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MOLECULAR GASTRONOMY IN FUNCTION OF SCIENTIFIC IMPLEMENTATION IN PRACTICE

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Abstract:
Modern culinary direction - molecular gastronomy is very complex, and the relative youth of that direction affects the ignorance of the matter by a large number of professionals and the general public. It is precisely this lack of matter which causes a number of disagreements between chefs and scientists, while there is a number of related debates about aspects of molecular gastronomy, especially in connection with a change in its gastronomic cuisine. The main focus of disagreement lies in the name of "molecular", which mostly leads to a misunderstanding, because of the identification with something microscopic. A very common mistake is to address this branch of gastronomy as a style of cooking, which she doesn't represent. The second mistake is naming its practical application of molecular cooking, molecular cuisine. Molecular gastronomy is a scientific discipline that studies food and asks questions and gives answers so far unanswered questions about gastronomy. Simply put, molecular gastronomy can be understood as a process of application of science in everyday cooking, and the application of molecular gastronomy in the kitchen. Modern man with his awareness made some chefs to reconsider the adoption of these radical ideas to accomplish the fusion of science and gastronomy. This idea is established as a full hit, because today the best restaurants in the world, the vast majority of those who have seen the benefits of these two joints before incompatible branches of human activity. As a culinary direction it quickly spread to Western Europe and North America, and it later spread to other parts of the world, but Croatia and neighboring countries are not one of them. Molecular gastronomy shows the trends of further progress, and in the future molecular gastronomy will be more prevalent and popular.

Key words: molecular gastronomy, inovation, gastronomy trends.

INTRODUCTION

Molecular gastronomy is the new direction of gastronomy mostly initiated by idea of implementation of science in cooking. Many things associated with this term are not quite clear and many have a wrong idea. This direction of gastronomy seeks innovation and improvement of the existing situation, a fundamental goal of improving ways of preparing meals, so that they have such taste as it should be in the optimal case, every

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time. The idea of a practical molecular gastronomy in restaurants and forming a sort of combination of traditional and modern, artistic and scientific approach to cooking is widespread throughout the world, but the greatest concentration of such restaurants are located within the European Union, where actually were created the first prototypes of such restaurants. In the todays' world the obesity is one of the biggest problems of modern man, a result of sedentary lifestyles and unbalanced diets imposed by lifestyle. Standard restaurants' offer is based on the portions that exceed nutritional requirements and the entry of such foods further undermine the notion of a balanced diet. For these reasons there is a need for rationalization and regular moderate intake of what is needed. Rationalization of nutrition is one of the main features of the new attitudes adopted by molecular gastronomy, as well as the use of food as a whole.

MAIN REPRESENTATIVES OF MOLECULAR GASTRONOMY

Molecular gastronomy exists for twenty years and throughout that period many of the experts gave her contribution to the development, definition and practical application. The division of the scientists and scholars with authors on one side and chefs on the other side want to separate the two parts of this scientific discipline. The main reason for the division is that the first group deals only with research, publishing books and scientific papers. They are neither cooks nor do they have their own restaurants, but they are advisers of chefs, while cooks are applying knowledge of scientists and authors to improve their work and introduce innovations into the world of gastronomy.

From scientists, authors and scholars the most important are: Hervé This, Nicholas Kurti, Harold McGee and Peter Barham.

Hervé This, French chemist, father and co-creator of molecular gastronomy. Among his most important discoveries we can point out the perfect temperature for cooking eggs (about 65ºC while the albumen coagulates, but not yolk) and the use of electric fields to improve smoking salmon. He also devised a recipe for challenging the laws that cooking chocolate and water do not mix so called Chocholate Chantilly.

Nicholas Kurti, the Hungarian physicist who has spent most of his life in Britain, during the Second World War he worked on the atomic bomb. In 1969 using at that time the latest invention, a microwave oven, scored reverse the so-called *Baked Alaska* so called *Frozen Florida*, which is cold outside and warm inside.

Harold McGee, the American scientific author, who writes about chemistry, engineering, and history and cooking. In addition, he lectures about cooking chemistry in cooking schools and universities such as The Oxford Symposis on Food, Denver The National History Museum and the Fermi National Accelerator Laboratory, and teaches a three-day course in New York under the name "Harold McGee series".

