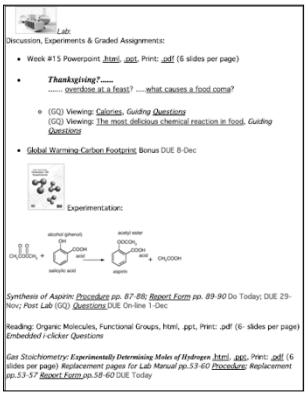
Chem 108: Lab

Week 14

Sign in / Pick up Papers and Handouts


Lab:
Discussion, Experiments & Graded Assignments:

- Week #15 Powerpoint .html, .ppt, Print: .pdf (6 slides per page)
- *Thanksgiving?.....* ..... overdose at a feast? ....what causes a food coma?
  - (GQ) Viewing: Calories, *Guiding Questions*
  - (GQ) Viewing: The most delicious chemical reaction in food, *Guiding Questions*
- Global Warming-Carbon Footprint Bonus DUE 8-Dec

Experimentation:

Synthesis of Aspirin: *Procedure pp. 87-88; Report Form pp. 89-90* Do Today; DUE 29-Nov; *Post Lab* (GQ) *Questions* DUE On-line 1-Dec

Reading: Organic Molecules, Functional Groups, html, .ppt, Print: .pdf (6- slides per page) *Embedded i-clicker Questions*

Gas Stoichiometry: Experimentally Determining Moles of Hydrogen .html, .ppt, Print: .pdf (6 slides per page) *Replacement pages for Lab Manual pp.53-60 Procedure; Replacement pp.53-57 Report Form pp.58-60* DUE Today

Quiz Questions

Experimentally Determining Moles of Hydrogen

QUESTION

The density of an unknown atmospheric gas pollutant was experimentally determined to be 1.964 g/ L @ 0 °C and 760 torr.

- ***What is the molar mass of the gas?***
- ***What might the gas be?***

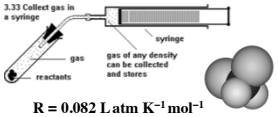
A) CO B) SO_2 C) H_2O D) CO_2

QUESTION

Freon-12, CF_2Cl_2, a "safe" compressible gas, was widely used from 1935-1994 as a refrigerant in refrigerators, freezers, and air conditioning systems. However, it had been shown to be a greenhouse gas and to catalytically destroy the ozone layer in a ratio of >14,000:1. It was phased out and banned.

200. ml of Freon-12 was collected by syringe. It weighed 0.927 grams, had a temperature of 30.0°C (303.1K), and a pressure of 730 mm of Hg (. What is the experimental molar mass of Freon-12?

A. 12.1 g/mol
B. 84 g/mol
C. 92.7 g/mol
D. 115 g/mol
E. 121. g/mol



R = 0.082 L atm K^{-1} mol^{-1}

QUESTION

0.0820 grams of a volatile compound in the gas phase, which smells like fresh raspberries, was trapped in a syringe. It had a volume of 12.2 mL at 1.00 atmosphere of pressure and 25.0°C. What is the molar mass of this pleasant smelling compound ?

A) 13.8 g/mol
B) 164 g/mol
C) 40.9 g/mol
D) 224 g/mol

QUESTION

Which sequence represents the gases in order of increasing density at STP?

A) Fluorine < Carbon monoxide < Chlorine < Argon

B) Carbon monoxide < Fluorine < Argon < Chlorine

C) Argon < Carbon monoxide < Chlorine < Fluorine

D) Fluorine < Chlorine < Carbon monoxide < Argon

QUESTION

Real gases exhibit their most "ideal" behavior at which relative conditions?

