NOTE: The following are not allowed to be turned in as the tasks for the Chemical Change Video Assignment.

- **Browning of apples or other fruits**
- **Lighting of match sticks**
- **Burning of natural gas or propane gas or butane gas or their mixtures without their use for cooking**
- **Burning of camp fuels**
- **Burning of paper**
- **Burning of charcoals or barbeque fire starter chips**
- **Burning of cigarettes or other tobacco products**
- **Burning of alcoholic beverages**
- **Burning of rubbing alcohol or petrol (gasoline) or petroleum products**
- **Burning of wood**
- **Burning of Plastic**
- **Burning of foam**
- **Burning of cotton or yarns or fabrics**
- **Burning of moth balls**
- **Burning of incense sticks**
- **Burning of candle**
- **Farting**
- **Belching**

Also please note that boiling or freezing water is a physical change. Similarly, Bubbling Lava Lamp is a Physical Change, not a Chemical Change.

Your task for this assignment should be complex enough that it exhibits the following physical changes that indicate a change in composition which accompanies a chemical change. At least eight of these 10 changes need to be present and explained in your video.

1. ***Color generation***
2. ***Glow or spark generation***
3. ***Heat changes***
4. ***Volume change***
5. ***Textural changes***
6. ***Water absorption***
7. ***Water release***
8. ***Gas generation***
9. ***Smell generation***
10. ***Noise generation***

Task Description, Rubric, and Exemplars

Create a video of a chemical change taking place in the kitchen or in the home's environment - video done along with parents or adult sibling - commentary (voice over) given by the student explaining why it is a chemical change providing details of the reactants, products, reaction conditions, and the balanced chemical equation along with phases, and the evidences of chemical change through indicators of a chemical change. The video can be up to 10 minutes but needs to be concise and precise and should have been edited accordingly.

Home Environment (5 pts); Adult Partner throughout the process, participating in the lab and speaking/responding (15 pts); Commentary is given by student (5 pts), explanation of why a chemical change given by conversation between the parent and the student (10 pts); Reaction Conditions (15 pts); Balanced Chemical Equation with phases (15 points); Evidence of Chemical Change through indicators (15 pts) Details on the qualities of Reactants (10 pts). Details on the qualities of products (10 pts).

Exemplars:

https://drive.google.com/file/d/0B7an485n3QWVZVY2X1Z6WE9GSkk/view?usp=sharing

https://drive.google.com/file/d/0BwNZguaSmyVHdXgzSjdoWkI1RDg/view?usp=sharing

Resources for Common Chemical Reactions in Cooking Food

Some Resources for chemical reactions in the kitchen are given here. Please research further for other chemical reactions.

Reaction between Baking Soda and Vinegar

$2NaHCO_{3(s)} + 2CH_3COOH_{(aq)} \rightarrow 2CH_3COONa_{(aq)} + 2H_2O_{(l)} + 2CO_{2(g)}$

Chemical Reaction in baking with baking soda or baking powder

$NaHCO_{3(s)} \rightarrow Na_2CO_{3(s)} + H_2O_{(g)} + CO_{2(g)}$

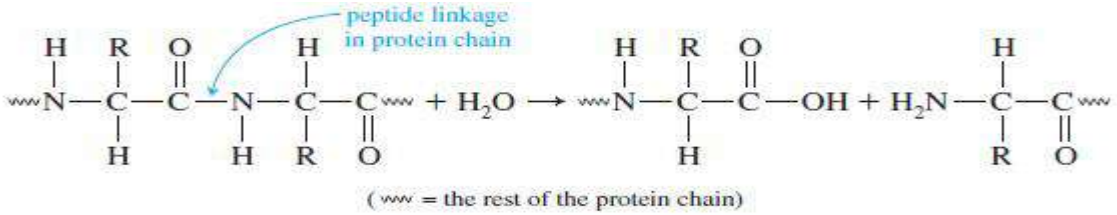
Chemical Reaction between White and Yok of the Egg

$FeCl_{2(aq)} + H_2S_{(g)} \rightarrow FeS_{(s)} + 2HCl_{(aq)}$

Chemical Equation for the Reaction between Egg Shell and Vinegar

$CaCO_{3(s)} + 2CH_3COOH_{(aq)} \rightarrow 2(CH_3COO)_2Ca_{(aq)} + 2\ H_2O_{(l)} + 2CO_{2(g)}$