Peter Barham, a British professor of physics and molecular gastronomy is important because of the work *The science of cooking* issued in 2001 and cooperation with the chefs, especially with Heston Blumenthal. Barham also holds the record in the Guinness Book of Records for the fastest made a liter of ice cream where he used liquid nitrogen.

From the representatives of the practical application of molecular gastronomy the most prominent are: Grant Achatz, René Redzepi, Homar Cantu.

Ferran Adria, the Spanish chef who is seen by many the greatest chef of our time, maybe of all time. It is known under the synonym Salvador Dali of cooking. Importance of Adrià for culinary world is for its application of innovative and creative ways of preparing dishes such as the use of liquid nitrogen, spherification and so called air or very light foam. It will be remembered as one of the first chefs to apply industrial additives. Among his most significant recipes can be extracted olive reverse, fake caviar, Foire gras consommé, and others.

Heston Blumenthal, a British chef who has so far published four books and recorded three series, mostly related to his book. Linking it up with molecular gastronomy, although he does not like that name and considered it before a complicated and elitist. Among his most important innovation we emphasize cooking under vacuum to maximize the expansion of bubbles during the preparation of food such as chocolate and some desserts. Takes care of the ultra-slow cooking and the application of sous-vide technique or cooking in vacuum pouches under controlled temperatures. From the recipes the most important are ice cream bacon and eggs, hot and cold tea and pineapple gel formation that were previously impossible because the pineapple contains an enzyme that does not allow it. Blumenthal also collaborates with scientists, the most important physicist Peter Barham and experimental psychologist Charles Spence. Cooperates with the Institute Fermenish in Switzerland, which is developing aroma and taste perception study. In collaboration with Fermenishom, Blumenthal matched many foods that are compatible chemical composition such as e.g. mouldy cheese and chocolate.

Homar Cantu, American inventor, entrepreneur who nourishes molecular gastronomy. In the culinary world famous for the use of lasers in the kitchen, creation of sushi with printers, so called healthy junk food, the manipulation of the nutritional value of certain food, and among other things, cooperation with NASA on the 3D printer of food in the mission of sending humans to Mars. Cantu cultivates a specific style of cuisine that differs from other chefs, and his use of science in the kitchen and futuristic presentations exceeds any one of molecular gastronomy restaurant. His style is described as post-modern kitchen.

Grant Achatz, is an American chef and one of the pioneer of application of molecular gastronomy. His restaurant Alinea is one of the best restaurants of today, and in 2006 it was proclaimed as the best restaurant in 2006.

René Redzepi the Danish chef Macedonian-Albanian origin, his style of cuisine is based on the nature and traditional Scandinavian cuisine and the influence of molecular gastronomy.

APPLICATION OF ADDITIVES AND INNOVATION IN THE PREPARATION OF FOOD MOLECULAR GASTRONOMY

The term to cook is defined as the use of heat to transform food for consumption. The question is whether this is the only way to transform the food for consumption? Is the heat the only that can be used to cook something? When the meat is removed from the refrigerator it is dissolved, for this process the heat is also used, but for that meat we would never say that it is cooked. If the egg yolk is mixed with ethanol it will coagulate and it will tranform although this transformation has not used any heat (This 2010). There are many ways for transforming foods in traditional gastronomy. These methods

are applied in the modern "scientific" molecular gastronomy. With the development of traditional ways of trying to introduce new and innovative ways.

From new ways of transformation of food used in molecular gastronomy in everyday practice can be applied:

- spherification in a bath of sodium alginate or calcium chloride and water
- the use of liquid nitrogen

a) spherification in a bath of sodium alginate and calcium chloride and water - an innovative way of transforming food without the presence of heat. This is a technique used for making, among other things, false and reverse olive caviar. There are many variations of using this process, but the last two uses are the most often. During spherification the food is transformed in the way of placing them in a thin, slowly solvable membrane of sodium alginate and calcium chloride. The process of spherification in a big way introduces Spanish chef Ferran Adrià and he was one of his trademarks.

For complete spherification it is required special equipment, and it consists of the following components:

- sodium-alginate
- salt, calcium chloride (calcium without food can not be spherificated)
- spoons of different shapes and sizes
- syringe without a needle (for the fake caviar)
- water bath for stopping the process

b) **Use of liquid nitrogen** is a relatively new technique in gastronomy. The temperature of liquid nitrogen is -196°C and as such has long been used mainly for various industrial purposes. Its use as a cooking technique reduces the production of ice cream and sorbet. It is a great plus in making ice cream with liquid nitrogen so that the crystals are very small due to the short time of freezing and thus ice cream made in this way has a very creamy and smooth texture.