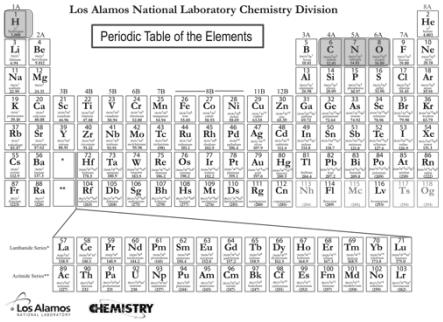
A) Low temperatures and low pressures
B) High temperatures and high pressures
C) High temperatures and low pressures
D) Low temperatures and high pressures

Organic Molecules

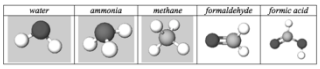
Functional Groups

Dr. Ron Rusay

Elemental building blocks for all organic molecules



Organic Molecules

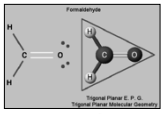


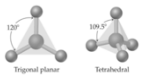
Shapes, Functions & Structural Analogies
Water, Ammonia, Methane

Plus >C=O units

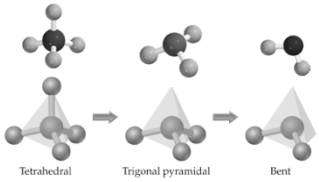
Molecular Models for C, H, N, O

Fundamental repeating shapes found in every biological molecule





C =black
H = gray
N = blue
O = oxygen



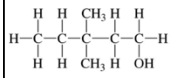
pink = generic atom

Representing Organic Molecules

http://chemconnections.org/general/movies/Representations.MOV

Representing Organic Molecules
Common Formulas & Drawings

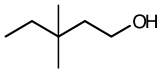
Molecular formula: $C_7H_{16}O$ **Empirical Formula:** $C_7H_{16}O$



Condensed Structure:

$CH_3CH_2C(CH_3)_2CH_2CH_2OH$ or $CH_3CH_2\underset{\displaystyle CH_3}{\overset{\displaystyle CH_3}{C}}CH_2CH_2OH$

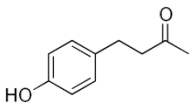
Bond-Line Structure:

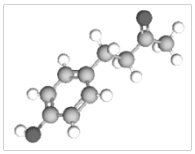


QUESTION

A compound that smells like fresh raspberries, the following structure, $C_2H_2O_2$, matches its calculated molar mass which is 164 g/mol.

A) TRUE
B) FALSE

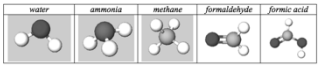




Organic Molecules
Common Functional Groups

Name	General Formula
Alcohols	R−OH
Ethers	R−O−R′
Amines	$R-NH_2$
Carboxylic Acids	

R′− or R− represents any generic carbon atom bonded in the functional group



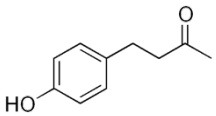
Organic Molecules
Common Functional Groups

Name	General Formula
Aldehydes	
Ketones	
Carboxylic Acids	
Esters	
Amides	

R′− or R− represents any generic carbon atom bonded in the functional group

QUESTION

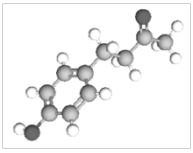
Select the function(s) in the molecule



	Alcohol	R−OH
	Ether	R−O−R′
	Amine	$R-NH_2$
	Aldehyde	
	Ketone	
	Carboxylic Acid	
	Ester	
	Amide	

QUESTION

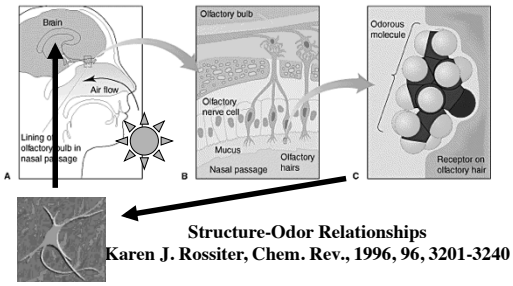
Select the function(s) in the molecule



	Alcohol	R−OH
	Ether	R−O−R′
	Amine	$R-NH_2$
	Aldehyde	
	Ketone	
	Carboxylic Acid	
	Ester	
	Amide	

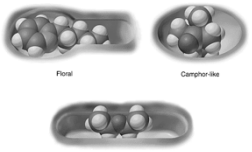
Detecting stuff we cannot see: the Sense of Smell
Models, Theories & Interactions

http://chemconnections.org/organic/chem226/Labs/Smell/smell-links.html



Structure-Odor Relationships
Karen J. Rossiter, Chem. Rev., 1996, 96, 3201-3240

Historical view of a few smell receptors.



