

Chem 108: Lab

Week 9

Sign in

Pick up handouts plus 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.



S. Curry (D. Green)

and on your partner's form

What's My Formula?

DUE Today:

**ONE Complete Group Report
(Pages Stapled Together)**

***Confer with Group members
after completing today's Lab
procedures with your partner
and getting the data pages
signed by Dr. R.***

Name: D. Green (S. Curry)

Section: _____

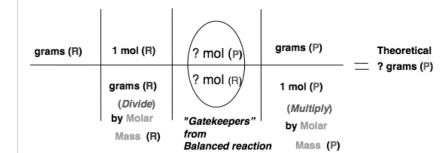
Report Form – What's My Formula

Unknown Number	
Mass, Evaporating Dish + Unknown	
Mass, Evaporating Dish	
Mass, Unknown	
Mass Evaporating Dish + Salt (Product), after heating	
Mass Evaporating Dish + Salt (Product), after 2 nd heating	
Mass Salt (Product)	
% Salt (Product)	
Mass Salt (Product) / Mass Unknown x 100 =	
% Molar Mass Salt (Product)	
Closest from last week's 4 lab calculations	
Unknown Identification	

Calculations:

% Salt (Product) = Mass Salt (Product), after heating / Mass Unknown Sample x 100

Theoretical Yield:



% Yield = actual grams of Salt (Product) / "Theoretical" grams x 100

What's My Formula?

DUE Today:

**ONE Complete Group Report
(Pages Stapled Together)**

***Confer with Group members
after completing today's Lab
procedures with your partner.***

Each group member is to contribute one completed replacement pg. 36 handout with their own name first followed by partners' names of all members in entire group. The unknown number(s) should be the one(s) worked on, in the order worked on.

There must be one form for each unknown including bonus samples.



S. Curry (D. Green)

and on your
partner's form

Name: D. Green (S. Curry)

Section: _____

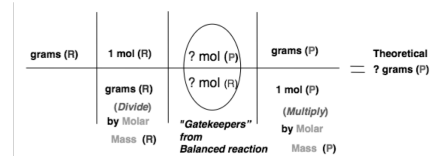
Report Form – What's My Formula

Unknown Number	
Mass, Evaporating Dish + Unknown	
Mass, Evaporating Dish	
Mass, Unknown	
Mass Evaporating Dish + Salt (Product), after heating	
Mass Evaporating Dish + Salt (Product), after 2 nd heating	
Mass Salt (Product)	
% Salt (Product)	
Mass Salt (Product) / Mass Unknown x 100 =	
% Molar Mass Salt (Product)	
Closest from last week's 4 lab calculations	
Unknown Identification	

Calculations:

$$\% \text{ Salt (Product)} = \text{Mass Salt (Product), after heating} / \text{Mass Unknown Sample} \times 100$$

Theoretical Yield:



$$\% \text{ Yield} = \text{actual grams of Salt (Product)} / \text{"Theoretical" grams} \times 100$$



S. Curry (D. Green)

and on your partner's form

Name: D. Green (S. Curry)

Section: _____

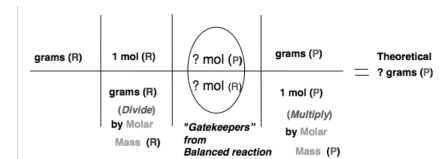
Report Form – What's My Formula

Unknown Number	
Mass, Evaporating Dish + Unknown	
Mass, Evaporating Dish	
Mass, Unknown	
Mass Evaporating Dish + Salt (Product), after heating	
Mass Evaporating Dish + Salt (Product), after 2 nd heating	
Mass Salt (Product)	
% Salt (Product)	
Mass Salt (Product) / Mass Unknown x 100 =	
% Molar Mass Salt (Product)	
Closest from last week's 4 lab calculations	
Unknown Identification	

Calculations:

% Salt (Product) = Mass Salt (Product), after heating / Mass Unknown Sample x 100

Theoretical Yield:



% Yield = actual grams of Salt (Product) / "Theoretical" grams x 100

What's My Formula?

DUE Today:

ONE Complete Group Report
(Pages Stapled Together)

Each page 36 must have a complete set of clear calculations for the unknown 's number to include % Yield & Theoretical Yield Calculations for the respective unknown.

What's My Formula?

DUE Today:

**ONE Complete Group
Report
(Staple Pages Together)**

Completed pages 37 & 38 must have a complete set of clear Theoretical % Mass calculations and reactions for each of the respective unknowns.

Separate pages for each unknown are acceptable.

