Chem 108: Lab

Week 9

Sign in
Pick up handouts with a scantron
Sit at your lab station

i.e. where your lab drawer is located

Today's Experiments: Chemical Reactions I & II
Select a partner; Procedures pg. 62 & pp.44-45
Chemical Reactions I: Fermentation, Synthesis of Ethanol
Chemical Reactions II: General Reactions

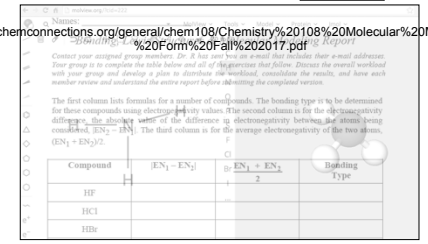
Both sets of procedures are to be completed today

Molecular Modeling

(Individual or Collaborative)

Report Form (Replacement pages for Molecular Model Lab pp. 97-103)

http://chemconnections.org/general/chem108/Chemistry%20108%20Molecular%20Modeling%20Form%20Fall%202017.pdf

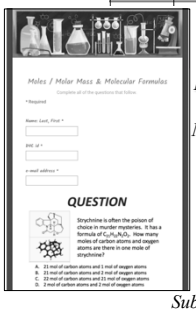


Turn-in individually or one per group
Due 27-Mar

GCs DUE +7 Days

Guide-Bonds	Guide- TED Mol	Quiz Molar Mass	Guide-Shapes	Quiz Shapes
20	20	50	20	50

Post Labs DUE RPT Day



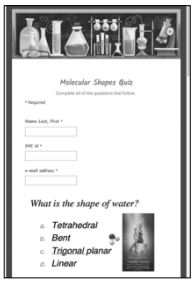
QUIZZES

Moles / Molar Mass
&
Molecular Formulas

and

Molecular Shapes

Both Quizzes DUE: 29-Mar



Submit individually on-line
Refer to Calendar & Resources pages for links

Chemical Reactions I & II

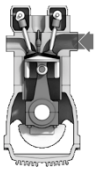
Select a partner; Lab Manual pp.44-45. & pg. 62

Do Today

pp. 44-45

- Combination (Synthesis)
- Decomposition
- Single Displacement
- Double Displacement

1

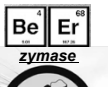


- Biological Reactions: Enzyme Catalysts
- **Fermentation pg. 62**
- Combustion: Oxidation-Reduction

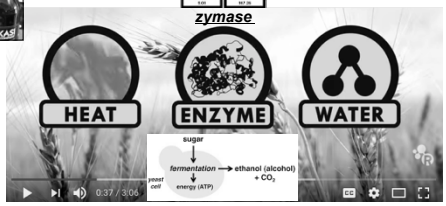
http://www.piney.com/BabNinkasi.html)

Chemical Reactions I (Biological Reaction)

Bakers' yeast fermentation



zymase



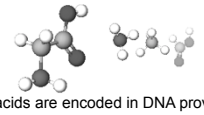
https://www.youtube.com/watch?v=vW99JEaDApY

http://www.piney.com/BabNinkasi.html

Amino Acids & Enzymes

Pre-set Legos of Chemical Biology & Bio-catalysis

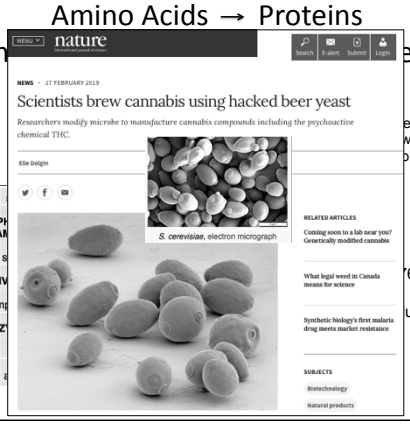
Amino acids contain **carbon, hydrogen, oxygen, and nitrogen**, which resemble the following shapes & structural components



- 20 different amino acids are encoded in DNA providing a genetic code, an archive representing specific sequences of amino acids, which are linked together forming a specific protein.
- Hundreds of amino acids are linked together through amide (peptide) bonds to form these proteins, some of which, enzymes, provide the catalytic basis for the chemistry of life.
- There are less than 20,000 total proteins produced from humans' entire DNA genome, each coded for by a specific gene in DNA's ~3 billion genetic bases.

Amino Acids → Proteins

En ers



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which
ohol).