4 October 2004

The Nobel Assembly at Karolinska Institutet has today decided to award

The Nobel Prize in Physiology or Medicine for 2004

jointly to

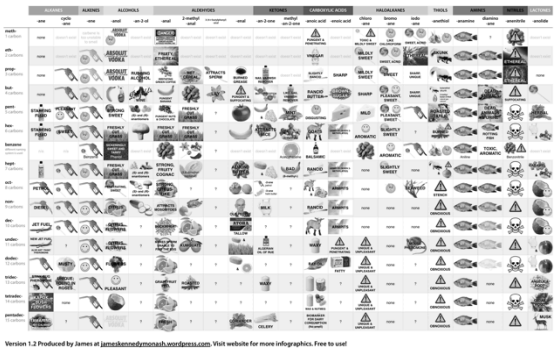
Richard Axel and Linda B. Buck

for their discoveries of

"odorant receptors and the organization of the olfactory system"

http://chemconnections.org/organic/chem226/Labs/Smell/ChemComm.html

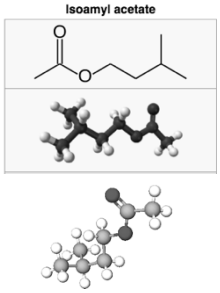
Organic Functions & Smell Receptors.



One molecule, one function: One Smell Receptor

Isoamyl acetate, also known as isopentyl acetate, is an ester formed from isoamyl alcohol and acetic acid. It is a colorless liquid that is only slightly soluble in water, but very soluble in most organic solvents. Isoamyl acetate has a strong odor which is also described as similar to both banana and pear.[3] Banana oil may be either pure isoamyl acetate, or flavorings that are mixtures of isoamyl acetate, amyl acetate, and other flavors.

Isoamyl acetate

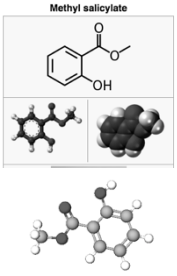


$C_7H_{14}O_2$

One molecule, two functions: One Smell Receptor

Methyl salicylate (oil of wintergreen or wintergreen oil) is an organic ester naturally produced by many species of plants, particularly wintergreens. It is also synthetically produced, used as a fragrance, in foods and beverages, and in liniments.

Methyl salicylate

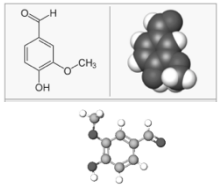


$C_8H_8O_3$

One molecule, three functions: One Smell Receptor

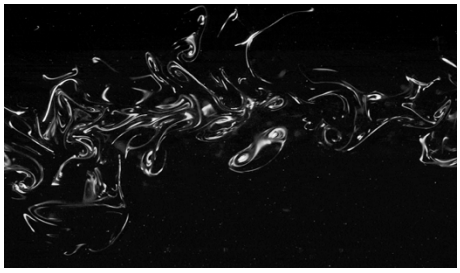
An extract of the cured, full-grown, unripe fruit of an orchid produces a popular flavoring. The natural extract sells for ~ $1500/kg versus ~ $20/kg for the synthetic version. The structure of the compound that is responsible for the smell/flavor is shown to the right. The Guinness Book of World Records once listed this compound as having the lowest smell detection limit of all chemicals (2 x 10 $^{-11}$ g per 1,000 cm^3 of air).