Chemical Equation for Denaturing of Proteins

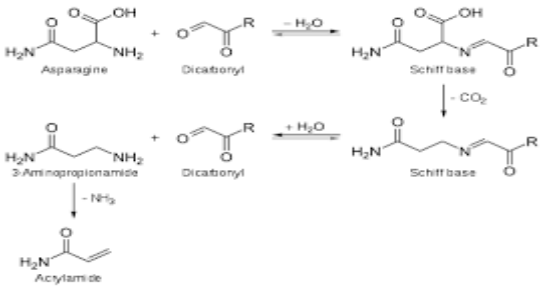


Chemical Equation of the Maillard Reaction

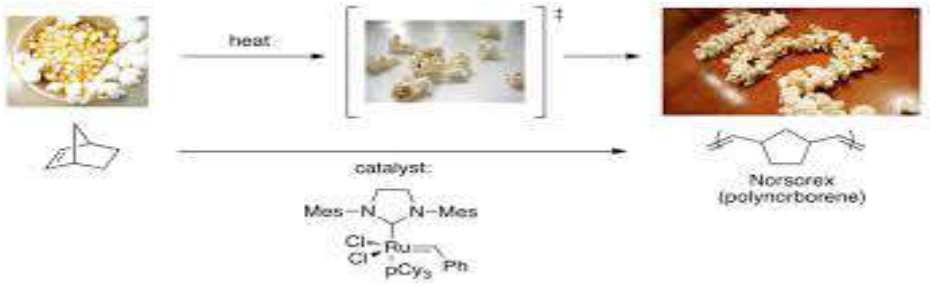
General Reaction

$Amino\ acid_{(aq)} + Sugar_{(s)} \rightarrow Schiff\ base_{(s)} \rightarrow Amides_{(s)}$

Maillard Reaction with specific formulas

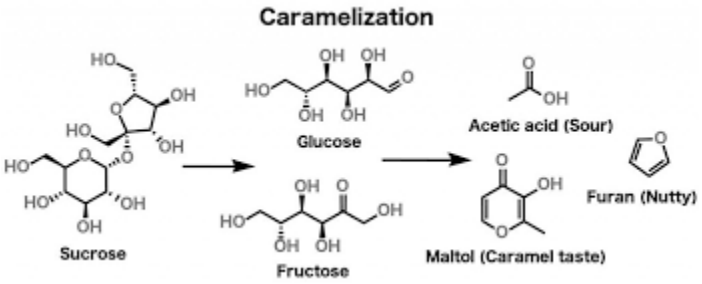


Chemical Equations in the Popping of Popcorn



Chemical Equation for Caramelization

$Sugar_{(aq)} \rightarrow Glucose_{(aq)} + Fructose_{(aq)} \rightarrow Acetic\ acid\ _{(aq)} + Maltol_{(aq)} + Furan_{(aq)}$



Cooking Chemistry

https://www.haikudeck.com/cooking-chemistry-science-and-technology-presentation-0TaQPzWIBf

Chemistry of cooking

https://www.slideshare.net/Chemrcwss/c24-the-chemistry-of-cooking

Chemistry of bread making

http://www.compoundchem.com/2016/01/13/bread/

Chemistry and Craft of Making Bread

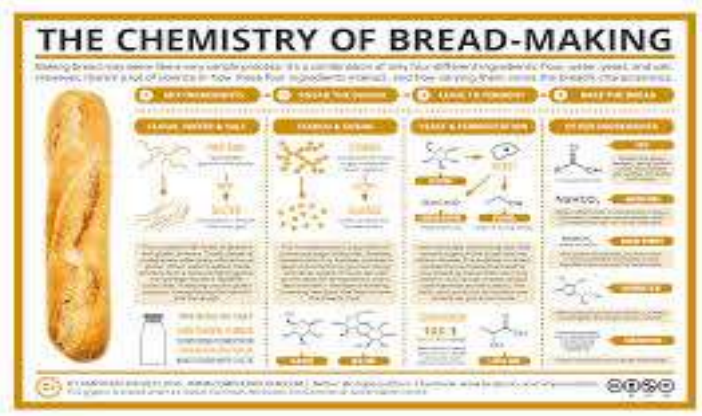
https://www.dailymotion.com/video/x4a5ayh