3. Calculate theoretical mass of product for
a. sodium hydrogen carbonate

Balanced Equation:	
Molar Mass Sodium Hydrogen Carbonate:	Molar Mass Salt Product:
Theoretical Mass of Salt Product:	

b. potassium hydrogen carbonate

Balanced Equation:	
Molar Mass Potassium Hydrogen Carbonate:	Molar Mass Salt Product:
Theoretical Mass of Salt Product:	

c. barium chloride dihydrate

Balanced Equation:	
Molar Mass Barium Chloride Dihydrate:	Molar Mass Salt Product:
Theoretical Mass of Salt Product:	

d. calcium sulfate dihydrate

Balanced Equation:	
Molar Mass Calcium Sulfate Dihydrate:	Molar Mass Salt Product:
Theoretical Mass of Salt Product:	

3. Calculate theoretical mass of product for
a. sodium hydrogen carbonate

Balanced Equation:	
Molar Mass Sodium Hydrogen Carbonate:	Molar Mass Salt Product:
Theoretical Mass of Salt Product:	

b. potassium hydrogen carbonate

Balanced Equation:	
Molar Mass Potassium Hydrogen Carbonate:	Molar Mass Salt Product:
Theoretical Mass of Salt Product:	

c. barium chloride dihydrate

Balanced Equation:	
Molar Mass Barium Chloride Dihydrate:	Molar Mass Salt Product:
Theoretical Mass of Salt Product:	

d. calcium sulfate dihydrate

Balanced Equation:	
Molar Mass Calcium Sulfate Dihydrate:	Molar Mass Salt Product:
Theoretical Mass of Salt Product:	

Molar Comparisons of Analgesics

Calculate Moles : Doses (mmol/dose)

What's My Formula?

Post Lab:

Must submit Individually
From calendar link

DUE Friday



What's My Formula?
Post Lab

* Required

Name: Last, First *

DVC id *

Post Lab:
Molar Comparisons of Analgesics
Calculating Moles : Doses (mmol/dose)

Which analgesic has the most biologically active ingredient based on millimoles per dose (*mmol/dose*)?

5.0 g of each would produce the following number of doses:

	Formula	Doses	<i>mmol/dose</i>
Aspirin	<chem>C9H8O4</chem>	15.0	?
Ibuprofen	<chem>C13H18O2</chem>	25.0	?
Naproxen Sodium	<chem>C15H13O3Na</chem>	22.7	?
Acetaminophen	<chem>C8H9NO2</chem>	5.0	?

Molar Mass Aspirin = 180.1 g/mol
5.0 g / 180.1 g/mol = 0.028 mol / 15 doses = 1.8 mmol/dose

Molecular Modeling

(Collaborative Effort / Individual Report Forms)

Report Form (*Replaces Molecular Model Lab pp. 102-104*)

<http://chemconnections.org/general/chem108/Chemistry%20108%20Molecular%20Modeling%20Form%20Fall%202019.pdf>

The screenshot shows the MolView software interface. At the top, there is a search bar and navigation tabs for 'Tools', 'Model', 'Protein', and 'Jmol'. Below the navigation is a toolbar with various icons for editing and viewing. The main area displays a table with the following columns: Chemical Formula, # Valence e's in Molecule, Lewis Structure, Name of VSEPR Arrangement (Geometry), Name of Shape (Molecular Geometry), Bond (Polar or Non-Polar), Molecule (Polar or Non-Polar), OPTIONAL 3 Dimensional Drawing, and Resonance (Yes or No). The table contains data for several molecules: H₂O, NH₃, CH₄, C₂H₄, HCN, and C₂H₂. To the right of the table, a 3D ball-and-stick model of a molecule is shown, with atoms represented by white, blue, and red spheres. The interface also includes a 'Report Form' button and a 'Molecular Models' button.

Chemical Formula	# Valence e's in Molecule	Lewis Structure	Name of VSEPR Arrangement (Geometry)	Name of Shape (Molecular Geometry)	Bond (Polar or Non-Polar)	Molecule (Polar or Non-Polar)	OPTIONAL 3 Dimensional Drawing	Resonance (Yes or No)
H ₂ O				N		Polar		No
NH ₃				O		Polar		No
CH ₄				P				No
C ₂ H ₄			Around each C	Around each C	C-H C-C	Non-Polar		No
HCN			Around C	Around C	H-C C-N	Polar		No
C ₂ H ₂			Around each C	Around each C	C-H C-C			No

<http://chemconnections.org/general/chem108/Molecular%20Modeling-intro%20%26%20table%202019f.pdf>

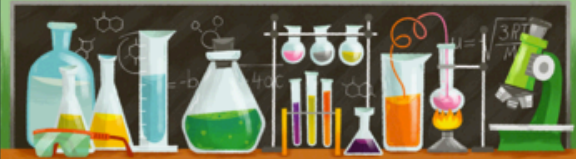
Turn-in individually
Due 23-Oct

QUIZZES

Moles / Molar Mass & Molecular Formulas and Molecular Shapes

Both Quizzes

DUE:
25-Oct



Moles / Molar Mass & Molecular Formulas
Complete all of the questions that follow.

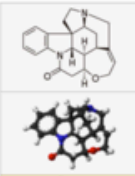
* Required

Name: Last, First *

DVC id *


e-mail address *

QUESTION



Strychnine is often the poison of choice in murder mysteries. It has a formula of $C_{21}H_{22}N_2O_2$. How many moles of carbon atoms and oxygen atoms are there in one mole of strychnine?

A. 21 mol of carbon atoms and 1 mol of oxygen atoms
B. 21 mol of carbon atoms and 2 mol of oxygen atoms
C. 22 mol of carbon atoms and 21 mol of oxygen atoms
D. 2 mol of carbon atoms and 2 mol of oxygen atoms



Molecular Shapes Quiz
Complete all of the questions that follow.