vanillin



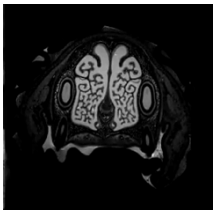
Bonus:
The space (volume) of the Oakland Coliseum Arena, aka Oracle Arena, is approximately 90,000,000 ft^3. If 1.00g of the compound were released at center court, and was completely and evenly dispersed throughout the building, would you smell it sitting in sec. 204, row H, seat 121? Show your calculation. (1 ft^3 = 0.0283 m^3)

What a smell looks like



https://www.youtube.com/watch?v=58U52lDTuvk&list=PLgawtcOBBjr9I-NDoUX-HmTQr_VN465G2&index=3

Inside the extraordinary nose of a search-and-rescue dog



https://www.youtube.com/watch?v=FLH36ML8IEU

Dogs Can Smell Cancer - Secret Life of Dogs - BBC

https://www.youtube.com/watch?v=e0UK6kkS0_M

Turkey with Brown Sugar Glaze

Smell & memory:

Triggering Remembrances

Marcel Proust: À la recherche du temps perdu

In Search of Lost Time

aka

Remembrance of Things Past

Functional Groups Continued:

Amino acids (Handout)

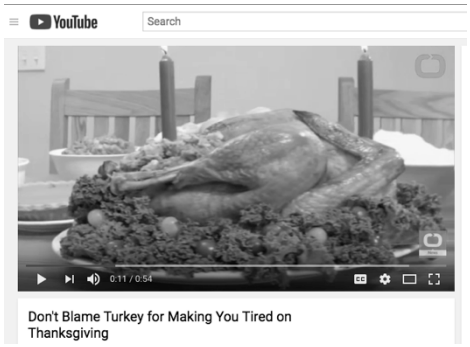
Proteins-Enzymes

Carbohydrates

(sugars)

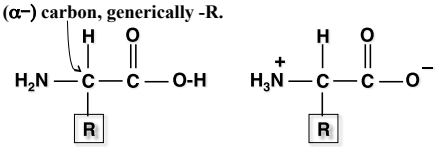
Synthesis of Aspirin

https://www.youtube.com/watch?v=geQnPq09IJY



A base + an acid in the same molecule?
Amino Acids

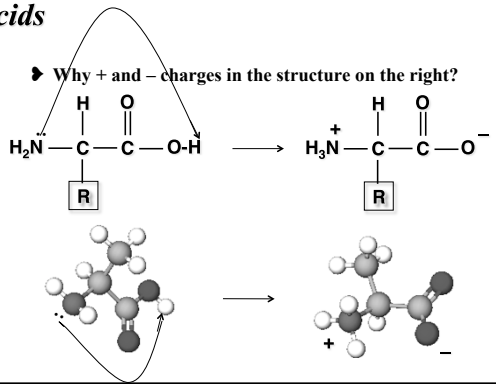
- More than 700 amino acids occur naturally, but 20 of them are particularly important.
- These 20 amino acids are the building blocks of proteins in humans and other organisms
- They differ in respect to the group attached to the alpha (α−) carbon, generically -R.



- Why + and – charges in the structure on the right?

A base + an acid in the same molecule? Amino Acids

- Why + and – charges in the structure on the right?

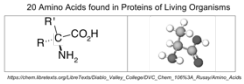


Amino Acids

https://chem.libretexts.org/LibreTexts/Diablo_Valley_College/DVC_Chem_106%3A_Rusay/Amino_Acids

- Our bodies can synthesize about 10 amino acids.
- "Essential" amino acids are the other 10 amino acids, which have to be ingested in our diet.

20 Amino Acids found in Proteins of Living Organisms



https://chem.libretexts.org/LibreTexts/Diablo_Valley_College/DVC_Chem_106%3A_Rusay/Amino_Acids

