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To study the formation of flavouring juices balls using yummy Spherification Technique

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Abstract :

Study on Spherification, that is the technique of molecular gastronomy which is simplest technique that are for the sphere formation of liquid juices of various vegetables with using some home remedies to cure food poisoning in it. It is a simple, fluent technique which is used to the formation of sphere. It will prove beneficial technique whoever is interested and wants to know about this fairly new technique. Some chemical parameters on physical also such as freezing temperature, sphere formation rate, PH, melting and cooling point, gelling time, concentration, etc. Spherification is a food science that seeks to investigate the physical transformations of ingredients that occur in cooking. It is a modern style of cooking and takes advantages of many technical innovations from the scientific disciplines. The modern skilled works on the building blocks of centuries of culture and cooking techniques, perfected with time. Spherification is no such exceptions, to study the impact of culture and social obligations on the most modern addition to science.

Spherification is distinct from the traditional food science, which is focused on food production on an industrial scale, nutrition and food safety. It gives high importance of artistic component in culinary. Using this technique it's made vegetable juices like magic means big sized portion converted into small sized and presentable, priceless, time consuming and also preservable. It is the study of molecules as they relate to chemical and physical process of cooking.

It has introduce to scientific aspect of cooking, an art with which can create, invent and discover new ones.

Keywords :

Spherification, Preservative, Gelling Agent, PH Papers, Vegetables Juices, sweetening Agent, Melting And Boiling Point, etc.

Introduction :

The technique is called Spherification and is a part of a larger food science trend called molecular gastronomy. Spherification is the sub type of molecular gastronomy for creating such spheres which differ based on the calcium contain of the liquid product to be spherified.

Spherification is a modern cuisine technique that involves creating semi-solids spheres with thin membranes out of liquids. This makes it possible to encase liquid within the solid sphere. Calcium chloride and sodium alginate are the two basic components used for this technique. The two main component involved in spherification are alginate strands, usually found in the additive sodium alginate, and calcium ions, which can come from calcium chloride, calcium lactate, or calcium gluconate. One of these ingredients is dissolved into a distilled water bath, while the other is dissolved in the liquid to spherify.

When sodium ions [Na+] are bonded to the oxygen, the strand is fairly flexible and soluble in liquid. If a solution containing sodium alginate is dropped into a calcium ion bath, however, the calcium ions bond to the alginate strands, replacing the sodium ions. Calcium ions have a positive two charge [Ca+] and therefore must make two bonds to complete their electron shell and become stable molecules. Because they are taking the place of sodium ions, they must make an additional bond to satisfy this requirement. The molecules are all stuck together in a huge network! This eliminates their flexibility, making them more rigidly bonded together .This looks and feels like a thin gel, which makes up the sphere thin membrane. When alginate molecules are in contact with a liquid with both calcium ions and a low pH, many of the molecules will react with the hydrogen ions instead of the calcium ions. Hydrogen ions have the same charge as sodium ions, so they will not need to bond with other alginate strands to complete their electron shells. As a result, the alginate strands will remain as flexible as they were with the sodium ions and no gel will form. We must add sodium citrate to liquids with low pH to react with the excess hydrogen ions, allowing the calcium ions to react with the alginate strands more readily.

Finally, the basic spherification does not last a long time because of one simple reason there are too many alginate strands within the sphere to go unreacted for an extended period of time. The calcium ions will find a way to react with the remaining alginate molecules, and as they do so, the huge network of atoms that makes up the membrane will extend inwards.

History :

The creation of the discipline of molecular gastronomy was intended to bring together what had previously been fragmented and isolated investigation into the chemical and physical processes of cooking into an organized discipline within food science, to address what the other discipline within food science either do not cover or in a manner intended for scientist rather than cooks.

The term "molecular and physical gastronomy" was coined in 1988 by Hungarian physicist Nicholas Kurti and French physical chemist Hervé This. In 1992, it became the title for a set of workshops held in Erice, Italy (originally titled "Science and Gastronomy") that brought together scientists and professional cooks for discussions about the science behind traditional cooking preparations. Eventually, the shortened term "molecular gastronomy" became the name of the approach, based on exploring the science behind traditional cooking methods.

Kurti and This considered the creation of a formal discipline around the subjects discussed in the meetings. After Kurti's death in 1998, the name of the Erice workshops was changed by This to "The International Workshop on Molecular Gastronomy 'N. Kurti'". This remained the sole director of the subsequent workshops from 1999, and continued his research in the field of molecular gastronomy at the Inra-Agro Paris Tech International Centre for Molecular Gastronomy, in charge of organizing the international meetings

There are many branches of food science that study different aspects of food, such as safety, microbiology, preservation, chemistry, engineering and physics. Until the advent of molecular gastronomy, there was no branch dedicated to studying the chemical processes of cooking in the home and in restaurants. Food science has primarily been concerned with industrial food production and, while the disciplines may overlap, they are considered separate areas of investigation.