The concept at first, totally impossible to understand, but cooking with liquid nitrogen is nothing more than cooking in a very cold medium. Because of the large so-called "wow effect" the use of liquid nitrogen can be considered scientific, and especially since it is not used in traditional cuisines, but it is more innovative way for the creation of an extremely traditional preparations like ice cream or sorbet, which previously could only work because most of the cooler was not able to achieve much lower temperatures and is no more scientific to the bread making (McGee 2004).

New machinery, equipment and tools at the present time offer chefs the opportunity to achieve what was always possible with the food, but the available equipment didn't allow, in other words the borders of realisable are moving. These new capabilities enable the use of science as well as mutual cooperation between chefs and scientists. New equipment can be divided into those originally intended for laboratories, which slowly begins to apply in catering kitchens and the one whose purpose is primarily and exclusively planned for the professional catering kitchen, some of which are designed as equipment intended for household.

New equipment dedicated to kitchen:

- anti-grill
- machine for rotation of sugar
- paco jet
- sous-vide water bath
- smoking gun

– gastrovac
– bottle for production of domestic whipped cream
– spaghetti set.

Laboratory equipment applicated in kitchen:

– centrifuges
– syringes
– desiccators
– laser
– gas torch
– temperature with magnetic mixer
– swing evaporators or rotaval
– thermometer.

ANTI-GRILL - on the market, we encounter two types of anti grill:
Electrical anti-grill "bakes" using liquid nitrogen freezing food at temperature up to -34°C. There are variations of anti-grill instead of using electricity for freezing food using liquid nitrogen, and is called Teppan Nitro. In addition to difference in the way of freezing there is a difference in temperature because by using liquid nitrogen Teppan Nitro can be achieved much lower temperature up to -148°C. Anti-grills allow completely freeze sauces and purees and semi-freeze dishes to get a crispy surface and creamy center.

MACHINE FOR ROTATION OF SUGAR - a device often seen in amusement parks, while rarely used in restaurants. It is used, among the others, in restaurant El Bulli, but not for the spin of sugar which original purpose of this device is in the production of sugar cotton. Application of machine for rotation of sugar is not in any way scientific innovation as it is a very creative way of using the device.

When talking about modern catering equipment, this is primarily thought of:

– electrical
– with liquid nitrogen.

PACO JET - machine that is used to make ice cream and sorbet. It is used in most professional kitchens. It consists of a very sharp knife that turns up to 2000 rpm. Using the paco jet we can get the ice cream with a very small crystals, a very similar texture as in liquid nitrogen. Except for the sweet it is used to produce salt types of ice cream.

SOUS-VIDE WATER BATH - sous-vide technique was used in kitchens before, but the revival it is experienced with the development of molecular gastronomy. The technique consists of placing vacuum food (meat) in the bath. The specificity of this technique is that it can control the cooking temperature and time to get better results than simple boiling in water, the only deficiency of the method is extremely long cooking time.

SMOKING GUN - a device that is used for processing a variety of dishes, smoked flavors. A very simple principle that adds a secondary smoked flavor to dishes. The process consists of a selection of flavors, aromas of putting in a small compartment and blowing smoke in an enclosed container or bowl covered with foil.

GASTROVAC - is a serious professional cooking appliance often used in kitchens of molecular gastronome. It is a kind of combination of slow ladle so called slo-cooker, vacuum and thermostat (but without magnetic mixer). It works by sucking the flavor out of food and water with the help of vacuum and leaves it completely dry like a sponge. After that fills dry cells of food such as pre-selected fluid wine. So we can get using gastrovaca pear with an intense wine aroma.

BOTTLE FOR PRODUCTION OF DOMESTIC WHIPPED CREAM - is used to convert the liquid in the foam and to add flavor. Originally intended for making homemade whipped cream but in molecular gastronomy, its application is truly diverse. To achieve results two gas are used: carbon dioxide (CO2) and nitrous oxide better known as nitro (N20)

SPAGHETTI SET - composed of silicone or plastic tubes and bottles used to fill precisely the desired compound. It is used for making spaghetti from gelling agents and water or stock. The most frequently used gelling agent is agar, but not alone.

