

MOLECULAR GASTRONOMY



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11. DEHYDRATING

- A STEP/PROCESS TO REMOVE MOISTURE WITHIN THE FOOD.
- IN SOME APPROACH, IT USED TO MAKE FINAL PRODUCTS BECOMES POWDER CONSISTENCY
- USING LOW HEAT TEMPERATURE DEVICE (DEHYDRATOR) OR ANY OTHER APPLIANCE.
- IT PURPOSE TO PRESERVE FOOD AS WELL AS RETAIN ITS SHAPE.

11. DEHYDRATING

- AVOID USING EXCESSIVE / HIGH HEAT
- NO STACKING SO THE HEAT WILL FLOW EVENLY
- CUTTING THE INGREDIENTS THINNER AND UNIFORM SIZE
- WIDELY APPLICABLE FOR LOTS OF TYPE OF PREPARATIONS

DEHYDRATING | TECHNIQUE



DEHYDRATING | TECHNIQUE

MAKING CROQUANT TECHNIQUE

- “CROQUANT” TRADITIONALLY IS CRISPY SWEET CAKE/ BRITTLES MADE OF PEANUT



DEHYDRATING | TECHNIQUE

- MODERN CROQUANT MADE OF ANY SWEETENED INGREDIENT THAT CRISPED DURING DEHYDRATING PROCESSES
- IT CRISP WITH HELP OF SUGAR OR ISOMALT OR GLUCOSE SYRUP
- ADDING MALTODEXTRIN IS NECESSARY FOR HIGH WATER CONTAIN INGREDIENTS
- THIS TECHNIQUE WAS INTRODUCED BY FERRAN ADRIA OF EL BULLI RESTAURANT IN SPAIN

DEHYDRATING | TECHNIQUE

- **DUST POWDER**
- DRYING PROCESS OF HERB OR ANY VEG/FRUIT AND GRIND IN SPICE OR COFFEE POWDER.
- FOR LEAFY INGREDIENTS, BLANCHING IS SUGGESTED TO GET BRIGHT GREEN COLOR.
- DUSTING HAS PURPOSE OF DECORATION AS WELL AS FLAVOR PAIRING AND PRESENTING THE FOOD IN VARIOUS TEXTURE.



DEHYDRATING | TECHNIQUE

- **DIRT/SOIL**
- ACHIEVE BY DEHYDRATING SOLID INGREDIENTS AND GRIND IT COARSELY



DEHYDRATING | TECHNIQUE

- **CRISPY FOAM/PUFF/MERINGUE**
- MADE BY SPREADING A THIN LAYER OF FOAM MADE WITH METHYLCELLULOSE AND DEHYDRATING IT UNTIL IT BECOMES CRISPY. THE RESULT IS A VERY LIGHT MERINGUE SHEET.

OR

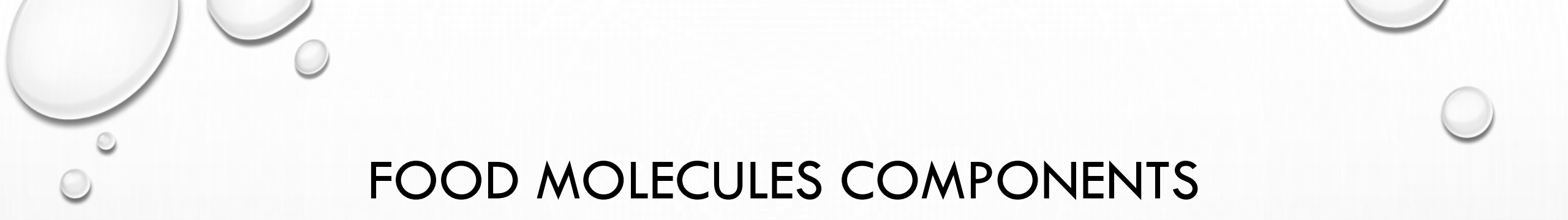
- BY SIMPLY DEHYDRATE THE MERINGUE (EGG WHITE + SUGAR)



DEHYDRATING | TECHNIQUE

- **EDIBLE FILM / GLASS**
- ACHIEVE BY DEHYDRATE THE GLUCOSE OR ISOMALT CONTAINING LIQUID
- OTHER WAY IS TO ADD MODIFIED CORN STARCH, A MODERNIST FOOD STARCH DERIVED FROM CORN WHICH HAS BEEN SPECIALLY MODIFIED TO FORM CLEAR FLEXIBLE FILMS WITH EXCELLENT SHEEN WHEN IT DRIES (CALLED: **PURE-COTE B790**)