'6 g/mol

ues: 396

Chemical Reactions: Fermentation

Start Today: in pairs **pg. 62**

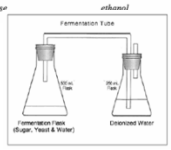
http://www.piney.com/BabNinkasi.html

A 3900-year-old clay tablet, which was found in Iraq between the Tigris and Euphrates rivers, had a Sumerian poem (*http://www.piney.com/BabNinkasi.html*) honoring Ninkasi, the patron goddess of brewing. It contains the oldest surviving beer recipe, describing the fermentation of the carbohydrates found in bread, *bappir*, made from barley, honey, dates and sweet aromatic herbs. The global availability of carbohydrates and native microbes (yeasts) has led to the production of many different types of beers, ales, wines, and fruit based alcoholic beverages in many countries throughout the world. [*The bottle on the left was found in Eugene, Oregon, ... But, it dates only to 2016.*]

In this experiment you will ferment a carbohydrate, sucrose (table sugar), using bakers yeast. The reaction is:

$$C_{12}H_{22}O_{11} + H_2O \xrightarrow{\text{zymase}} 4\,C_2H_5OH + 4\,CO_2$$

sucrose ethanol



Chemical Reactions I

✿Biological Reactions: Enzyme Catalysts

Fermentation pg. 62

Report Form – Fermentation–Distillation

Preparation of the solution **pg. 66**

Mass, sucrose + container	
Mass, container	
Mass, sucrose*	

To Do Today

Have Dr. R. initial completed data pg. 66 before leaving lab

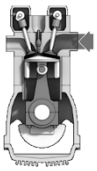
Chemical Reactions I & II

With your partner; Complete Lab Manual pp.44-45. & pg. 62

Do Today

pp. 44-45

1



✿Combination (Synthesis)

✿Decomposition

✿Single Displacement

✿Double Displacement

✿**Combustion: Oxidation-Reduction**

✿Biological Reactions: Enzyme Catalysts

Fermentation pg. 62

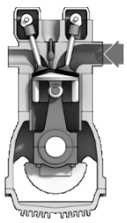
http://www.piney.com/BabNinkasi.html)

✿**Combustion: Oxidation-Reduction Reaction**

Octane (Gas) Combustion Engine

$$2\,C_8H_{18(l)} + 25\,O_{2(g)} \longrightarrow 16\,CO_{2(g)} + 18\,H_2O_{(l)} + \textbf{energy}$$

1



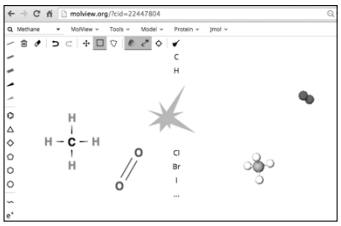
http://chemconnections.org/general/movies/4StrokeEngine_Ortho_3D_Small.gif

http://molview.org

Molecular Shapes ⟺ Lewis Structures

MolView: Visual On-line Molecular Modeling

https://www.youtube.com/watch?v=cOJ3MUpDrfI&list=PLE7B4FAD08F1EBCE2&index=2



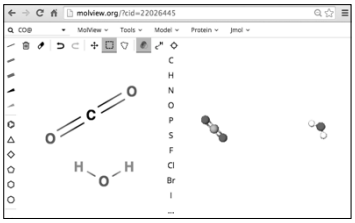
Bonding, Lewis Structures

Computational Experiments, Molecular Modeling

http://molview.org

Molecular Shapes ⟺ Lewis Structures

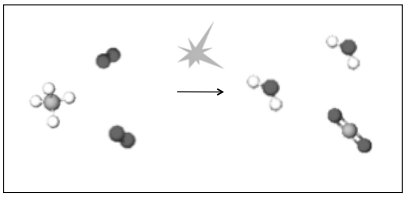
MolView: Visual On-line Molecular Modeling



Bonding, Lewis Structures
Computational Experiments, Molecular Modeling

Combustion

$$1\ CH_{4(g)} + 2\ O_{2(g)} \longrightarrow 1\ CO_{2(g)} + 2\ H_2O_{(g)} + energy$$