Science of Bread

https://www.youtube.com/watch?v=JthJR3pWkUo

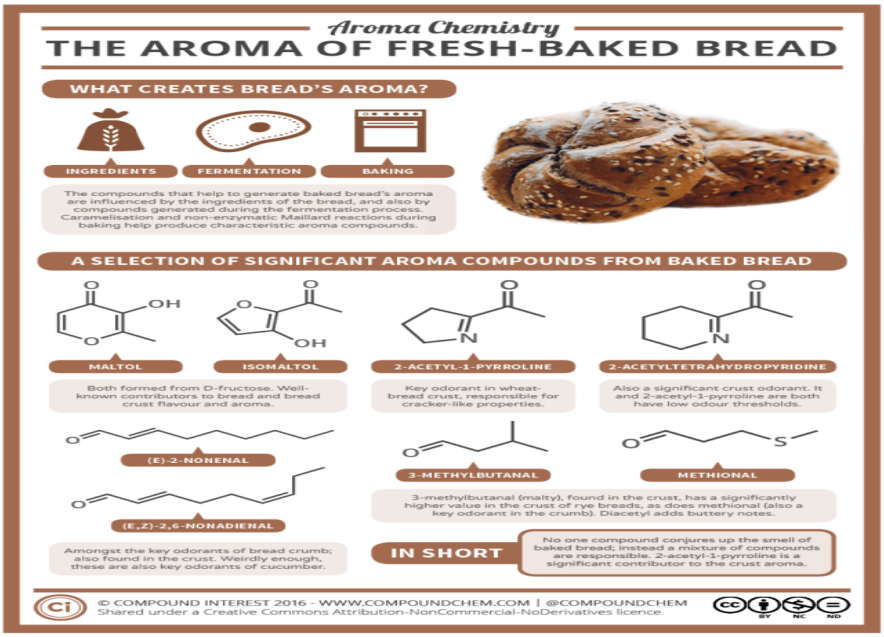
Poster on Bread making

https://www.compoundchem.com/2016/01/13/bread/



Poster on Aroma of Fresh Baked Bread

https://www.compoundchem.com/2016/01/20/bread-aroma/



Cookies

https://sciencemadefun.net/blog/cookie-chemistry/

Chemistry of Baking Cookies

https://www.thoughtco.com/chemistry-baking-cookies-4140220

Cookie-Baking Chemistry

https://www.npr.org/sections/thesalt/2013/12/03/248347009/cookie-baking-chemistry-how-to-engineer-your-perfect-sweet-treat