Tomato Sphere **Chili Sphere**

Process : Spherification

Take

Vegetable Juices

[Example-Onion, Tomato, Chilli, Mix Vegetable]

Add

Sodium Alginate + Agar-Agar [Gelling Agent]

Stir Well Blender

Bring the mixture to the boil

Stand for 5 min.

Unwanted air bubbles may form during blending cover

The mix with plastic wrap and place in the refrigerator

Until bubbles disappears [1 to 24 hrs]

Add

Preservative and Sweetening / Flavouring Agent

Stand for 5 min.

Prepare Bath

Maintain PH >3.6

Water +Calcium Chloride or very cold vegetable oil

Mix Well set for min

Fill syringe with base [above mixture]

Droplet into the bath

Forming sphere

30 sec to set Rinse in clean water

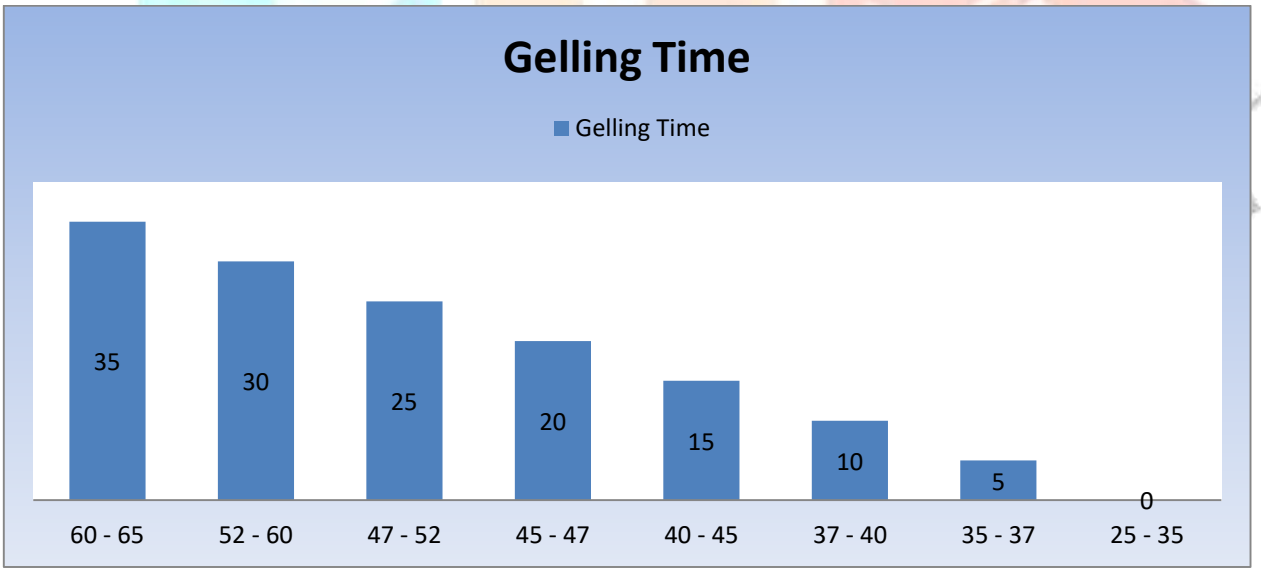
Ready to direct Nutrient supply .

The base ,whole above mixture fail to get into a sphere for many reason including low ph or high mineral content ,salt such as Sodium Citrate and also the Lemon Juice which is also acts as preservative can solve these problem. Juice

cannot contain calcium or too acidic. The ph level must be greater than 3.6, to reduce the acidity simply add sodium citrate.

1. Sodium Alginate –It has property to make gelled spheres. It is used in food industry for the production of gel like foods.
2. Calcium Chloride- It is used as a food additive, food preservative. It's effectiveness as an anticaking agent, stabilizers, and thickener. Calcium Chloride can be used to adjust for minerals deficiencies.
3. Agar-Agar- It is a gelatinous substance. It is used for conducting microbiological tests. It is considered a healthy addition to weight loss plans due to it being low in calories, fat, sugar and carbohydrates. It can be used as a preservatives forming gel content.

