is open people are addressing people are going and looking into their product desired product and thereby it is outside is 20, 22 degree though air conditions, but not lower than 20 degree centigrade. So, it is lot which is there and you cannot force people to close that container result ice cream is becoming gradually warm.

So, when it is getting warm and warm, some melting of the water is taking place. And when again in the night time again for 10, 12 hour cities under close condition again it is getting refrozen. So, this thaw and freezing process is melting is making the ice crystal bigger and this is the defect of the ice cream that. That coarsening of the ice cream or ice is happening which will be felt by your mouth when you are putting it. So, this is a disadvantage that it when you are keeping it in the deep freezer it should not be oh kept open, but your stabilizer is helping to prevent that coarsening right.

So, it also as some disadvantage, that is it causes heavy and soggy body and resists melting right. So, since it is air preventing coarsening so that is also resisting melt in melting. So, the same example or same explanation happens that you are putting in your mouth and it is not getting melted so that is not desirable. Since water and air purpose is to increase the volume, a water is for the composition, but air is to increase the volume right. So, if you see the if you take a cup of ice cream maybe you it will cost you 10 rupees 20 rupees depending on what you were taking, but take it once and allow it to melt completely right.

And the cup if it is a 50 ml cup, then you will see after melting totally it has become volume has become almost half around 25 ml. So, rest was air so which got escaped after melting right. So, this air is added to the product. So, it is increasing the volume right, but again some disadvantage that volume is there weight is less, but increases the transportation and storage cost because lot of spacing need right. So, that is increasing your cost both transport as well as storage right.

Some flavoring and coloring materials are used, fruits and nuts and permitted flavours artificial flavours are used for that and some it increases the acceptability. But disadvantage if it is excess, then the a harsh flavour may reduce the acceptability in because of the intense flavour satisfies your satiety or desired quickly right. Same some color is all flavour is added some color is also added.

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So, that color is company secret, but advantage is that it permits food colors permitted food colors are added suppose to, but it in also improves the acceptability and it also aids in identifying the flavour. So, someone is the red colored so that may be pineapple or that may be tutti frutti or some other butterscotch or some to identify that this color code may also help. So, with this let us stop today that the, what it is made of ice cream and what the constituents do we have explained in detail.

Thank you.