* Required



Name: Last, First *

DVC id *

e-mail address *

What is the shape of water?

a. Tetrahedral
b. Bent
c. Trigonal planar
d. Linear



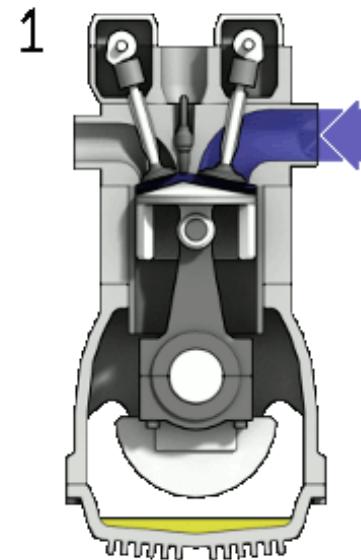
Submit individually on-line
Refer to Calendar & Resources pages for links

Chemical Reactions I & II

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

Do Today

- ❁ Combination (Synthesis)
 - ❁ Decomposition
 - ❁ Single Displacement
 - ❁ Double Displacement
-
- ❁ Biological Reactions: Enzyme Catalysts
 - ❁ **Fermentation pg. 62**
 - ❁ Combustion: Oxidation-Reduction



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

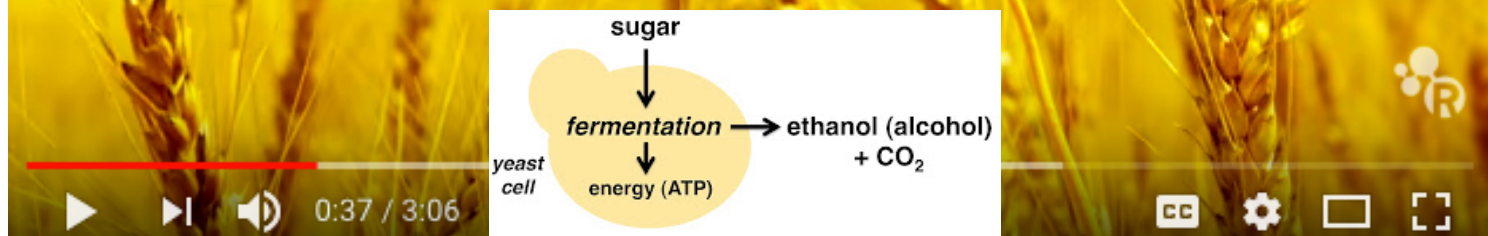


Chemical Reactions I (Biological Reaction)

Bakers' yeast fermentation



zymase



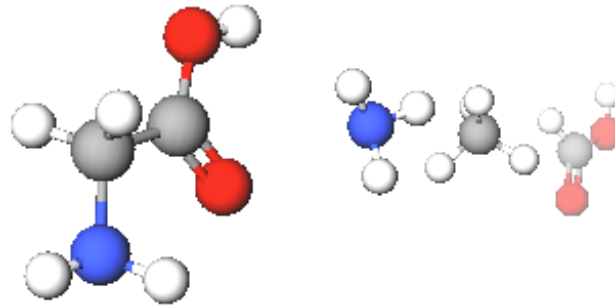
<https://www.youtube.com/watch?v=vW99JEaDApY>

<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

MENU **nature**
International journal of science


SEARCH E-alert SUBMIT LOGIN

NEWS • 27 FEBRUARY 2019


Scientists brew cannabis using hacked beer yeast

Researchers modify microbe to manufacture cannabis compounds including the psychoactive chemical THC.

Elie Dolgin


S. cerevisiae, electron micrograph



RELATED ARTICLES

Coming soon to a lab near you?
Genetically modified cannabis

What legal weed in Canada means for science

Synthetic biology's first malaria drug meets market resistance

SUBJECTS

Biotechnology
Natural products

ers

erting
which
phol).

ALPH
AN

S

INV

simp

ZY

a

6 g/mol

ues: 396

Chemical Reactions: Fermentation

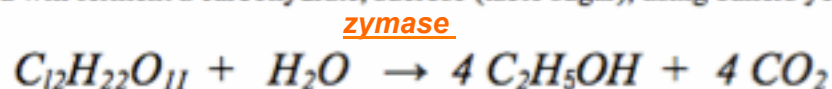
Start Today: in pairs **pg. 62**

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



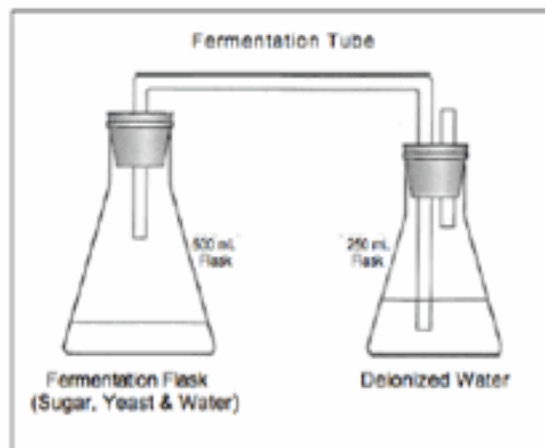
A 3900-year-old clay tablet, which was found in Iraq between the Tigris and Euphrates rivers, had a Sumerian poem (<http://www.piney.com/BabNinkasi.html>) honoring Ninkasi, the patron goddess of brewing. It contains the oldest surviving beer recipe, describing the fermentation of the carbohydrates found 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:



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



Chemical Reactions I & II

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

Do Today

❁ Combination (Synthesis)

❁ Decomposition

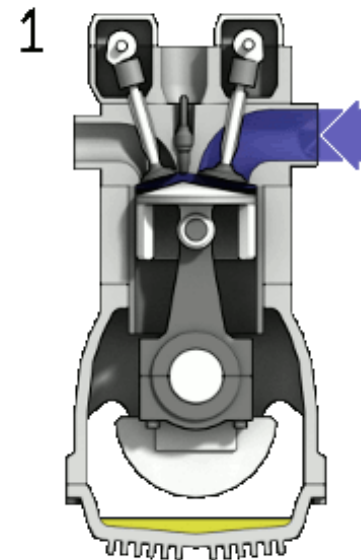
❁ Single Displacement

❁ Double Displacement

❁ Combustion: Oxidation-Reduction

❁ Biological Reactions: Enzyme Catalysts

Fermentation pg. 62



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



Combustion Products

Energy & CO₂



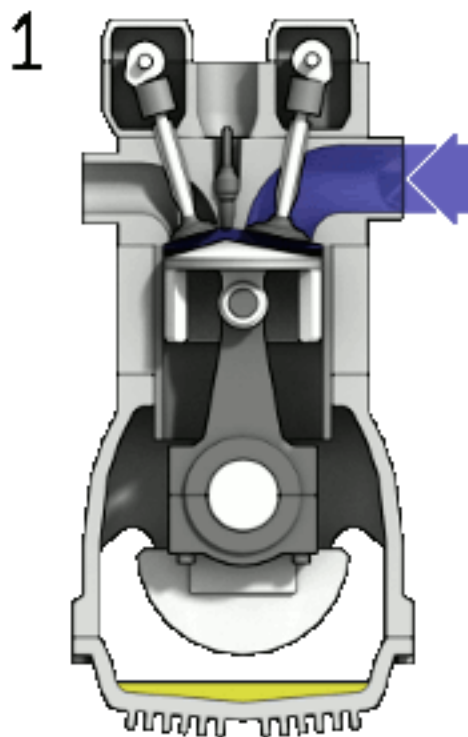
#3

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

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

☼ Combustion: Oxidation-Reduction Reaction

Octane (Gas) Combustion Engine



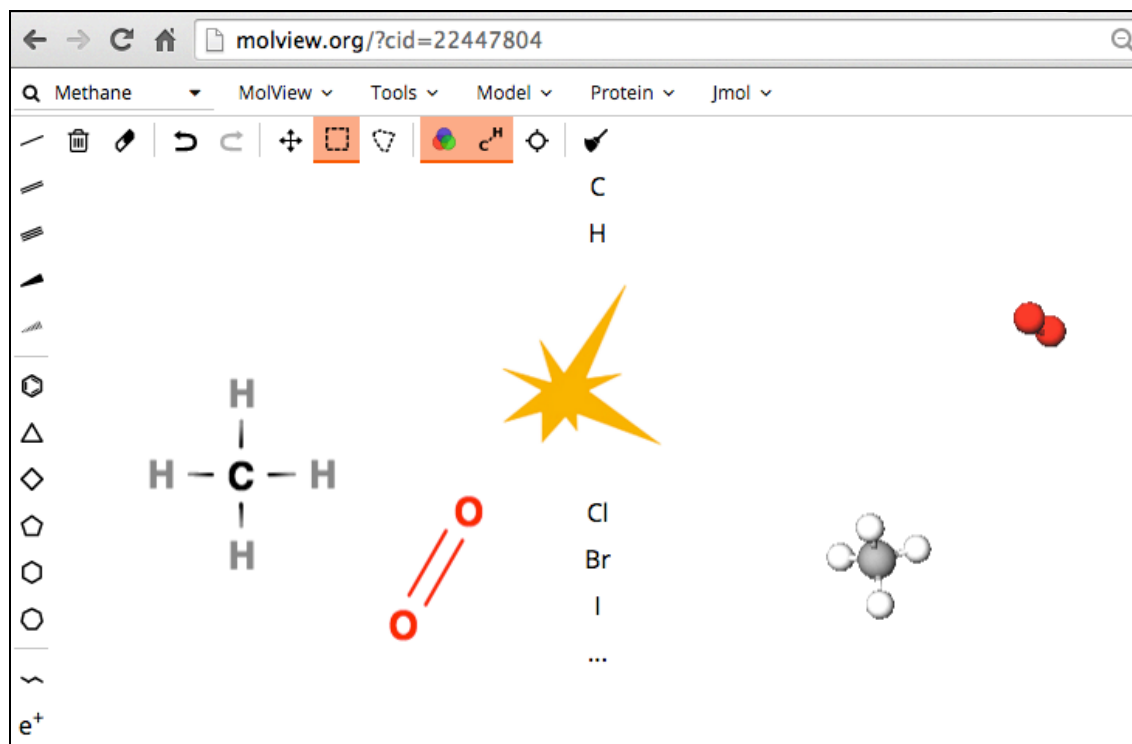
http://chemconnections.org/general/movies/4StrokeEngine_Ortho_3D_Small.gif