Temperature (®C)	Gelling Time(Min)
25 -35	0
35 - 37	5
37 - 40	10
40 - 45	15
45 - 47	20
47 - 52	25
52 - 60	30
60 - 65	35



- **Home remedies to cure food poisoning :**
- Honey: Owing to its antibacterial and antifungal properties. Honey is one of the most effective food poisoning remedies. Adding honey in sphere formation act as an sweetening agent / flavouring agent which cure also food poisoning.
- Preservation- Sodium Benzoate is a common preservative in acid or acidified food such as vegetable juices. Yeast are inhibited by benzoate to a greater extent than are moulds and bacteria. Juices are preserved by pasteurization or by using chemical preservatives. Pasteurization is a process in which juice is heated to 100C.or slightly below for a sufficient time to inactivated or kill the micro-organism, which cause spoilage.
- Salting : The freshly made sphere of juices are surrounded in salt and left in a cool dry place.

- Drying : Dehydrating sphere is a method of food preservation that removes enough moisture from the food, so bacteria ,yeast and moulds cannot grow.
- Canning : Canning is an important, safe method for preservation if practiced properly. The canning process involves placing it in a jar and container.

Different chemicals are added as preservative or additives. These chemicals increases shelf life of juices and enhance its taste and nutrient quality. Some of these chemicals may have such positive Impacts on health.

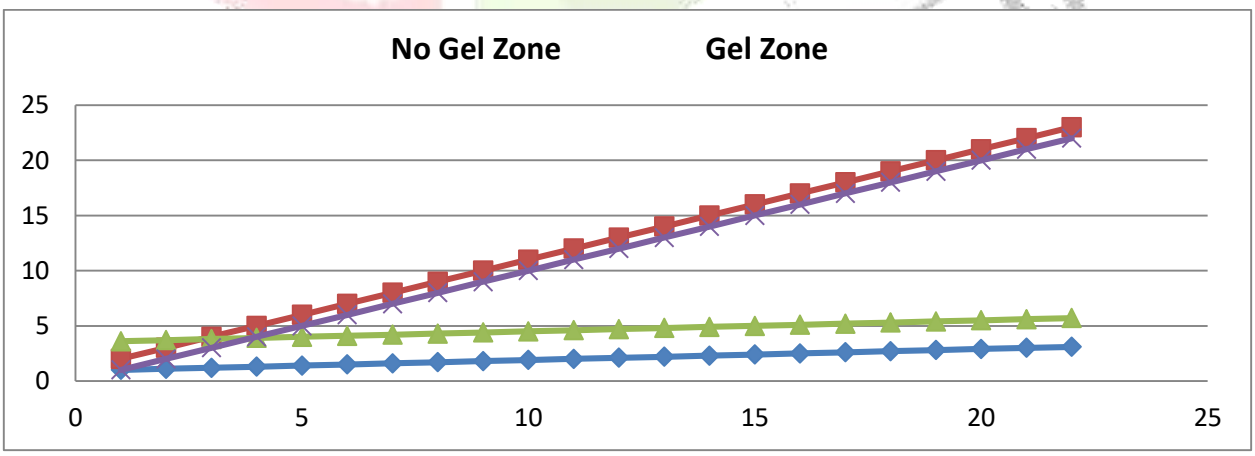
- **Physico-Chemical Parameters :**

1. Colour of the juice balls is depends on the nature of the mixed vegetables juices. Like example Tomato juice taken sphere formation is nearly equals to red in colour. Colour is directly depends on the currently sample taken.
2. Odour, like taste is depends on the flavouring and other preservation technique. Odour is recognized as a quality factor. Observed balls is yummy in a taste and odour.
3. Temperature effectively perform best roll in sphere formation rate. Melting point, freezing point, room temperature, boiling point which are main factors in it. As the temperature increase gelling time decrease and vice -versa.
4. PH is the value expressed as the negative logarithm of the hydrogen concentration. The ph range is usually given as 0 to 14; 7 being neutral, less than 7 acidic and above 7 basic or alkaline. PH is recorded with the help of standard ph paper strips. The paper is dipped and colour developed was compared with standard colour code given. Juices cannot contain calcium or be too acidic. The ph level must be greater than 3.6 to reduce acidity, simply add sodium citrate to maintain ph.
5. Gelification is defined as the process of turning a substance into a gelatinous form. With this process, liquid substances are converted into solids with the help of a gelling agent. Common gelling agents come from natural sources and include agar-agar, gelatin, Carageenan, gellan gum, pectin and methylcellulose. More often than not, these gelling agents are presented in a dry,solid form which needs to be hydrated.

   All of these are hydrocolloids and react when dispersed in liquids. Gels resulting from this process may range from tough and hard to weak and soft. Gels are characterized by having a viscous property when heated and becoming solid or jelly like once cooled. Melting and cooling points for gelling agents may differ according to type.

