Welcome to the World of Molecular Gastronomy

This course book is designed in a simple, user friendly format to give the reader a basic understanding of the principles and techniques. We start out with basic ratios for Spherification Reverse Spherification, Foam, Air, and Speghetti. The basic formulas for creating gastronomic "wow" getters. The book is intended to be a place for the Molecular Gastronomist to place his research and continue to develop into a repertoire of fun recipes and a go to place for all things molecular in your kitchen. As the course unfolds please take notes and add recipes, photographs, contact information and locations of how to find hard to reach items.

KEEP IN MIND

Every chef has his or her own style of cooking and uses a different set of favorite techniques and plating styles.

In this style of cooking, use the best ingredients possible because the techniques are used to focus attention on flavors, colors, textures, and aromas.

Current Trends

Nontraditional thickeners. In addition to the traditional starches, chefs have new ways to thicken sauces and to change the texture of liquids. Some of these thickening agents work without heating and are simply blended with the cold liquid. This allows the chef to create sauces and other liquids with a fresh, uncooked taste.

Foams, froths, and bubbles. For many years, chefs have made foamy sauces by whipping or blending a sauce just before plating. These foams collapse quickly, however. Avant-garde chefs stabilize foams with gelatin, lecithin, and other ingredients. A well-made foam adds an additional flavor dimension to the plate without adding bulk.

Gels. Turning a liquid, such as a vegetable juice, into a solid not only gives it a different texture but also enables the food to be cut into many shapes, allowing the chef to create different visual presentations. Chefs use regular gelatin as well as other jelling agents, such as agar-agar, which is derived from seaweed.

Drying and powdering. Drying a food intensifies its flavor and, of course, changes its texture. Eating a cauliflower floret that was deep-fried and then dehydrated until crisp is a much different experience than eating steamed, buttered cauliflower. If the dehydrated food is powdered, it becomes yet another flavor and texture experience.

Spherification. This technique creates spheres of liquid contained inside a thin gel wall. In the standard method, the liquid is mixed with a hydrocolloid called sodium alginate. In a separate container is a water bath containing calcium. When the liquid is dropped into the calcium bath, the alginate and the calcium react to form a thin wall of gel surrounding a liquid center. The chef can make tiny spheres by using an eye dropper or larger ones by freezing the liquid in a mold before dropping it into the calcium bath. The opposite method is to dissolve the calcium in the flavorful liquid and drop it in an alginate bath. This is called reverse Spherification.

SPECIALIZED INGREDIENTS

The ingredients below are used in tiny quantities. For this reason, avant-garde chefs are likely to be working in the metric system. This need for precision carries over into every aspect of the chef's work, from scaling all ingredients and measuring temperatures to cutting ingredients and creating plate arrangements.

- **Agar-agar**. A jelling agent derived from seaweed. Agar-agar is a traditional ingredient in Asian cuisines and has long been used in Western cooking as a vegetarian substitute for gelatin. To use, stir into a cold liquid and bring to a boil. The liquid sets to a gel when cooled to 95°F (35°C). Once jelled, it can be reheated to serve warm because it does not melt until heated to at least 185°F (85°C). To use as a thickener, jell the liquid and then blend in a blender.

- **Calcium lactate and calcium chloride**. Calcium compounds used in the process of Spherification.

- **Carageenan**. A hydrocolloid or thickener derived from seaweed. Carageenans are mixed with cold liquids and then heated to thicken.

- **Guar gum**. A hydrocolloid or thickener derived from the guar bean plant. This is a powerful stabilizer and thickener that has long been used in commercial ice creams.

- **Methylcellulose**. A hydrocolloid derived from plant fiber. It has long been used as a dietary fiber supplement. It is an unusual thickener and jelling agent because it thickens as it is heated and thins out or melts when cooled. This allows the chef to create unusual effects. Methylcellulose is also used to stabilize foams.

- **Sodium alginate**. A hydrocolloid derived from seaweed. This ingredient is used in the process of Spherification. It does not have to be heated to make a gel, and the gel is nonreversible. This means once the gel formed, it stays solid even when heated.

- **Soy lecithin**. A powerful emulsifier. Lecithin is the component of egg yolks that makes mayonnaise possible. Also extracted from soybeans, lecithin is used to stabilize many mixtures that would separate without it. It enables air bubbles to be captured and suspended in mid “Air”.

- **Tapioca maltodextrin**. A modified food starch that, when mixed with fat, changes it to a powder. Because maltodextrin dissolves in water, an oil, such as olive oil, that has been powdered changes back to an oil in the mouth.

- **Ultra-Tex 3**. A modified food starch extracted from tapioca. The name is a trademark of the National Starch Company, which makes it. Ultra-Tex 3 thickens cold liquids without heating. If the thickened liquid is poured into a thin layer, it dries to form a thin film or sheet.

- **Xanthan gum**. A hydrocolloid or thickener made by fermenting sugar with a special bacterium. It has been used for years to give structure to gluten-free breads and other baked goods. Liquids thickened with xanthan gum have the same thickness whether hot or cold.

- **Liquid Nitrogen:** is nitrogen in a liquid state at an extremely low temperature. It is produced industrially by fractional distillation of liquid air. Liquid nitrogen is a colorless clear liquid with density of 0.807 g/mL at its boiling point and a dielectric constant of 1.43. Liquid nitrogen is often referred to by the abbreviation, LN2 or "LIN" or "LN" and has the UN number 1977.

At atmospheric pressure, liquid nitrogen boils at −196 °C (77 K; −321 °F) and is a cryogenic fluid which can cause rapid freezing on contact with living tissue. When appropriately insulated from ambient heat, liquid nitrogen can be stored and transported, for example in vacuum flasks. Here, the very low temperature is held constant at 77 K by slow boiling of the liquid, resulting in the evolution of nitrogen gas.