Apart from equipment designed for the modern kitchen, in practice, we encounter a range of equipment which is intended for laboratory use, such as:

LASER - the use of lasers in the kitchen is dedicated to the infusion of aroma in cups. The first restaurant that used lasers in the kitchen is the Moto in Chicago. The process takes place in the way that on the laser beam is put the desired flavor, in order to get something between smoke and plasma that envelops the entire cup of the desired flavor. So far this is the only application of lasers in the kitchen. Direct application of lasers in food as a way of transforming food does not yet exist, and it is difficult to imagine the future use of lasers as a medium of thermal transformation of food in the kitchens of most uneconomical because of the limitation of the laser.

CENTRIFUGES - machines that produce gravity by turning 40 times greater than Earth's. Already used in many industries. In modern kitchens, one of the applications of centrifuges is the removal of solids from the juice so that it eventually gets transparent liquid with no solid parts. Spin can make ultra bright consommé.[2]

DESICCATORS - there are ordinary and vacuum desiccators. They are a kind of laboratory equipment that is used for drying and storage hygroscopic substances. Two-piece are made of thick, cast glass. In the lower part shall be a substance that attracts moisture to itself, and above it, the porcelain fence with large openings, is placed a substance intended for drying. As a meas for launching moisture is used anhydrous calcium chloride. At the vacuum desiccators used vacuum to remove moisture in foods.

GAS TORCH - mostly used as the final part of cooking sous-vide. Using the torch has two reasons, the first is killing the bacteria because of the relatively low temperature cooking in sous-vide technology, and the second is to create Maillard reactions that is browning of meat, effects similar to caramelization characteristic for meat, chocolate, beer, etc. It is also used for rapid caramelization of sugar and other sweets.

TEMPERATURE WITH MAGNETIC MIXER - using this device greatly reduces the possibility of burned sauces. It is especially interesting a small magnet in the form of capsule, which is located at the bottom of the vessel and is constantly turning, and so mixes liquid.

SYRINGES - medical equipment that has not previously had any links with the kitchen. Some of the applications of syringes are e.g. extraction of fluid from the eggs and injecting other fluids (ice cream) without breaking the shell. Another application is the "injection" of flavor in meat. Syringes without needles are used in spherification (fake caviar).

SWING EVAPORATORS OR ROTAVAL - looks mostly on laboratory instrument. Its function is to distill the rotating fluid without the presence of heat to maintain flavor.

THERMOMETER - used to determine the current temperature of the media in which food is preparing as well as for determining the temperature of food. Its use in

[2] Consommé – bright soup got from soup

the kitchen did not begin with molecular gastronomy but the popularization of this device is.

Additives are substances of accurately known chemical composition that can not be consumed as food or as a typical ingredient of food, regardless of nutritional value, they are added to food to enhance their technological and sensory properties. Additives are added to food in: the technological process of production, during the preparation, processing, packaging design, transportation and storage.

Additives are grouped by categories, each category has its own special name and each additive, so that they are divided into (Lerotic and Vinkovic Vrcek, 2004):

1. Dye (E100-E181),
2. Preservatives (E200-E290),
3. Antioxidants, acidity regulators (E296-E385),
4. Emulsifiers, emulsion, stabilizers (E400-E495PR),
5. Regulators of acidity and substances to prevent coagulation (E500-E585),
6. Flavor enhancers (E600-E640PR),
7. Artificial sweeteners, stabilizers, thickeners (E900-E1520).

Molecular gastronomy is used mostly those additives from the categories of emulsifiers, emulsion and stabilizer, few of the categories of antioxidants, acidity regulators, and some of the artificial sweeteners, thickeners and stabilizers, the most common is sugar Isomalt. Emulsifiers used in molecular gastronomy are also known as hydrocolloids. They alter the texture and appearance of food, not taste and are mostly of natural origin. These are substances that in contact with water or watery fluid form gels. They contain polysaccharides and proteins that are able to: gelling and thicken aqueous solutions, stabilizing foams and emulsions and prevent the crystallization of water or sugar (Lersch 2010). Emulsifiers, which belong to the group of hydrocolloids are as follows:

AGAR (E-406) - a powder that is obtained by extraction and drying agents that it's got from processed seaweed Gelidium. On the market appears in the form of dry powder white to light yellow. The color depends on the degree of purity. Price of agar depends on the purity of it. Agar is used as nutrient substrates on which are grown under sterile conditions, plant or bacterial culture. Agar also retains moisture, and when mixed with water we obtain a soft gel. It is thermorevrsible, it forms a gel when heated, and as it cools so slowly it turns into a liquid. It is resistant to heat, light brittle, high temperature differences between the gelation and melting temperature. Do not fall into dangerous additives.