Brownie Science

https://foodcrumbles.com/chemistry-brownie-science-recipe/

Pancake

https://www.wired.com/2012/07/pancakes-served-with-a-side-of-science/

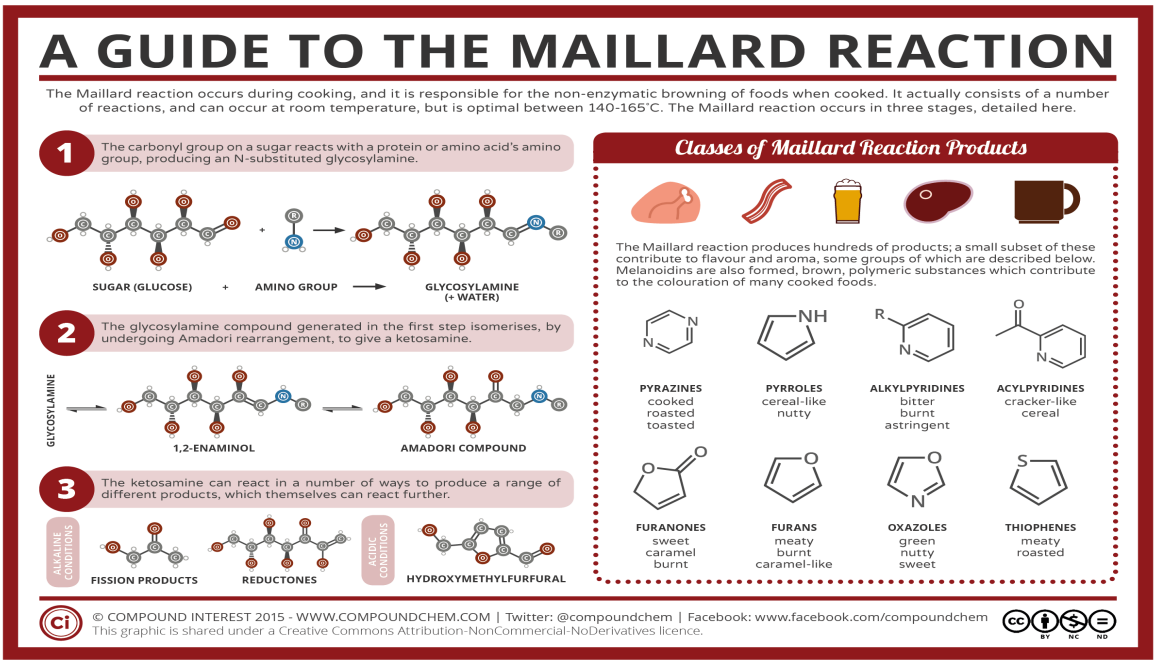
Cake

http://www.dispatch.com/content/stories/science/2013/11/24/1-cakeschemistry.html

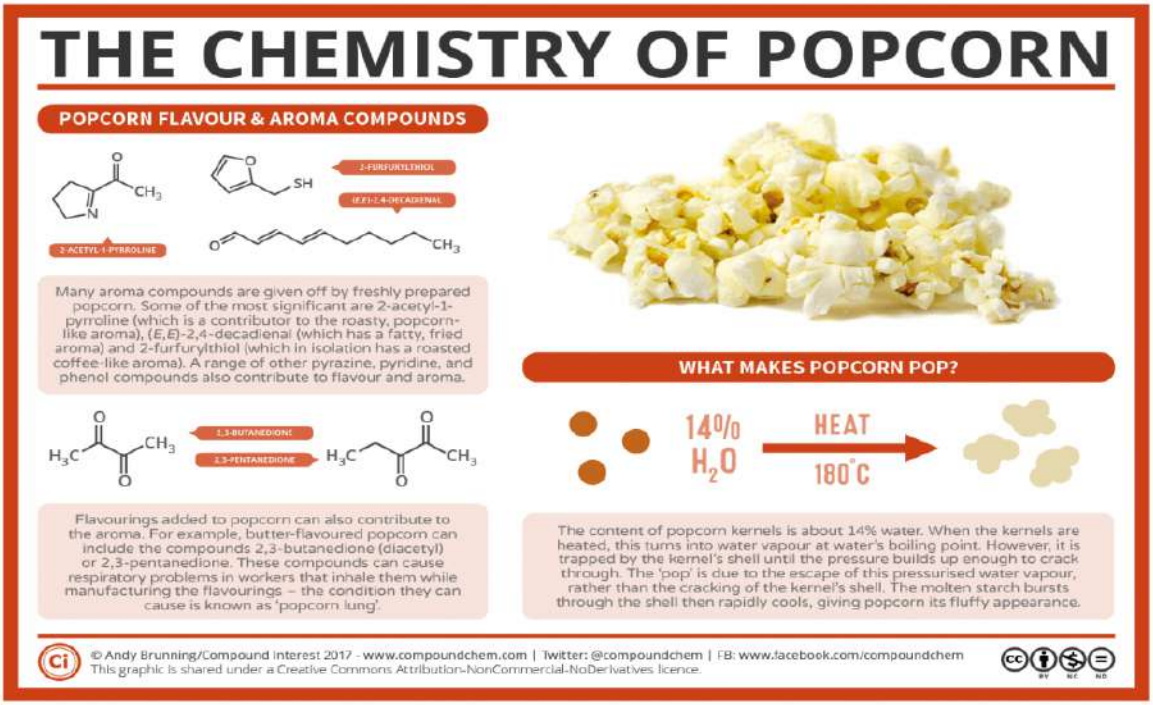
Chemistry of Baking

https://nzic.org.nz/ChemProcesses/food/6D.pdf

A guide to the Malliard Reaction (From Discover Magazine Blogs)



Chemistry of Popcorns from http://www.compoundchem.com/2017/01/19/popcorn/



Popcorn popping

http://poppingcornpigakuri.blogspot.com/2017/06/popping-corn-physical-or-chemical-change.html

Egg and its Chemical Composition

http://uoqasim.edu.iq/e_Learning/lec_file/The%20eggs%20and%20its%20chemical%20composition%206.pdf

Chemistry of Egg White

https://www.giapo.com/the-chemistry-of-egg-whites/

Chemistry of Lipids in Egg Yolk

https://www.jstage.jst.go.jp/article/jsnfs1949/24/6/24_6_317/_article

Why do egg yolks turn green?