Name	1	H	R-	R'-	Rasmol Color	Function & Class
Alanine	Ala	A	H-	CH_3-	dark grey	Aliphatic Hydrophobic
Arginine	Arg	R	H-	$CH_2CH_2CH_2NHC(NH_2)NH$-	blue	Basic Hydrophilic
Asparagine	Asn	N	H-	CH_2CONH_2-	cyan	Amide Highly Hydrophilic
Aspartate	Asp	D	H-	CH_2COH-	bright red	Acidic Hydrophilic
Cysteine	Cys	C	H-	CH_2SH-	yellow	Sulphur Containing Hydrophobic
Glutamine	Gln	Q	H-	$CH_2CH_2CONH_2$-	cyan	Amide Highly Hydrophilic
Glutamate	Glu	E	H-	CH_2CH_2COH-	bright red	Acidic Hydrophilic

Amino acids: two functions, an acid & a base, in the same mol

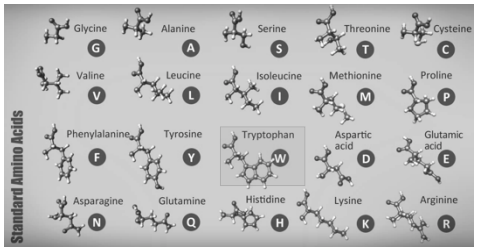
Amines $R{-}NH_2$

Carboxylic Acids

	Alcohol	R−OH
	Ether	R−O−R′
X	Amine	$R{-}NH_2$
	Aldehyde	R-C(=O)-H
	Ketone	R-C(=O)-R′
X	Carboxylic Acid	R-C(=O)-OH
	Ester	R-C(=O)-OR′
	Amide	R-C(=O)-N(R″)R‴

Amino Acids
"Legos" of Chemical Biology

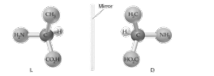
All amino acids contain C, H, O, and N; two, C & M also have sulfur.



http://chem.libretexts.org/LibreTexts/Diablo_Valley_College/DVC_Chem_106%3A_Rusay/Amino_Acids

20 Amino Acids of Life

chiral: mirror images



Amino Acids:

Name	1	H	R-	R'-	Rasmol Color	Function & Class
Alanine	Ala	A	H-	CH_3-	dark grey	Aliphatic Hydrophobic
Arginine	Arg	R	H-	$CH_2CH_2CH_2NHC(NH_2)NH$-	blue	Basic Hydrophilic
Asparagine	Asn	N	H-	CH_2CONH_2-	cyan	Amide Highly Hydrophilic
Aspartate	Asp	D	H-	CH_2COH-	bright red	Acidic Hydrophilic
Cysteine	Cys	C	H-	CH_2SH-	yellow	Sulphur Containing Hydrophobic
Glutamine	Gln	Q	H-	$CH_2CH_2CONH_2$-	cyan	Amide Highly Hydrophilic
Glutamate	Glu	E	H-	CH_2CH_2COH-	bright red	Acidic Hydrophilic
Glycine	Gly	G	H-	H-	light grey	Aliphatic Hydrophobic
Histidine	His	H	H-	CH_2-(imidazole)	pale blue	Basic Hydrophilic
Isoleucine	Ile	I	H-	$CH_3CH_2CH(CH_3)$-	green	Aliphatic Hydrophobic

Leucine	Leu	L	H-	CH_2CHCH_3-	green	Aliphatic Hydrophobic
Lysine	Lys	K	H-	$CH_2CH_2CH_2CH_2NH_2$-	blue	Basic Hydrophilic
Methionine	Met	M	H-	$CH_2CH_2SCH_3$-	yellow	Sulphur Containing Hydrophobic
Phenyl-alanine	Phe	F	H-	CH_2-(phenyl)	mid blue	Aromatic Hydrophobic
Proline	Pro	P	-	(pyrrolidine)-CO_2H	flesh	Aliphatic Hydrophobic
Serine	Ser	S	H-	CH_2OH-	orange	Hydroxylic Hydrophilic
Threonine	Thr	T	H-	$CHOH$-CH_3	orange	Hydroxylic Hydrophilic
Tryptophan	Trp	W	H-	CH_2-(indole)	pink	Aromatic Hydrophobic
Tyrosine	Tyr	Y	H-	CH_2-(4-OH-phenyl)	mid blue	Aromatic Hydrophobic
Valine	Val	V	H-	CH_3-$CHCH_3$-	green	Aliphatic Hydrophobic