GELLAN (E-418) - polysaccharide which is creates by bacteria Sphingomonas Elodea. It is a substance for gelling, stabilizing and emulsification, an alternative to Agar. Able to apply temperature to 120°C. It is transparent. It is used in the dairy industry in milk from soybeans. It is not dangerous to health.

GUAR GUM or GUARANI (E-412) - obtained from the guar seed plants. Guar bean is firstly peeled, then milled and extracted from it we get a fine powder or guar gum. Guar gum is very stable, it is fastly coagulation in contact with water, it has eight times greater thickening power of ordinary corn starch. In most cases it is used with xanthan gum. It is used in textile, cosmetic, pharmaceutical industries and in mining. In the food industry is used in bakery, dairy industry and in the fillings and sauces. Guar gum does not fall into dangerous additives. It is used to treat many diseases of stomach and is used as an aid in weight loss and diabetic diets.

ARABIC GUM (E-414) - also known as chaar gund or meska, is a natural gum derived from resin bonded wood of black locust, in particular acacia senegal and acacia seyal. Commercially produced from wild trees in Senegal, Sudan and Somalia, as well as in Palestine and the Middle East where it is used as an ingredient for gelling desserts. Arabic gum is a complex mixture of polysaccharides and glycoproteins and is mostly used in food industry as a stabilizer. It is also used in the manufacture of paints, adhesives, cosmetics, textile industry and as the ink viscosity controller. It is completely edible and not harmful.

KARRAGEENAN (E-407) –Carrageenan (E-407) - gelatin extract of seaweed *Chondrus crispus*. Vegetarian and vegan alternatives to gelatin. There are three main types of carrageenan: Kappa (hard gels), Iota (soft gels) and Lambda (does not create a gel used as a thickener for dairy products). It is used as a stabilizer or thickener. Studies by the WHO (World Health Organization) on laboratory rats suggest a connection between stomach cancer and carrageenan as well as possible relationships with other gastro intestinal diseases.

KARUBA TYRE (E-410) - polysaccharide of vegetable origin, derived from locust beans. In pure form, like a powder white or yellowish color. Together with the xanthan gum is used in the manufacture of ice, it is preventing formation of ice crystals and it even after a few glitches. Creates a gel only in the presence of agar, kappa carrageenan or xanthan. It is considered harmless.

COGNAC TYRE (E-425) - polysaccharide extracted from plant stalks Lesioidae Amorphophallu. It appears under many names, most notably brandy and cognac glucomannan flour. Thermoreversible, but only under alkaline conditions, degradable in water and is considered dijatetskim product. The kitchen is used as a thickener and emulzifikator. It is considered harmless, even used in the health industry as an aid in weight loss, constipation and as a mean to reduce cholesterol levels.

XANTHAN GUM (E-415) - a synthetic thickener, stabilizer and gelling. It is produced by fermentation of corn sugar by bacteria. In larger doses, it is acting laxative. Permitted in organic food production. Possible the production of genetically altered corn, but the final evaluation of the effects of so-produced xanthan gum is not yet possible to give. It is considered harmless.

METHYL CELLULOSE (E-461) - a chemical substance derived from cellulose. In its pure form is white powder, soluble in cold water and forms a translucent gel. Used as a thickener and as emulsificator in various dishes as well as in the cosmetic industry. It is also used as an aid in constipation. Thermoreversible a gelling agent, when heated, forms a gel as it cools so slowly turns into a liquid. Methyl cellulose as well as the cellulose is not digestible, not toxic and it doesn't cause allergic reactions and is not dangerous to health.

SODIUM ALGINATE (E-401) - olisaharid derived from brown algae. In the presence of calcium chloride forms gel. It is able to absorb 200-300 times more water than their weight. Color varies from white to yellowish-brown. Used as a stabilizer and thickener and food as the main ingredient in the process of spherification. It is not dangerous to health.

PECTIN (E-440) - pectins differ in the length of the polymer chains, complexity, and structure monosaharidne units. In acidic conditions, pectin forms a gel. Because of this phenomenon is used as an edible gelling agent in food processing. This effect is used in the manufacture of jams, jellies and similar products.