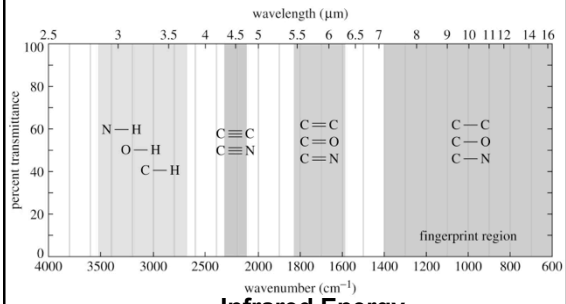
Bonding, Lewis Structures
Computational Experiments, Molecular Modeling

Combustion Products

Energy & CO_2

https://www.youtube.com/watch?v=Q9u8vM8YjeU&index=3&list=PLE7B4FAD08F1EBCE2

Infrared- Bond Absorbances

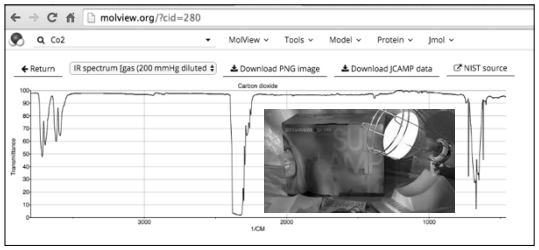


Infrared Energy

Electromagnetic Radiation

Infrared - Bond Absorbances

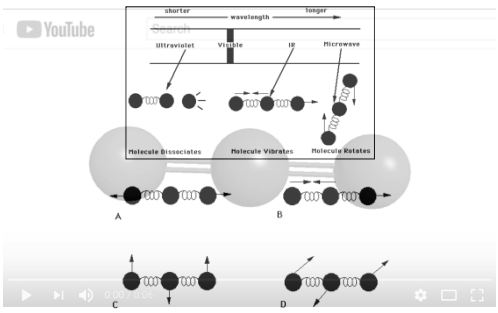
http://molview.org

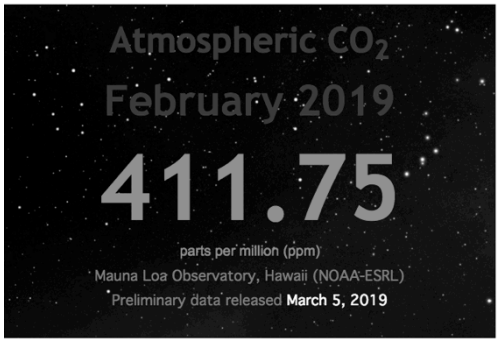


Sun lamps = Infrared Energy

CO_2 Bond Vibrations - Absorbances

https://www.youtube.com/watch?v=W5gimZlFY6I

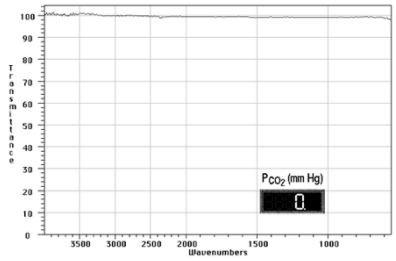




https://www.co2.earth/

Infrared Spectra: CO_2 Concentration Effects

Nitrogen & Oxygen produce flat lines: 100% Transmission, 0 Absorbance



Turn in Global Warming scantron for quiz credit

CO_2 Concentration Effects

https://www.youtube.com/watch?v=EvphJO8VKlc&index=4&list=PLE7B4FAD08F1EBCE2

CO_2 Concentration Effects

https://twitter.com/i/events/1106352501077364736?cn=ZmxleGlibGVfcmVjcw%3D%3D&refsrc=email

Global Warming

Survey Questions & Bonus Assignment

http://chemconnections.org/general/chem108/Global%20warming%20questions.pdf

http://chemconnections.org/general/chem108/Global%20warming%20%26%20Carbon%20Footprint.2017.pdf

Chemical Reactions II

Each partner is to keep individual records & reports pp. 46-52

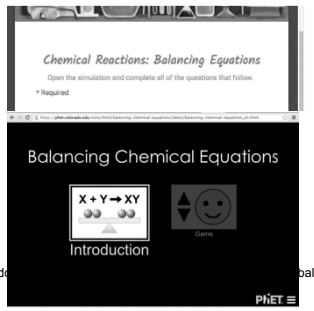
To Do today:

- ✿Combination (Synthesis)
- ✿Decomposition
- ✿Single Displacement
- ✿Double Displacement

- ✿Combustion: Oxidation-Reduction
- ✿Biological Reactions: Enzyme Catalysts

Have Dr. R. initial completed Lab Manual pp.46-47 plus pg. 66 before leaving lab

Post lab



https://phet.colorado balancing-chemical-