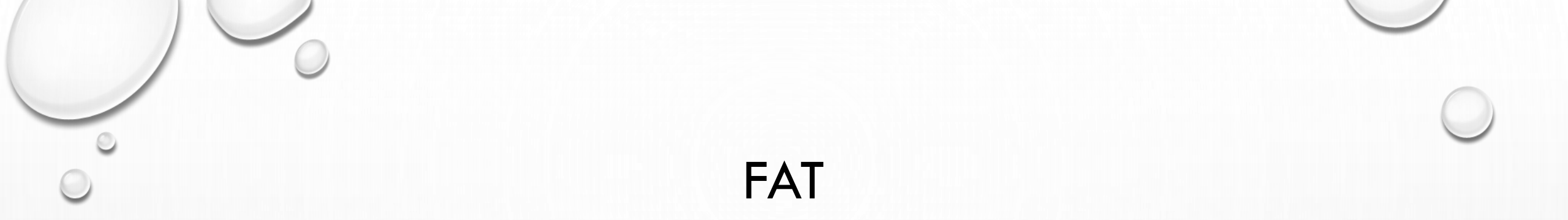




FOOD MOLECULES COMPONENTS

- FAT
- CARBOHYDRATE
 - WATER
 - PROTEIN





FAT

- FATS AND OILS ARE INVALUABLE IN THE KITCHEN: THEY PROVIDE FLAVOUR AND A PLEASURABLE AND PERSISTENT SMOOTHNESS;
 - THEY TENDERIZE MANY FOODS BY PERMEATING AND WEAKENING THEIR STRUCTURE;
 - THEY'RE A COOKING MEDIUM THAT ALLOWS US TO HEAT FOODS WELL ABOVE THE BOILING POINT OF WATER, THUS DRYING OUT THE FOOD SURFACE TO PRODUCE A CRISP TEXTURE AND RICH FLAVOR.
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FAT

- **SATURATED FAT**

- SATURATED FAT IS SOLID AT ROOM TEMPERATURE, WHICH IS WHY IT IS ALSO KNOWN AS "SOLID FAT." IT IS MOSTLY IN ANIMAL FOODS, SUCH AS MILK, CHEESE, AND MEAT. POULTRY AND FISH HAVE LESS SATURATED FAT THAN RED MEAT. SATURATED FAT IS ALSO IN TROPICAL OILS, SUCH AS COCONUT OIL, PALM OIL, AND COCOA BUTTER.

FAT

- **TRANS FAT**

- THIS IS A FAT THAT HAS BEEN CHANGED BY A PROCESS CALLED HYDROGENATION. THIS PROCESS INCREASES THE SHELF LIFE OF FAT AND MAKES THE FAT HARDER AT ROOM TEMPERATURE. HARDER FAT MAKES CRISPIER CRACKERS AND FLAKIER PIE CRUSTS. TRANS FAT CAN RAISE YOUR CHOLESTEROL, SO EAT AS LITTLE TRANS FAT AS POSSIBLE. YOU'LL FIND IT IN:
 - PROCESSED FOODS.
 - SNACK FOODS, SUCH AS CHIPS AND CRACKERS.
 - COOKIES.
 - SOME MARGARINE AND SALAD DRESSINGS.
 - FOODS MADE WITH SHORTENING AND PARTIALLY HYDROGENATED OILS.

FAT

- **UNSATURATED FAT**
- UNSATURATED FAT IS LIQUID AT ROOM TEMPERATURE. IT IS MOSTLY IN OILS FROM PLANTS. IF YOU EAT UNSATURATED FAT INSTEAD OF SATURATED FAT, IT MAY HELP IMPROVE YOUR CHOLESTEROL LEVELS.
 - **MONOUNSATURATED FAT:** THIS FAT IS IN AVOCADO, NUTS, AND VEGETABLE OILS, SUCH AS CANOLA, OLIVE, AND PEANUT OILS. EATING FOODS THAT ARE HIGH IN MONOUNSATURATED FATS MAY HELP LOWER YOUR "BAD" [LDL CHOLESTEROL](#). MONOUNSATURATED FATS MAY ALSO KEEP "GOOD" HDL CHOLESTEROL LEVELS HIGH
 - **POLYUNSATURATED FAT:** THIS TYPE OF FAT IS MAINLY IN VEGETABLE OILS SUCH AS SAFFLOWER, SUNFLOWER, SESAME, SOYBEAN, AND CORN OILS. OMEGA TWO TYPE OF THIS FATS ARE:
 - OMEGA 3 AND OMEGA 6