GELATIN (E-441) - one of the most common additives used in cooking. Elastic gel, which melts in the mouth, soft and transparent. It is obtained from collagen found in bones, cartilage and even in the innards of animals. Production of gelatin is strictly regulated, only the extract from animals that have a veterinary certificate. Its application is indeed varied, but the application in the kitchen, gelatin is used in the pharmaceutical industry as a coating of capsules, used as a ballistic gel in the preparation of paintball ball. Gelatin is not harmful to health.

All of these additives belong to the hydrocolloids. But they are not the only additives used in preparing the dishes in molecular gastronomy. Of those who are not hydrocolloids we can point out *lecithin and maltodextrin.*

MALTODEXTRIN - polysaccharide which is obtained by partial hydrolysis of starch. It is digested very slowly probavljuje and is used as an additive in the production of juices and sweets. Chefs use it to convert liquid into solid substances. This allows its large liquid absorption capacity.

LECITHIN – is in the white egg and soya beans. It is used to stabilize the cold liquid and as a mean for separating cocoa butter from cocoa powder. In the molecular gastronomy is used to stabilize the foam so called air.

When using the additives it should be respected that additives do not pose a health risk to consumers, it must not mislead consumers and to conceal the weaknesses of the quality of raw materials or processing methods, may not alter the taste of food just a texture, and despite the fact that most of the additives used in molecular gastronomy are safely to consume (except perhaps carrageenan) and of the natural origin, but they are still not fully healthy.

CHARACTERISTICS OF THE RESTAURANT THAT APPLY MOLECULAR GASTRONOMY

There are many elements which different restaurants and standard restaurants apply molecular gastronomy. Most would expect from such restaurants chefs in lab coats, and kitchen as a laboratory. But it is far from the truth, although there is a big and obvious difference between the standard and the restaurant of molecular gastronomy. In essence, they are more restaurants, and less laboratories. The differences are most evident in the approach and in the kitchen equipment as well as her appearance. This shows Table 1 where there were taken to compare a standard restaurant and the most famous restaurant, also the best restaurant in the world who is regarded as the main representative of the application of molecular gastronomy, El Bulli, chef Ferran Adrià.

CRITERION STANDARD RESTAURANT RESTAURANT MOLECULAR GASTRONOMY (El Bulli) Hierarchy and a strict hierarchy of specialization in one part of the cuisine (head chef, sous chef, sousier). No hierarchy. Size of food dishes medium size large to very large. Presentation of Standard 3-5 hours, sometimes more.

Table 1. Differences between standard restaurant and restaurant that applies molecular gastronomy

CRITERION	STANDARD RESTAURANT	RESTAURANT MOLECULAR GASTRONOMY (EL BULLI)
Hierarchy	Hierarchy and a strict hierarchical divisions on specialization in one part oft he cuisine (head chef, sous chef, sousier).	No hierarchy of the standard terms, the emphasis on the free exchange of ideas, sharing of each chef prepares a certain dish
Number of courses	The number of courses in a three-course meal (soup or appetizer, main dish, dessert)	From 30 to 45 courses in one meal
Meal size	Size of meals from middle to large	Size meals small to very small
Meal presentation	Various dishes, but usually rustic.	Presentation tends to artistic-minimalism, avant-garde.
Meal duration	The duration of the meal between one and two hours.	Standard 3- 5 hours, sometimes more.
Menu	Exists	Don't exist
Number of staff	Depending on the size of the restaurant run to 12 in two shifts, medium 12-30 employees while great restaurants and counted to 40 workers in two shifts.	Kitchen has 55 chefs who prepare meals for 55 visitors in one shift.
Number of serving	More servings per day.	Only one serving per day
Chef's access to guest	Closed, the chef is limited to the kitchen.	Open the possibility of preparing meals at the table in front of the customer with an explanation

Source: Authors according to: Ivanovic, S. *Kuharstvo* i Bourdain, A. Decoding Ferran Adria

Those are the specifics that do not only characterize El Bulli, but also most restaurants of this type. The biggest difference is reflected in serving thirty small portions so called *tasting menu*. For this, there is a scientific reason because the brain after a while gets used to the taste, so it does not perceive what is consumed to such an extent after a long time, but the perception of taste becomes more automatic (although the taste is still present in the same way, the brain simply shuts down). For this reason, there is this way of serving dishes. In addition, it should be that in most chef-scientists there is not only one flavor, but that they alter from the primary, secondary and tertiary, i.e. perception of a certrain meal takes place in several phases.