   Gelification has been around for years, and it has undergone a lot of changes in terms of use. In the modern kitchen the gelification technique has many different uses. It can serve to stabilize liquids without affecting taste. It may also be used for suspending food particles and creating various shapes for aesthetic purposes. Lastly, it can also be used to create various textures and improve dining experiences.

No Gel Zone		Gel Zone	
PH	**Time(Min)**	**PH**	**Time(Min)**
1	2	3.6	1
1.1	3	3.7	2
1.2	4	3.8	3
1.3	5	3.9	4
1.4	6	4	5
1.5	7	4.1	6
1.6	8	4.2	7
1.7	9	4.3	8
1.8	10	4.4	9
1.9	11	4.5	10
2	12	4.6	11
2.1	13	4.7	12
2.2	14	4.8	13
2.3	15	4.9	14
2.4	16	5	15
2.5	17	5.1	16
2.6	18	5.2	17
2.7	19	5.3	8
2.8	10	5.4	19
2.9	21	5.5	20
3	22	5.6	21
3.1	23	5.7	22



6. How an alkaline diet works :

Alkaline diets are a popular choice for people who want to achieve optimum good health. However, many people don't actually understand this diet or how it works. The concept is actually fairly simple the diet just focuses on regaining the balance that was lost when man started to eat a more domesticated diet. Instead of

focusing on foods that are high in sugar, simple carbohydrate as like alkaline diet primarily moves the balance towards fresh fruits and vegetables, whole grains, wholesome protein sources.

These foods may be either alkaline or acid in their natural state, but after the process of digestion they all produce what is termed as an "alkaline ash'' once digested and metabolized by the body. When the body's pH is kept at a slightly alkaline level, all the system can work more efficiently.

- **Health problem caused by acidosis :**

Research shows that unless the body's pH level is slightly alkaline, the body cannot heal itself. If body pH is not balanced, for example, minerals and food supplement. Body pH affects everything. Acidosis will decrease the body ability to absorb minerals and other nutrient, decrease the energy production in the cells, decrease its ability to repair damaged cells, decrease its ability to detoxify heavy metals, make tumor cells thrive, and make it more susceptible to fatigue and illness.

Result :

- Spherification is a food science that seeks to investigate the physical and chemical transformation of ingredients that occur in cooking technique.
- It is distinct from the traditional food science, which is focused on food production on an industrial scale, nutrition, and food safety.
- Using these technique, its made food like magic means big sized portion converted into small sized which are more preservable and time consuming. Converting liquid into a solid not only gives it a different texture but also allows the food to be in sphere.

Conclusion :

- Spherificaton, it will prove beneficial technique whoever is interested and wants to know about this fairly new, delicious, yummy technique.
- It is a modern style of cooking and takes advantages of many technical innovations from the scientific disciplines. Its work on the building blocks of centuries of culture and cooking techniques, perfected with time, Spherification is no such exception, to study the impact of culture and social obligation on the most modern addition to science.
- Keeping it fresh and make juice last longer. As we all know, drinking juices are an easier way to take in nutrients of fruits and vegetable. Sometimes we just do not have too much time to eat an as it fruits and vegetable, so that making juices balls is an great lifestyle.
- It has introduce to a scientific aspect of cooking, an art with which can create, invent, and discover new techniques.

References :

1. Molecular Gastronomy Exploring the science of flavor.
2. H. 2005. Molecular gastronomy: Exploring the Science of Flavor. London: Cambridge University Press.
3. Adrià, Ferran, Albert Adrià, and Juli Soler. 2008. A Day at elBulli: An Insight into the Ideas, Methods and
4. Barham, Peter, Leif H. Skibsted, Wender L. P. Bredie, Michael Bom Frøst, Per Møller, Jens Risbo, Pia
5. Mestric-Molnar, Tanja, et al. 2008. Suvremeni trendovi u gastronomiji. Zagreb: Agencija za strukovno obrazovanje.
6. Lerotic, Dana, and Ivana Vinkovic Vrcek. 2004. Sto se krije iza E- brojeva. Zagreb-Split: Udruga za demokratsko drustvo.
7. Snitkjær, and Louise Mørch Mortensen. 2010. Molecular Gastronomy: A New Emerging Scientific
8. Discipline. Chemical Reviews 110 (4): 2313-2365.
9. Blumenthal, Heston. 2005. Kitchen chemistry. Discovery Science.
10. Ivanovic, Slobodan. 2003. Kuharstvo 1. Zagreb: Skolska knjiga.
11. McGee, Harlold. 2004. On Food and Cooking. London: Hodder & Stoughton.
12. Creativity of Ferran Adrià. London: Phaidon Press.