<http://molview.org>

Molecular Shapes \longleftrightarrow Lewis Structures

MolView: Visual On-line Molecular Modeling

<https://www.youtube.com/watch?v=cOJ3MUpDrfl&list=PLE7B4FAD08F1EBCE2&index=2>

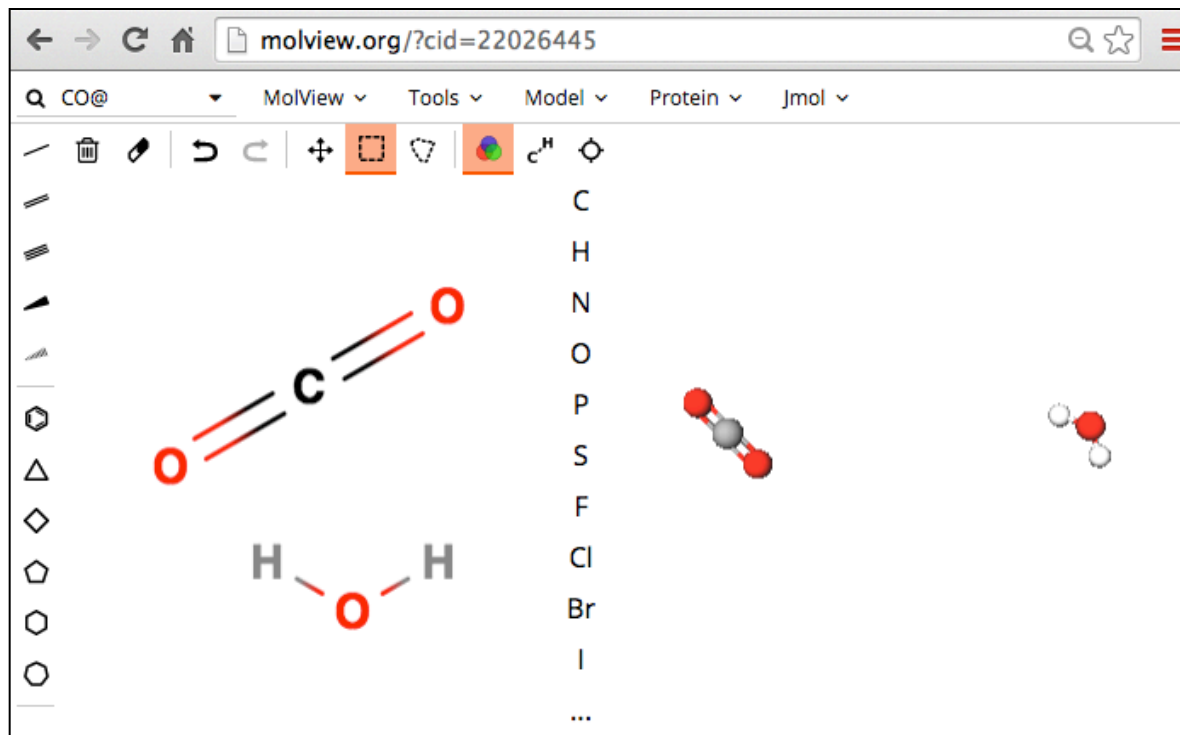


Bonding, Lewis Structures
Computational Experiments, Molecular Modeling

<http://molview.org>

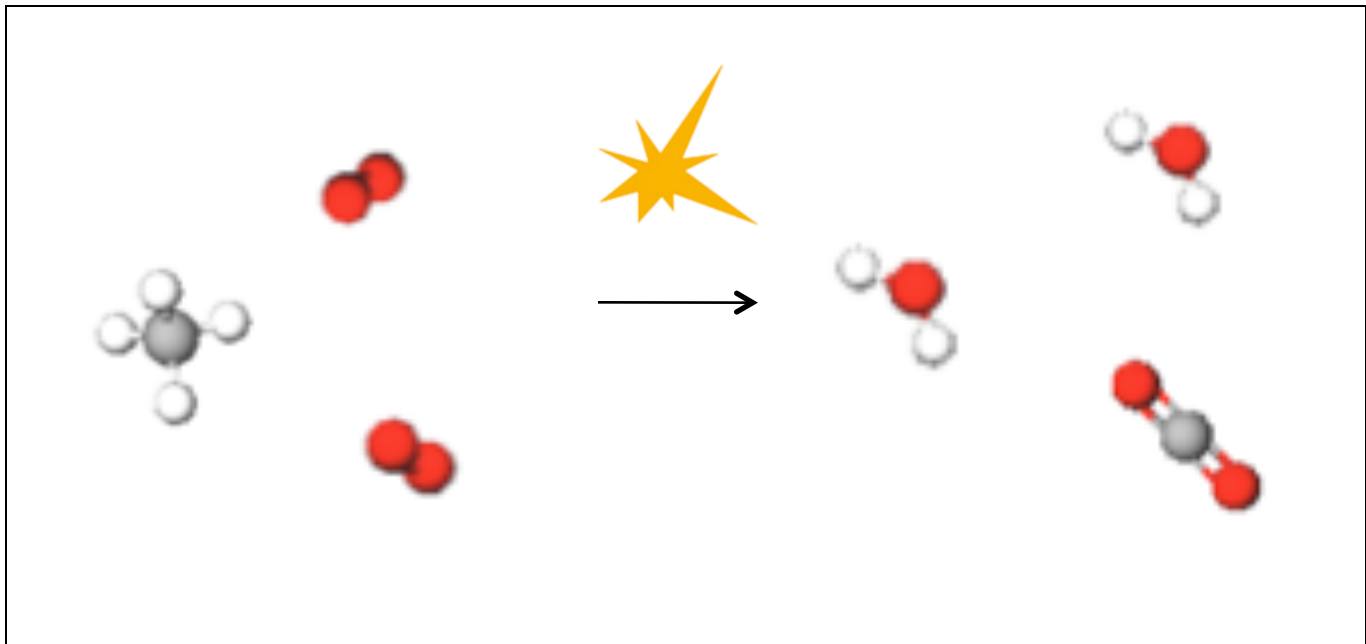
Molecular Shapes \longleftrightarrow Lewis Structures