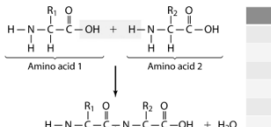
Amino acids: two functions, an acid & a base, in the same molecule

Amines $R{-}NH_2$

Carboxylic Acids R-C(=O)-OH

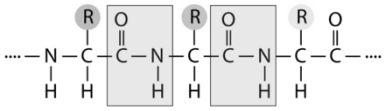
	Functions	
	Alcohol	R−OH
	Ether	R−O−R′
X	Amine	$R{-}NH_2$
	Aldehyde	R-C(=O)-H
	Ketone	R-C(=O)-R′
X	Carboxylic Acid	R-C(=O)-OH
	Ester	R-C(=O)-OR′
	Amide	R-C(=O)-N(R″)-R′

(Amide bond = Peptide bond)



Amides R-C(=O)-N(R″)-R′

	Alcohol	R−OH
	Ether	R−O−R′
X	Amine	$R{-}NH_2$
	Aldehyde	R-C(=O)-H
	Ketone	R-C(=O)-R′
X	Carboxylic Acid	R-C(=O)-OH
	Ester	R-C(=O)-OR′
X	Amide	R-C(=O)-N(R″)-R′



Chemical Biology

Reactions/Catalysts

Globular Proteins / Enzymes

Metabolism

Turkey with Brown-Sugar Glaze

★★★☆☆ 1120

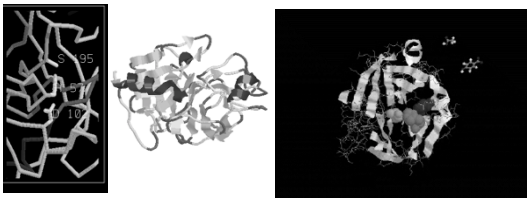
Digestion

Globular Proteins / Enzymes

Trypsin / α-Galactosidase / Invertase / Sucrase

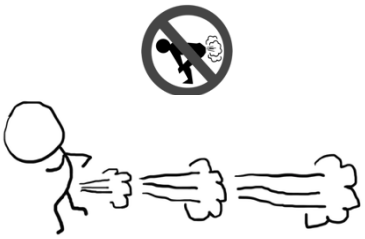
Digestion

Trypsin Enzyme: Catalyzes Hydrolysis



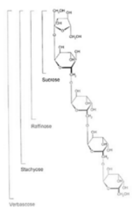
Trypsin, which catalyzes the digestion of proteins through hydrolysis, works in a similar way to acetylcholinesterase, but in breaking down other proteins instead of small molecules, acetylcholine - choline.

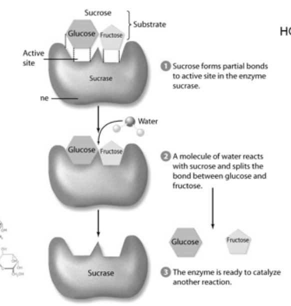
Biproduct of Digestion

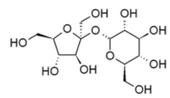


Digestion / Hydrolysis

α-Galactosidase/ Invertase/ Sucrase







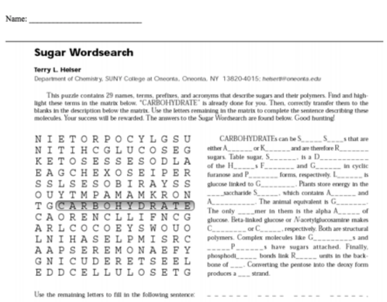
β-Fructose
α-Glucose

Organic Molecules

Functional Groups

alcohols, ethers, aldehydes, ketones

Carbohydrates / Saccharides / Sugars



Name: ______________________

Sugar Wordsearch

Terry L. Helser

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This puzzle contains 29 names, terms, prefixes, and acronyms that describe sugars and their polymers. Find and highlight these terms in the matrix below. "CARBOHYDRATE" is already done for you. Then, correctly transfer them to the blanks in the description below the matrix. Use the letters remaining in the matrix to complete the sentence describing these molecules. Your success will be rewarded. The answers to the Sugar Wordsearch are found below. Good hunting!