FATS IN THE KITCHEN

- OILS
 - BUTTER
 - CREAM
 - CHEESE
 - YOLK
 - MEAT PRODUCT, ETC
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FAT | BUTTER

- CONSIST OF 80% FAT, THE REST IS MILK PROTEIN AND WATER
- MADE FROM MILK BY COLLECTING THE “BUTTERCREAM” CHURNED TO SEPARATE THE FAT AND BUTTERMILK. THIS SEPARATION RESULT IN TWO PRODUCTS: BUTTERCREAM AND SKIM MILK
- CHURNING RESULTING THE BUTTERMILK FAT COAGULATED AND SEPARATE FROM BUTTERMILK. NOW WE HAVE BUTTER AND BUTTERMILK FROM THIS PROCESS.
- BUTTERMILK GOES FOR ANOTHER APPLICATION PROCESS, WHILE FAT KEEPS CHURNED TO FORM SMOOTH CONSISTENCY.
- BETA CAROTENE(COLOR PIGMENT) IN GRASS EATEN BY THE COW GIVES THE BUTTER YELLOW COLOR

BUTTER | FUNCTION

- CLARIFIED BUTTER (GHEE AS FAT IN INDIAN CUISINE)
 - MAKING HOLLANDAISE AND DERIVATIVES
 - MAKING BEURRE-NOISETTE (FORMS AT 120C)
- IN BAKING :
 - TENDERIZE THE PRODUCT BY COATING AND WEAKENING THE GLUTEN BONDS WITHIN THE STRUCTURE.
 - THOUGH THEY CONTAIN LITTLE OR NO MOISTURE, THEY PROVIDE THE ILLUSION OF WETNESS. FATS DON'T EVAPORATE OR BECOME ABSORBED WITH HEAT LIKE WATER DOES.
 - ENABLE BROWNING.
 - HELP MOVE HEAT THROUGH THE PRODUCT, PERPETUATING THE BAKING PROCESS.

BUTTER | FUNCTION

- COATING THE PAN TO AVOID STICKINESS
- TO FORM FLAKY TEXTURE IN PUFF PASTRY (IDEAL COMPARATION IS 15%-25%)

FAT | OIL

- MADE FROM ANIMAL, PLANT OR SYNTHETIC FAT TO USE IN VARIOUS COOKING METHOD, DRESSING OR DIPPING.
- EXCELLENT IN TRANSMITTING HEAT
- FRESH REFINED VEGETABLE OILS BEGIN TO SMOKE AROUND 450°F, ANIMAL FATS AROUND 375°F. FATS THAT CONTAIN OTHER SUBSTANCES, SUCH AS EMULSIFIERS, PRESERVATIVES, AND IN THE CASE OF BUTTER, PROTEINS AND CARBOHYDRATES, WILL SMOKE AT LOWER TEMPERATURES THAN PURE FATS
- PROVIDES A MOIST, RICH QUALITY TO MANY FOODS, AND THEIR HIGH BOILING/SMOKING POINT MAKES THEM AN IDEAL COOKING MEDIUM FOR THE PRODUCTION OF INTENSE BROWNING-REACTION FLAVORS (MAILLARD REACTION)

OIL | MAILLARD REACTION

- THE PRODUCTION OF INTENSE BROWNING-REACTION FLAVORS TO THE FOOD (NON SUGARCONTAINING) DUE TO AMINO ACID CONTAIN IN FOOD THAT REACT WITH HIGH HEAT.
- MAILLARD FLAVORS ARE MORE COMPLEX AND MEATY THAN CARMELIZED FLAVORS, BECAUSETHE INVOLVEMENT OF THE AMINO ACIDS
- DUE TO ONLY OCCUR IN HIGH HEAT, ONLY COOKING PROCESS USING HIGH HEAT PROOF MEDIUM (FAT) WILL ALLOW THIS REACTION OCCUR.
- WON'T BE OCCUR WHEN COOKING WITH WATER

Saturated and Unsaturated Fatty Acids in Foods and Cooking Fats

Proportions of fatty acids are given as a percentage of the total fatty-acid content.