MolView: Visual On-line Molecular Modeling



Bonding, Lewis Structures
Computational Experiments, Molecular Modeling

Combustion



Bonding, Lewis Structures
Computational Experiments, Molecular Modeling

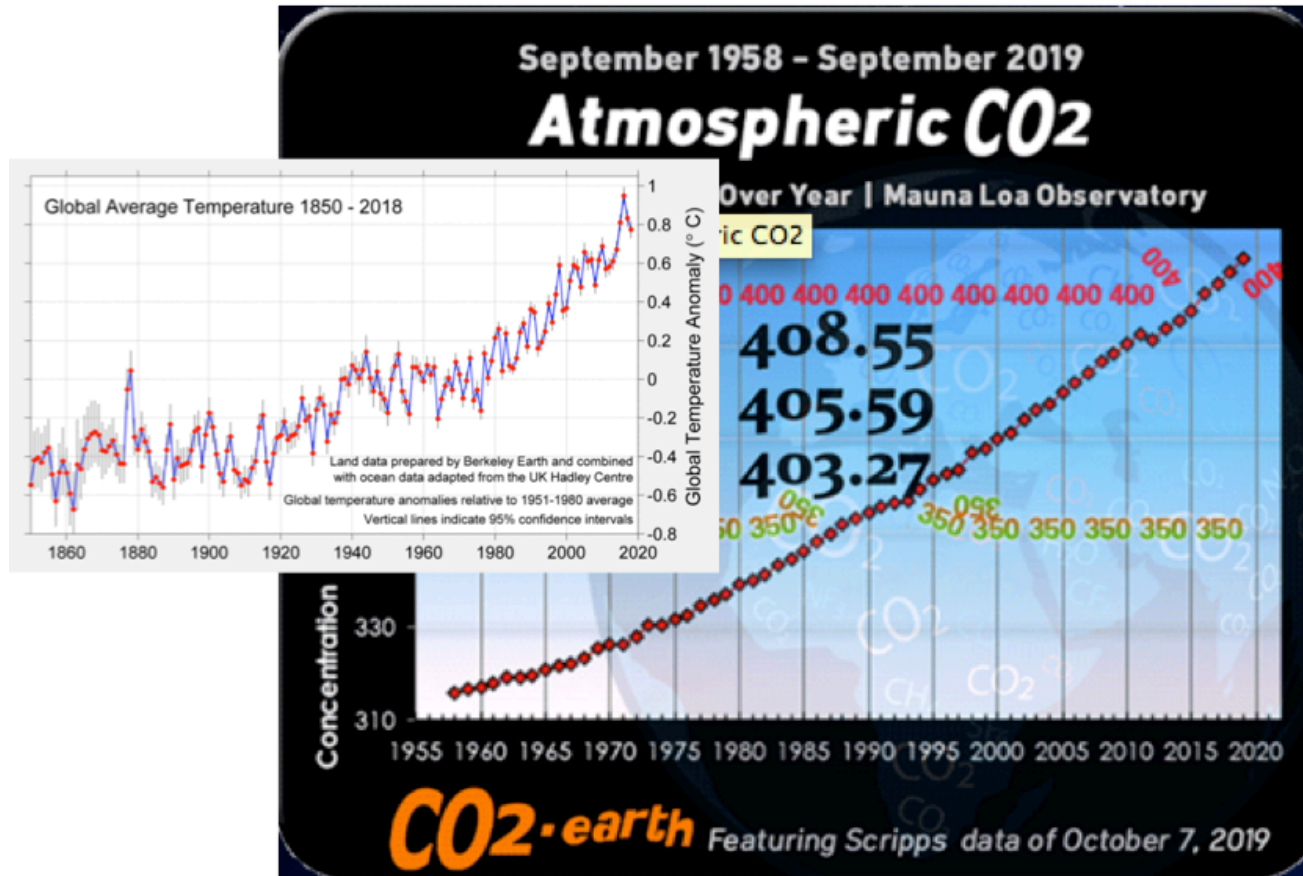
CO₂ Concentration Effects



#4

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

CO₂ Concentration Effects

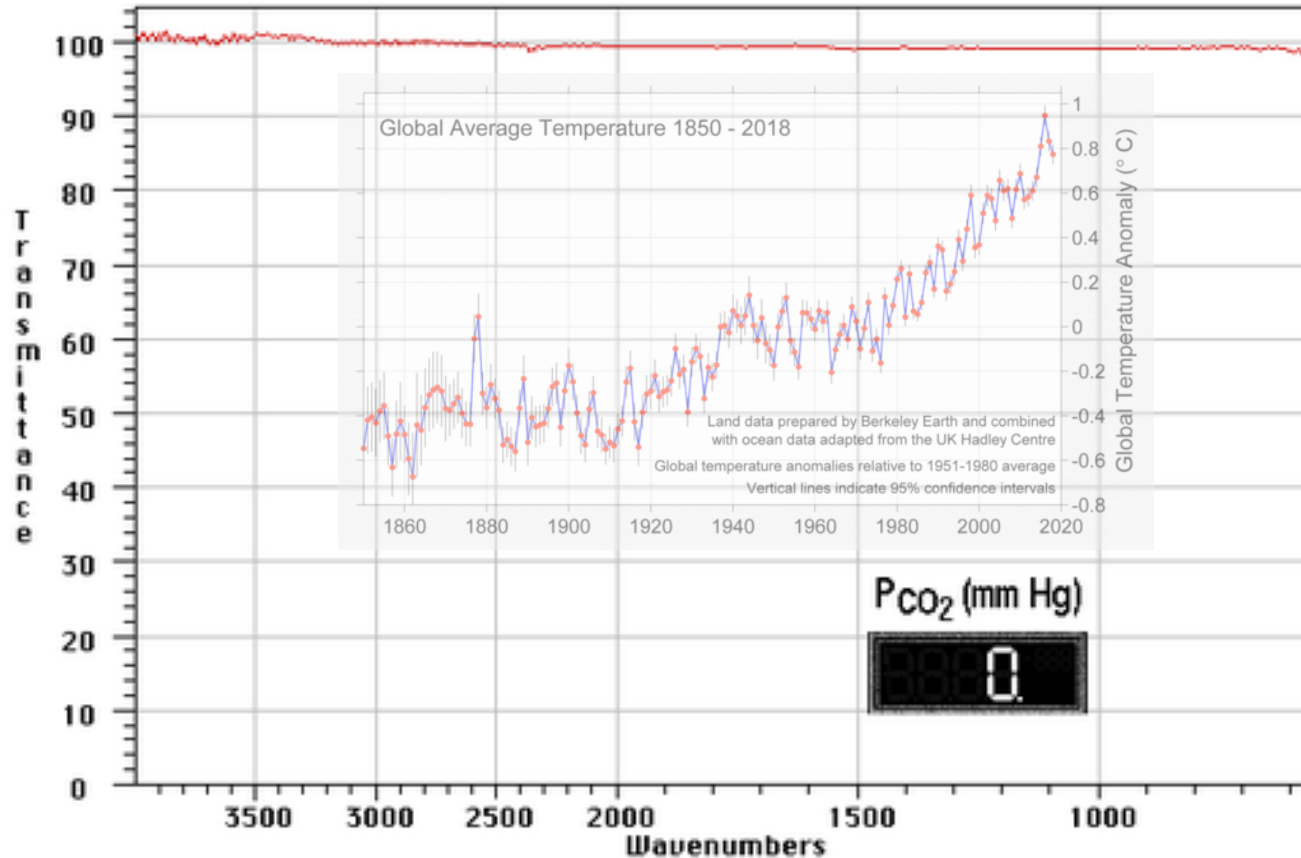


#4

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

Infrared Spectra: CO₂ Concentration Effects

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



Turn in Global Warming scantron for quiz credit

Global Warming

Survey Questions Bonus & Carbon Footprint Bonus

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

*Global Warming
Survey Questions
for Quiz bonus
(100%)*

Turn in Completed
Scantron

DUE Today

Global Warming, Your Carbon Footprint & Your Future

Provide answers to the following questions.