N I E T O R P O C Y L G S U
N I T I H C G L U C O S E G
K E T O S E S S E S O D L A
E A G C H E X O S E I P E R
S S L S E S O B I R A Y S S
O U Y T M P A M A M K R O N
T G C A R B O H Y D R A T E
C A O R E N C L L I F N C G
A R L C O C O E Y S W O U O
L N I H A S E L P M I S R C
A A P S E R E M O N A E F Y
G N I C U D E R E T S E E L
E D D C E L L U L O S E T G

CARBOHYDRATEs can be S_____ S____s that are either A______ or K______ and are therefore R_______ sugars. Table sugar, S______, is a D__________ of the H_____s F_______ and G______ in cyclic furanose and P_______ forms, respectively. L______ is glucose linked to G________. Plants store energy in the ____saccharide S_____, which contains A______ and A__________. The animal equivalent is G_______. The only ____mer in them is the alpha A_____ of glucose. Beta-linked glucose or *N*-acetylglucosamine makes C________ or C_____, respectively. Both are structural polymers. Complex molecules like G_________s and _____P______s have sugars attached. Finally, phosphodi_____ bonds link R_____ units in the backbone of ___. Converting the pentose into the deoxy form produces a ___ strand.

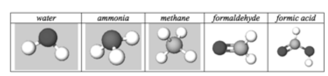
Use the remaining letters to fill in the following sentence: _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ .

Wordsearch Due Next Week

Sugars (Carbohydrates)

Common Functional Groups

Name	General Formula
Alcohols	R−OH
Ethers	R−O−R′
Amines	$R{-}NH_2$
Carboxylic Acids	R-C(=O)-OH



Sugars (Carbohydrates)

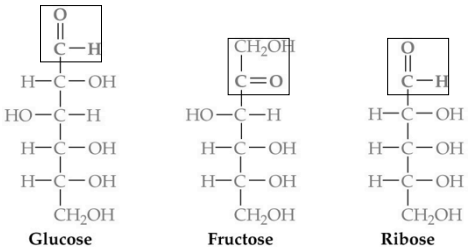
Common Functional Groups

Name	General Formula
Aldehydes	R-C(=O)-H
Ketones	R-C(=O)-R'
Carboxylic Acids	R-C(=O)-OH
Esters	R-C(=O)-OR'
Amides	R-C(=O)-N(R")R'

Carbohydrate (-ose) Formation

- The chemical reaction of light, chlorophyll and two greenhouse gases, which also provide oxygen:
  - $n\ CO_2 + n\ H_2O \longrightarrow C_n(H_2O)_n + n\ O_2$
- Empirical formula = CH_2O
- Monosaccharides (simple sugars)
- C_5 : pent-oses – *rib-ose*
- C_6 : hex-oses – *fruct-ose, gluc-ose*
  - Can be either an ald-ose (aldehyde + alcohols) or ket-ose (ketone + alcohols)

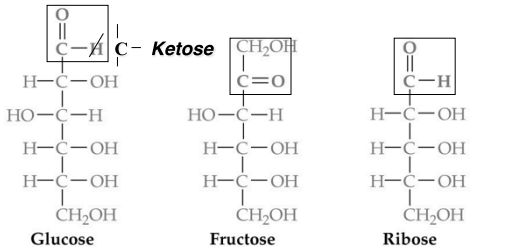
Aldose



Glucose Fructose Ribose

Aldose **Aldose or Ketose? Aldose or Ketose?**

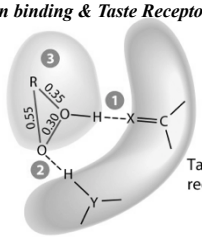
Ketose



Glucose Fructose Ribose

Protein binding & Taste Receptors

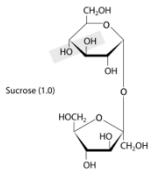
Sweet molecule



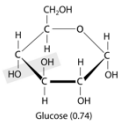
Taste receptor

- ***Sweet***
- ***Sour***
- ***Bitter***
- ***Salty***
- ***Umami***

1. —H in OH group on sweet molecule forms hydrogen bond with X— on receptor.
2. O— on sweet molecule forms hydrogen bond with H— in HY group on receptor.
3. Hydrophobic area behind O— atoms on sweet molecule.

