

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.

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.*

S. Class (D. Green)
and on your
partner's form
D. Green / S. Class/

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 × 100 =	
% Molar Mass Salt (Product)	
Closest from last week's lab calculations	
Unknown Identification	
Calculations:	
% Salt (Product) = Mass Salt (Product) after heating / Mass Unknown Sample × 100	
Theoretical Yield:	
Percent Yield:	
% Yield = actual grams of Salt (Product) / "Theoretical" grams × 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. Class (D. Green)
and on your
partner's form
D. Green / S. Class/

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 × 100 =	
% Molar Mass Salt (Product)	
Closest from last week's lab calculations	
Unknown Identification	
Calculations:	
% Salt (Product) = Mass Salt (Product) after heating / Mass Unknown Sample × 100	
Theoretical Yield:	
Percent Yield:	
% Yield = actual grams of Salt (Product) / "Theoretical" grams × 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.

S. Class (D. Green)
and on your
partner's form
D. Green / S. Class/

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 × 100 =	
% Molar Mass Salt (Product)	
Closest from last week's lab calculations	
Unknown Identification	
Calculations:	
% Salt (Product) = Mass Salt (Product) after heating / Mass Unknown Sample × 100	
Theoretical Yield:	
Percent Yield:	
% Yield = actual grams of Salt (Product) / "Theoretical" grams × 100	

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.

What's My Formula?

Post Lab:
Must submit Individually
From calendar link
DUE Friday

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

Which analgesic has the most (strongly) active ingredients based on (calculate) per mass (calculate)?

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

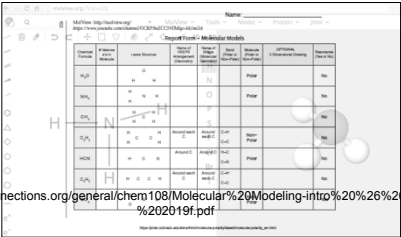
Analgesic	Chemical Formula	Molar Mass (g/mol)	Doses
Aspirin	C ₉ H ₈ O ₄	180.15	2.78
Ibuprofen	C ₁₃ H ₁₈ O ₂	206.29	2.42
Acetaminophen	C ₈ H ₉ NO ₂	151.17	3.31

Molar Mass Aspirin = 180.15 g/mol
0.5 g / 180.15 g/mol = 0.00278 mol = 2.78 millimoles

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>



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

Turn-in individually
Due 23-Oct

QUIZZES

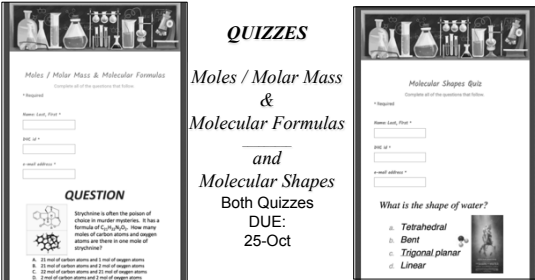
Moles / Molar Mass & Molecular Formulas

and

Molecular Shapes

Both Quizzes
DUE:
25-Oct

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

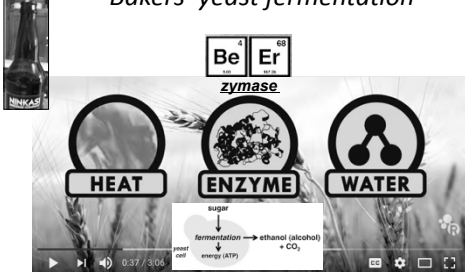
pp. 44-45



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

Chemical Reactions I (Biological Reaction)

Bakers' yeast fermentation



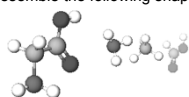
<https://www.youtube.com/watch?v=vW99JEaDAPY>

<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

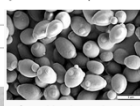


- 20 different amino acids are encoded in DNA providing a genetic code, an archive representing specific sequences of amino acids, which are linked together forming a specific protein.
- Hundreds of amino acids are linked together through amide (peptide) bonds to form these proteins, some of which, enzymes, 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

