

## BCBT 100 – Exam 4 Practice Questions {Bodwin – Fall 2015}

Where is chocolate grown? = near the equator, within ~20° of the equator, tropical climates

Describe the process of making chocolate from the tree to the finished bar. = pick the pods, remove the seeds/beans, ferment slightly, dry/dehydrate the seeds/beans (usually in the sun), pack and ship

What type(s) of browning is/are responsible for the brown color of chocolate? = Mostly enzymatic on the seeds/beans themselves, also Maillard browning during the roasting process

Which type of chocolate plant has the most delicate flavors? = Criollo. Look for “Criollo” on the label if you want a very floral chocolate

What is the purpose of “Dutch processing” of cocoa powder? = “Dutched” cocoa is treated with base (alkali) to make it mix better with water or other liquids that are mostly water

Describe the molecular changes that take place when chocolate is tempered. = The fats are crystallized and melted and crystallized and melted repeatedly to form the most stable fat crystals which make a smoother final chocolate

If a chocolate bar is not stored properly it can have a “dusty” appearance. Describe what has happened. = The chocolate has bloomed. The bar was allowed to warm up enough that some of the fats in the chocolate melted and migrated to the surface of the bar, then cooled and re-solidified. Because it’s altering the fat in the chocolate, blooming can “un-temper” the chocolate and make it less smooth.

What causes chocolate to “seize”? = water. If water is introduced to melted chocolate, it can dissolve some of the sugars that are present. The sugars help keep the other components of the chocolate from clumping, so removing some sugar can make the melted chocolate clumpy.

What are the advantages of letting chocolate melt in your mouth when tasting it? = Different aroma and flavor compounds can be released as the chocolate melts, giving rise to a more complex flavor profile. Allowing the fats to slowly melt also makes it easier to assess/experience the texture of the chocolate and “feel” the quality of the conching process. On the financial and calorie side, it slows down how fast you can eat chocolate, so a \$5 chocolate bar can last for a long time and be a relaxing, thoughtful, and decadent experience rather than just a way to cram “empty” calories in your mouth.

What is the difference between a “herb” and a “spice”? = “herbs” are (usually) leaves, “spices” are usually other parts of the plant (stems, flowers, seeds, fruits, root, etc)

What are some characteristics of terpenes found in herbs and spices? = composed of isoprene units, contribute “fresh” character to food, usually hydrophobic, more soluble in fats and oils

What are some characteristics of phenolics found in herbs and spices? = usually contain at least 1 “phenyl” ring (6-membered ring with alternating single and double bonds) and usually contain oxygen-containing groups, usually more hydrophilic, water-soluble, more specific flavorings than terpenes

What are some characteristics of pungents found in herbs and spices? = usually contain sulfur and/or nitrogen, activated by varying amounts by enzymes

What is an “isomer”? = Isomers are different substances that have the same composition (same number of each type of element) but different properties due to different physical arrangement and/or connection between the atoms

Where are the essential oils stored in herbs of the mint family compared to herbs of the carrot family? How does this difference affect the properties and uses of these herbs? = Mint essential oils usually in external storage glands on the leaves, allows expansion to store a lot of essential oil. Carrot family herb essential oils usually stored internally, less essential oil per mass of herb. Mint-family herbs have more accessible flavors, can be added later in the cooking process; carrot-family herbs often crushed and/or added earlier in the cooking process to allow more time to extract the flavors.

How is flour made? (from the McGee book) = milling, grinding, stone-ground, “improving”, bleaching

What is “leavening”? = raising. A leavened dough has trapped gases that make it “lighter” in texture

Describe the process and chemical reaction of chemical leavening. = Chemical leavening is almost exclusively a result of a carbonate reacting with an acid to release carbon dioxide.

What is the difference between baking soda and baking powder? Why are BOTH sometimes called for? = baking soda is sodium bicarbonate; baking powder is sodium bicarbonate mixed with some source of acid. If a recipe has sufficient acid, baking soda can be used alone. If there is not enough acid in the recipe, baking powder can supply some of the acid. Baking powders can also supply acid at different temperatures to give a second burst of chemical leavening during baking (“double-acting” baking powders)

What is gluten? How is gluten formed? What type of interactions between molecules are present in gluten? = Gluten is the long proteins that form a network in bread to trap gas. It’s formed from smaller glutenins reacting with each other by forming strong disulfide bonds. Weaker interactions between gluten molecules help form a strong gluten network (crosslinks, lipophilic interactions, etc)

How does kneading encourage gluten formation? = kneading stretches the glutenin and gluten molecules so they are straighter and can interact with each other more strongly. It also just serves as a way to thoroughly mix the dough so more glutenins can react with one another to form gluten

Describe the ways in which gluten can be modified when making a dough. What physical or chemical steps can be taken to increase gluten formation? What physical or chemical steps can be taken to decrease gluten formation? = Increase gluten → higher protein flour, add oxidizing substances (“improvers”), well-mixed “wet” dough, more kneading, more salt, less sugar, less fat/oil, less acid.

In aerobic metabolism of sugars, what are the products of the chemical reaction? = carbon dioxide and water

What are the products of the chemical reaction when yeast metabolizes sugars? = carbon dioxide and alcohol molecules (and other minor substances that develop flavor...)

Describe the differences between yeast-leavening and chemical-leavening. What are some advantages of each? = chemical leavening → quick, reliable, “clean”. biological leavening → develops flavor, self-replicating

What is Charles’ Law? = the volume of a gas is directly proportional to the absolute temperature of the gas

If the absolute temperature of 6.0L of a gas is tripled, what is the new volume of the gas? = Tripling the absolute temperature should triple the volume to 18.0L

What role does starch play in the structure of baking bread? = starch absorbs water and gels to form a secondary network when it is partially dehydrated during baking, this reinforces the gluten network to make a more stable and “lighter” structure in the bread. Starch also helps to pop and merge the bubbles that form in bread

Why is it important that the bubbles in baking bread merge and pop during the baking process? = to release steam and allow exchange/movement of gases within and in/out of the bread. If the bubbles were extremely stable (didn’t pop), the loaf of bread would deflate when it cooled.

What are some of the results/effects of having a lot of steam present when baking breads? = steam transfers a lot of heat by changing phase, regulates temperature changes, keeps the surface of the bread elastic longer (allows more rising...), helps gel the surface starch to make a glossy crust

What does it mean for a bread to become “stale”? How can staleness be prevented? Reversed? =

Dehydration/crystallization of the starch. Prevent by storing at room temp or freezing, reverse by gentle heating or toasting

How does the protein content of different types of flour affect the bread made from those flours? = More protein = more gluten, more gluten = better network for trapping gas