From Last Time:

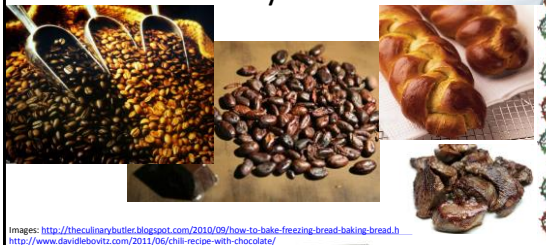
"Browning"

Different meaning in different foods

Browning Reactions

Many foods "brown"

Reactions differ by molecules



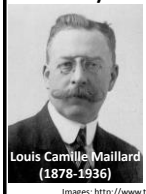
Images: http://theculinarybutler.blogspot.com/2010/09/how-to-bake-freezing-bread-baking-bread.h
http://www.davidlebovitz.com/2011/06/chili-recipe-with-chocolate/
http://www.frenchrevolutionfood.com/2008/09/franglais-maple-brown-sugar-creme-brulee/
http://openwalls.com/image?id=22369
http://blog.friendseat.com/how-to-make-hot-chocolate/

Maillard Browning

Proteins (+ reducing sugars)

Produce color and flavors

250°F/120°C



Louis Camille Maillard (1878-1936)

Images: http://www.telegraph.co.uk/foodanddrink/8426388/White-bread-falls-from-favour-as-shoppers-prefer-brown.html
http://www.food-info.net/uk/colour/maillard.htm

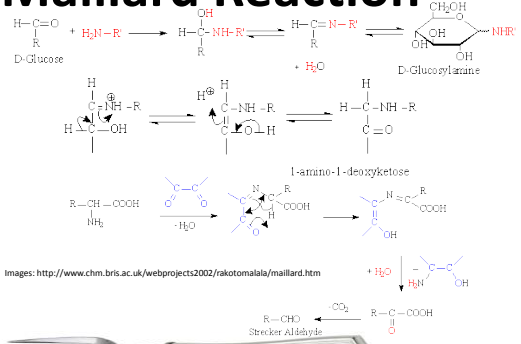
Encouraging Maillard

High heat, little water

Browning before stewing

Images: http://wellfed.typepad.com/well_fed/2005/12/mahogany_beef_s.html
http://www.onceuponachef.com/2012/09/roasted-tomato-salsa.html

Maillard Reaction



Images: http://www.chm.bris.ac.uk/webprojects2002/rakotomalala/maillard.htm

Sugar Browning

Sugar pyrolyzes (burns)

Flavor development

Caramelization

330°F/165°C

Enzymatic Browning

Phenol oxidase

Polymerizes phenols

Usually undesirable

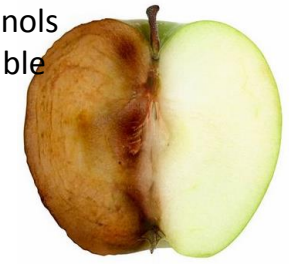


Image: http://www.oneresult.com/articles/nutrition/what-are-antioxidants-and-how-do-they-help

Enz Brown

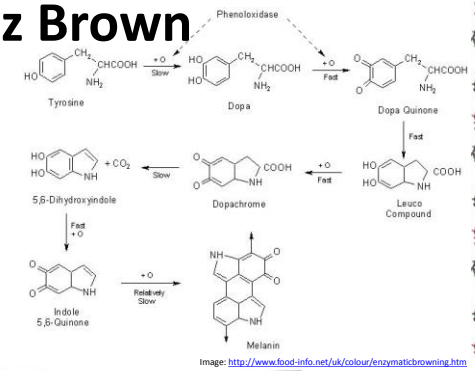


Image: http://www.food-info.net/uk/colour/enzymaticbrowning.htm

Balanced Browning

Control heat

- Sugar browning @ higher Temp

Control water

- Keeps Temp low

Cooking Methods

Boiling

Steaming

Pressure cooking

Baking

Frying

Grilling

Heat Management

Specific Heat Capacity –

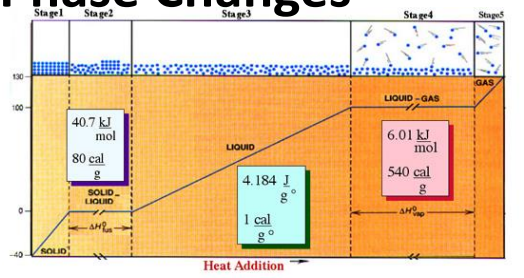
- the amount of heat energy required to raise the temperature of 1 gram of a substance 1°C.

For water, 1 calorie per gram °C

- "Dietary Calorie" vs. calorie

http://www.engineeringtoolbox.com/specific-heat-capacity-food-d_295.html

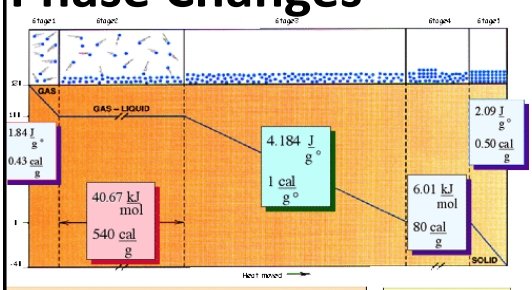
Phase Changes



What is the energy needed to take 1g H_2O at 0°C to 100°C ? 80 +100+ 540 =720cal

Image: http://faculty.sdmiramar.edu/fgarces/zCourse/All_Year/Ch100_01/aMy_FileLec/040L_LecNotes_Ch100/02_EnergyStateMatter/203_StMatter/203_StMatterIMF.htm

Phase Changes



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Water-based Cooking

Effective heat transfer

High heat capacity

Boiling

Steaming

Pressure cooking

Image: http://preparednesspro.wordpress.com/2009/08/11/myths-and-facts-of-water-storage/water-storage-myths-boiling-water/

Boiling

Even heating

Extracts flavors

- Good for intense flavors (bitter, alkaloids)
- Bad for subtle flavors

Easier to control cooking

Steaming

Even heating

Less flavor extraction

Easy to control

Retain color

Retain nutrients

Image: http://www.vegetariantimes.com/article/full-steam-ahead/

Salting the water

Colligative properties

Vapor pressure

Boiling point elevation

Image: http://rouxbe.com/tips-techniques/322-salting-water-for-cooking