Chemistry of Egg and Egg Shells from http://www.compoundchem.com/2016/03/26/eggs/

Why do eggs turn white when we boil them?

https://recipes.howstuffworks.com/menus/question616.htm

Eggs, Change, and Osmosis

https://www.labroots.com/videos/1685/the-chemistry-behind-egg-shell-vinegar-experiment

Reaction of Egg with Vinegar

Why add vinegar to dye eggs?

https://www.sciencefriday.com/educational-resources/eggs-to-dye-for/

An Exciting Egg Experiment

https://williambiolabreports.wordpress.com/2014/11/07/an-egg-citing-egg-speriment-by-william-h-vince-f-and-nolan-d/

Egg Facts

https://gemperle.com/egg-nutrition-facts/egg-facts/

Reaction between Egg and Vinegar

https://www.labroots.com/videos/1685/the-chemistry-behind-egg-shell-vinegar-experiment

Equation for reaction between baking soda and vinegar

https://www.thoughtco.com/equation-for-the-reaction-of-baking-soda-and-vinegar-604043

Baking soda & lemon juice reaction

http://sites.jmu.edu/chemdemo/2011/06/14/lemon-fizz/

Egg and Vinegar reaction

http://www.kidzone.ws/science/egg.htm

Equation for Egg Shells and Vinegar reaction

https://van.physics.illinois.edu/qa/listing.php?id=461

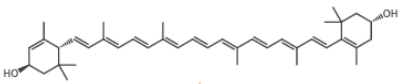
Science of Eggs

https://www.exploratorium.edu/cooking/eggs/eggscience.html

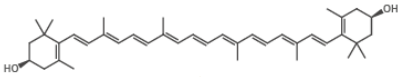
THE CHEMISTRY OF EGGS & EGG SHELLS

Eggs are one of the most versatile kitchen ingredients; there are numerous ways of cooking them on their own, and they can also be used to help create a range of other foods. Here, we take a look at what they're made of, and how they change during cooking.

EGG COLOUR & COMPOSITION



LUTEIN



ZEAXANTHIN

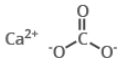
The yellow colour of egg yolks is due to the presence of the carotenoid pigments lutein and zeaxanthin. Artificial additives aren't permitted, but additives such as beta-carotene and marigold petals can be added to chicken feed to influence the yolk's colour.

EGG WHITE PROTEINS

OVALBUMIN	CONALBUMIN	OVOMUCIN	OTHERS
54%	12%	2%	32%

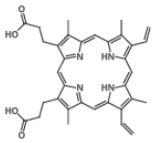
About 90% of the egg white is water; the rest of its mass is mostly protein. Ovalbumin's purpose is thought to be nutrition for the developing chick; Ovomucin helps thicken the egg white; and conalbumin binds iron & guards against infection.

EGG SHELL COMPOSITION



CALCIUM CARBONATE

Calcium carbonate is the main component of eggshells. Nanoparticles of calcium carbonate are arranged into ordered crystals by proteins, forming a calcite shell. The colour of the eggshell comes from porphyrin pigments on the shell's surface.



PROTOPORPHYRIN IX

Brown pigment; the presence of the pigment oocyanin causes eggs to have a blue or green colouration.

COOKING EGGS

BEFORE COOKING

AFTER COOKING

Egg proteins begin in the raw egg as folded chains, but as they are heated they begin to denature and unfold. Interactions between the unfolded proteins create a three-dimensional network, trapping the water and causing the egg to solidify.

HYDROGEN SULFIDE

FeS

IRON (II) SULFIDE

Hydrogen sulfide, formed by the reaction of sulfur-containing proteins in the albumen, is the compound that gives cooked eggs their characteristic smell. When eggs are cooked for a long time it can react with iron in the yolk, forming iron sulfide, and giving a green hue to the yolk surface.

7.6 — ALBUMEN pH OF FRESHLY LAID EGG

9.2 — pH AFTER SEVERAL DAYS OF STORAGE

Albumen pH increases as CO_2 diffuses out through the shell. Albumen adheres more strongly to the shell at lower pH, making it harder to peel boiled eggs.