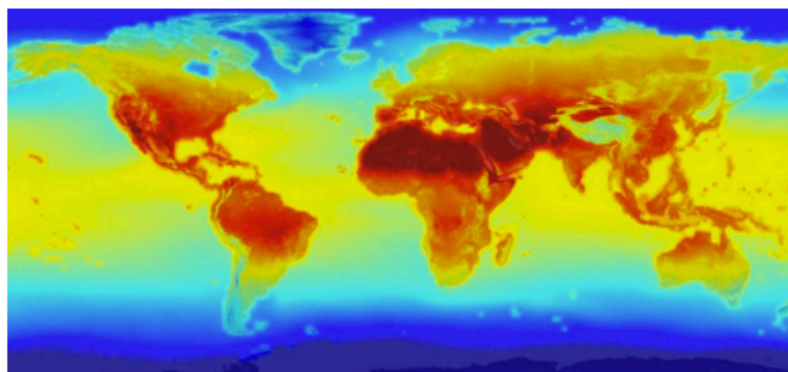
* Required

Name: (last, first) *

e-mail address: *

*Global Warming & Your Carbon Footprint
for Exam Bonus (up to 30 pts.)*

DUE On-line 11-Dec



<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

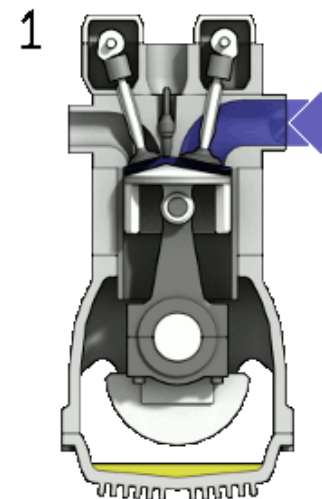


Chemical Reactions

Individual reports are to be turned in,

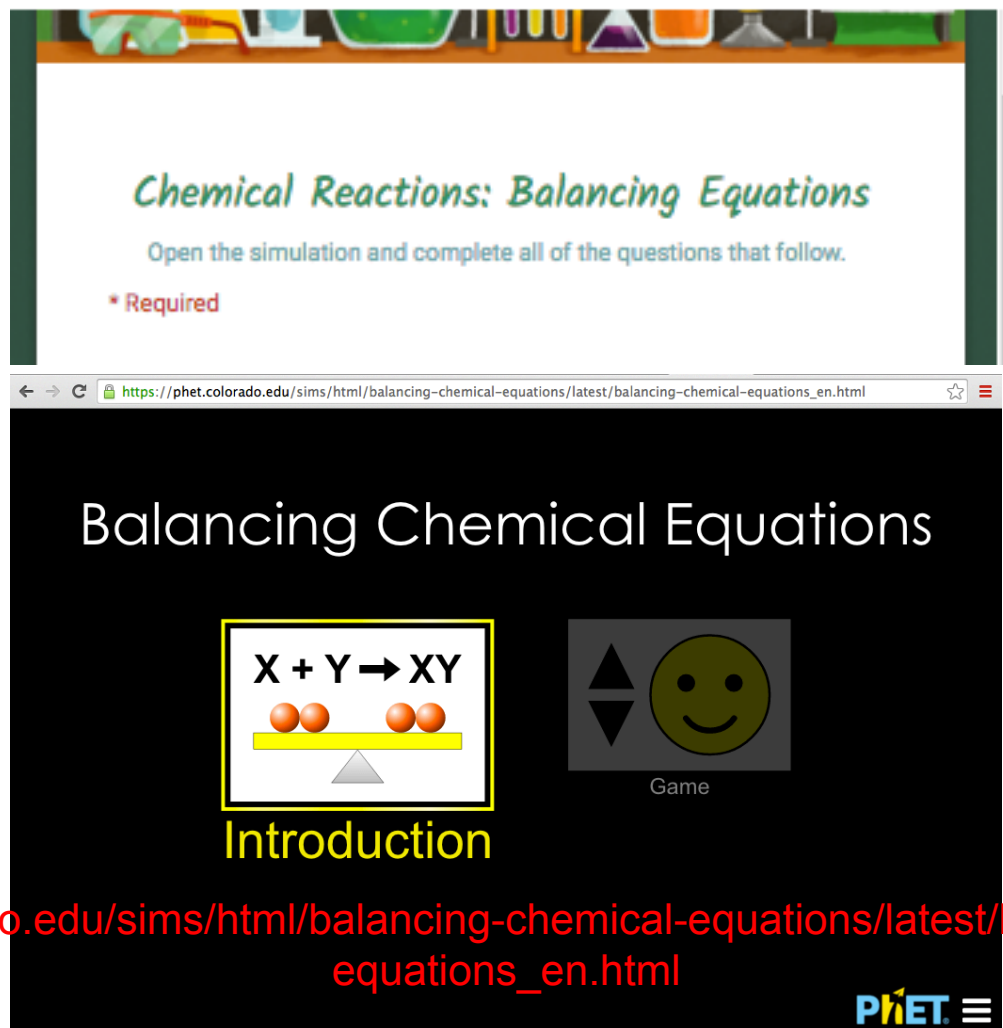
❁ Laboratory Manual: Report Form
pp.46-52 DUE Next Week

Post Lab: On-line Balancing Equations
DUE Next Week



DUE Next Week

Post lab : On-line Balancing Equations



The screenshot shows a web browser window displaying the PhET simulation page for balancing chemical equations. The page title is "Balancing Chemical Equations" and the URL is https://phet.colorado.edu/sims/html/balancing-chemical-equations/latest/balancing-chemical-equations_en.html. The page content includes a header with the title "Chemical Reactions: Balancing Equations" and a sub-header "Open the simulation and complete all of the questions that follow." Below this is a red asterisk and the word "Required". The main content area has a black background with the title "Balancing Chemical Equations" in white. There are two icons: one showing a chemical equation $X + Y \rightarrow XY$ with two orange spheres on the left and two orange spheres on the right, and another showing a green smiley face with the word "Game" below it. The PhET logo is in the bottom right corner.

Chemical Reactions: Balancing Equations

Open the simulation and complete all of the questions that follow.

* Required

https://phet.colorado.edu/sims/html/balancing-chemical-equations/latest/balancing-chemical-equations_en.html

Balancing Chemical Equations

$X + Y \rightarrow XY$

Game

Introduction

PHET

https://phet.colorado.edu/sims/html/balancing-chemical-equations/latest/balancing-chemical-equations_en.html