Scientists brew cannabis using hacked beer yeast

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



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 targets market resistance

SUBJECTS

Biotechnology
Natural products

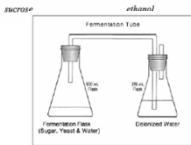
6 g/mol
ues: 396

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, *huggir*, 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:

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


Chemical Reactions I


🌱 Biological Reactions: Enzyme Catalysts
Fermentation pg. 62

Report Form – Fermentation–Distillation **pg. 66**

Preparation of the solution

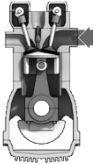

Mass, sucrose + container	
Mass, container	
Mass, sucrose*	

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 ¹

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

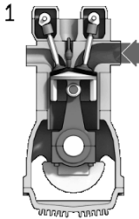
<http://www.piney.com/BabNinkasi.html>

Combustion Products
Energy & CO₂



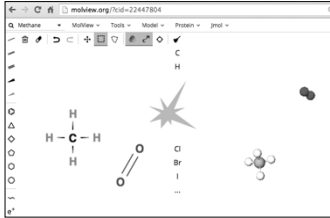
#3
<https://www.youtube.com/watch?v=Q9u8vM8YjeU&index=3&list=PLE7B4FAD08F1EBCE2>

🌱 **Combustion: Oxidation-Reduction Reaction**
Octane (Gas) Combustion Engine

$$2 C_8H_{18(g)} + 25 O_{2(g)} \rightarrow 16 CO_{2(g)} + 18 H_2O_{(l)} + \text{energy}$$


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

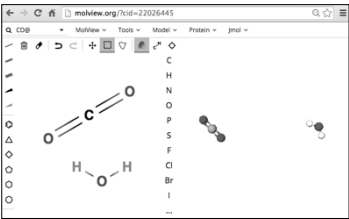
<http://molview.org>
Molecular Shapes ↔ Lewis Structures
MolView: Visual On-line Molecular Modeling
<https://www.youtube.com/watch?v=cOJ3MUpDrfl&list=PLE7B4FAD08F1EBCE2&index=2>



Bonding, Lewis Structures
Computational Experiments, Molecular Modeling

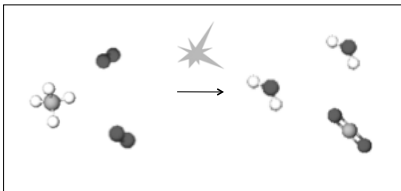
<http://molview.org>

Molecular Shapes \longleftrightarrow Lewis Structures
MolView: Visual On-line Molecular Modeling




Bonding, Lewis Structures
Computational Experiments, Molecular Modeling

Combustion

$$1 \text{CH}_4(g) + 2 \text{O}_2(g) \rightarrow 1 \text{CO}_2(g) + 2 \text{H}_2\text{O}(g) + \text{energy}$$


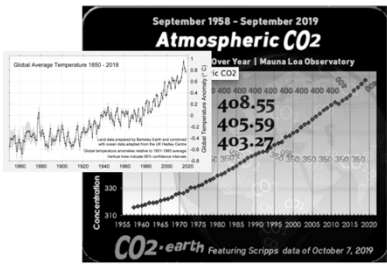
Bonding, Lewis Structures
Computational Experiments, Molecular Modeling

CO₂ Concentration Effects



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

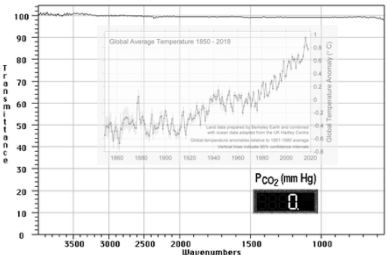
CO₂ Concentration Effects



#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, Your Carbon Footprint & Your Future

Global Warming Survey Questions for Quiz bonus (100%)

Turn in Completed Scantron

DUE Today

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

Chemical Reactions: Balancing Equations
Open the simulation and complete all of the questions that follow.
* Required

Balancing Chemical Equations

$X + Y \rightarrow XY$

Introduction

PHET

[https://phet.colorado.edu/en/simulation/balancing-chemical-](https://phet.colorado.edu/en/simulation/balancing-chemical-equations)

[balancing-chemical-](https://phet.colorado.edu/en/simulation/balancing-chemical-equations)