Fat or Oil	Saturated Fatty Acids	Monounsaturated Fatty Acids	Polyunsaturated Fatty Acids
Butter	62	29	4
Beef	50	42	4
Lamb	47	42	4
Pork	40	45	11
Chicken	30	45	21
Coconut oil	86	6	2
Palm kernel oil	81	11	2
Palm oil	49	37	9
Cocoa butter	60	35	2
Vegetable shortening	31	51	14
Cottonseed oil	26	18	50
Stick margarine	19	59	18
Tub margarine	17	47	31
Peanut oil	17	46	32
Soybean oil	14	23	58
Olive oil	13	74	8
Corn oil	13	24	59
Sunflower seed oil	13	24	59
Grapeseed oil	11	16	68
Canola oil	7	55	33
Safflower oil	9	12	75
Walnut oil	9	16	70

EGG

- YOLK WEIGHT $\frac{1}{3}$, WHITE $\frac{2}{3}$ OF TOTAL WHOLE EGG WEIGHT
- EGG WHITES CONTAIN 90% WATER, THE REST IS MINERAL, VITAMIN AND GLUCOSE (FOR FEEDING THE EMBRIO AT EARLY STAGE)
- EGGS COOKED BECOME SOLID FORM DUE TO COAGULATION OF PROTEIN ABOVE 60°C
- EGG WHITE BEGINS TO THICKEN AT $145^{\circ}\text{F}/63^{\circ}\text{C}$ AND BECOMES A TENDER SOLID AT $150^{\circ}\text{F}/65^{\circ}\text{C}$.
- THE YOLK PROTEINS BEGIN TO THICKEN AT $150^{\circ}\text{F}/65^{\circ}\text{C}$ AND SET AT $158^{\circ}\text{F}/70^{\circ}\text{C}$, AND WHOLE EGG—THE YOLK AND WHITE MIXED TOGETHER—SETS AROUND $165^{\circ}\text{F}/73^{\circ}\text{C}$.

EGG, OTHER INGREDIENTS AND COOKING TEXTURE

- WHEN WE DILUTE EGGS WITH OTHER LIQUIDS SUCH SUGAR , MILK AND CREAM, WE RAISE THE TEMPERATURE AT WHICH THICKENING BEGINS. MEANS LONGER COOKING TIME TO GET CERTAIN CONSISTENCY.
- ACIDS AND SALT MAKE EGGS THICKEN AND COAGULATE AT A LOWER COOKING TEMPERATURE, BUT ACTUALLY PRODUCE A MORE TENDER TEXTURE.
- **EGGS COOKED 3 TO 4 MINUTES (SOFT BOILED EGG)**
 - HAVE A BARELY SOLID OUTER WHITE, A MILKY INNER WHITE, AND A WARM YOLK
- **EGG COOK FOR 5 OR 6 MINUTES (HALF BOILED EGG)**
 - HAVE A SEMI-LIQUID YOLK BUT A SUFFICIENTLY FIRM OUTER WHITE THAT THEY CAN BE PEELED AND SERVED WHOLE.
- **EGG COOK FOR 7-8 MINUTES (HARD BOILED EGG)**
 - MINUTES THE YOLK IS STILL DARK YELLOW, MOIST, AND SOMEWHAT PASTY

EGG

The Composition of a U.S. Large Egg

A shelled U.S. Large egg weighs 2 ounces, or 55 grams. In the following table, all weights are given in grams (g) or thousandths of a gram (mg). Fat accounts for about 60% of the calories in an egg, saturated fat around 20%.

	Whole Egg	Egg White	Egg Yolk
Weight	55 g	38 g	17 g
Protein	6.6 g	3.9 g	2.7 g
Carbohydrate	0.6 g	0.3 g	0.3 g
Fat	6 g	0	6 g
Monounsaturated	2.5 g	0	2.5 g
Polyunsaturated	0.7 g	0	0.7 g
Saturated	2 g	0	2 g
Cholesterol	213 mg	0	213 mg
Sodium	71 mg	62 mg	9 mg
Calories	84	20	64

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Cottonseed oil	26	18	50
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Tub margarine	17	47	31
Peanut oil	17	46	32
Soybean oil	14	23	58
Olive oil	13	74	8
Corn oil	13	24	59
Sunflower seed oil	13	24	59
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Canola oil	7	55	33
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Walnut oil	9	16	70



THANK YOU