MODERN GASTRONOMY TRENDS AND FUTURE IN MOLECULAR CUISINE

The latest trend that has emerged under the influence of molecular gastronomy is molecular mixology, which proves that the trend is slightly spreads in the cocktail bars

and similar restaurants. First of all, molecular mixology makes specialized skills of mixing drinks that use analysis, knowledge and techniques adopted from the scientific disciplines and gastronomy to experiment with cocktail ingredients at the molecular level. Its purpose is to manipulate the aggregation state of the liquid, in order to create a new aroma, flavor, texture and appearance that increase the attractiveness of drinks and make the experience of consuming these types of cocktails, a lot more interesting. Excitement and innovations introduced by molecular mixology is converting the liquid to gels, foams and solids, and spherification of cocktails.

Concerns about the future of molecular gastronomy does not give clear answers, because the use and influence of molecular gastronomy is very wide in all respects and it includes more areas. Standard restaurants serve portions that exceed nutritional requirements and the intake of such foods further undermine the notion of a balanced diet. For these reasons there is a need for rationalization and regular moderate intake of what is needed. Modern man is more and more conscious in terms of nutrition, and thus indicated some chefs to reconsider the adoption of these radical ideas to accomplish the fusion of science and cooking. This idea is established as a full hit, because today the best restaurants in the world, the vast majority of those who have seen the benefits of these two joints which before were incompatible branches of human activity. Gastronomic direction - molecular gastronomy was quickly spread to Western Europe and North America, and later it was spread to other parts of the world, among those countries there is no Croatia, which was just becoming familiar with these trends, and in a few years is expected to be significant expansion in Croatia.

Culinary and scientific wizards will soon be able to replicate all the existing and create new flavors, and their creations to introduce us to a whole new world of food and provide us the opportunity to try various combinations that do not exist in fairy tales.

CONCLUSION

Molecular gastronomy is a new gourmet direction connecting the catering kitchen and laboratory, and thus creates new flavors, forms of unprecedented. It can be, of course, understood as a process of application of science in everyday cooking. Methods and means for obtaining the final products in the molecular gastronomy request the knowledge of the chemical and physical processes. Of course, the introduction of molecular gastronomy requests, too, and some modifications in the approach to guests, number of courses of which every dish is extremely small - the art on a plate, losing the concept of menus and menu, while the duration of a meal takes several times longer. Certainly, this approach also affects the habits of the people towards healthy eating, where it is no longer considered to be a meal consumed in a shorter time, but the opposite, and making sure the food is consumed, and thus affects the reduction of today's problems related to overweight-obese population.

Modern molecular gastronomy shows the tendency toward further progress and popularization, but a noticeable impact on the so-called "Molecular mixology", and molecular approach to the preparation of cocktails, where just as in the case of food, it is changing the physical state of food and it is searching the limits of each food. The future is unpredictable, and in which direction to go to molecular gastronomy remains to be seen.

REFERENCES

Adrià, Ferran, Albert Adrià, and Juli Soler. 2008. *A Day at elBulli: An Insight into the Ideas, Methods and Creativity of Ferran Adrià*. London: Phaidon Press.

Barham, Peter, Leif H. Skibsted, Wender L. P. Bredie, Michael Bom Frøst, Per Møller, Jens Risbo, Pia Snitkjær, and Louise Mørch Mortensen. 2010. Molecular Gastronomy: A New Emerging Scientific Discipline. *Chemical Reviews* 110 (4): 2313-2365.

Blumenthal, Heston. 2005. *Kitchen chemistry*. Discovery Science.

Ivanovic, Slobodan. 2003. *Kuharstvo 1.* Zagreb: Skolska knjiga.

Lerotic, Dana, and Ivana Vinkovic Vrcek. 2004. *Sto se krije iza E- brojeva.* Zagreb-Split: Udruga za demokratsko drustvo.

McGee, Harlold. 2004. *On Food and Cooking*. London: Hodder & Stoughton.

Mestric-Molnar, Tanja, et al. 2008. *Suvremeni trendovi u gastronomiji*. Zagreb: Agencija za strukovno obrazovanje.

This, H. 2005. *Molecular gastronomy: Exploring the Science of Flavor*. London: Cambridge University Press.