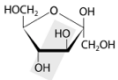


Sucrose (1.0)

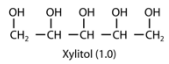


Glucose (0.74)

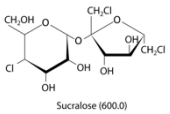
Sweetness factor = 1.0 ***Sweetness factor = 0.74***



Fructose (1.73)

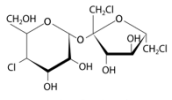


Xylitol (1.0)

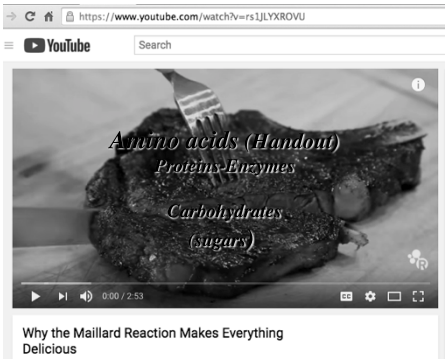


Sucralose (600.0)

Relative Sweetness Scale - Sucrose = 1	
Compound	Rating
Saccharin	300 X
Cyclamate	30 X
Aspartame	180 X
Acesulfame	200 X
Sucralose	600 X

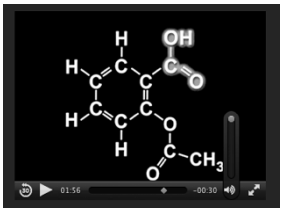


Sucralose (600.0)



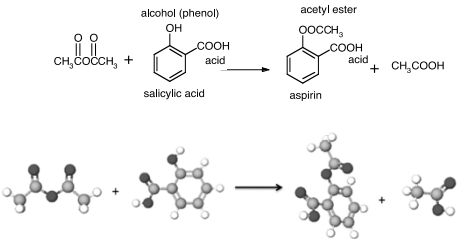
https://www.youtube.com/watch?v=rs1JLYXROVU

Synthesis of Postprandial Relief Aspirin



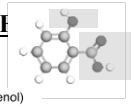
http://chemconnections.org/general/movies/Representations.MOV

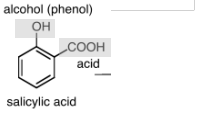
Chem 108
Synthesis of Aspirin

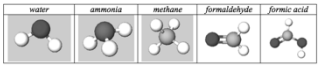


Salicylic Acid
Common Functional Groups

Name	General F
Alcohols	R–OH
Ethers	
Amines	
Carboxylic Acids	R-C-OH (O)

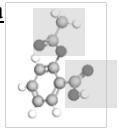


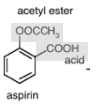




Aspirin
Common Functional Groups

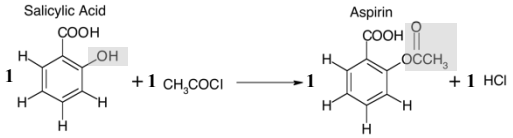
Name	General Formula
Aldehydes	R-C-H (O)
Ketones	R-C-R' (O)
Carboxylic Acids	R-C-OH (O)
Esters	R-C-OR' (O)
Amides	R-C-N(R")R' (O)





Mass Calculations: Reactants ⟷ Products

- **How many grams of aspirin are theoretically produced from 6.0 g of salicylic acid with an excess of acetyl chloride, C_2H_3OCl?**
- **Balanced Equation:**



$C_7H_6O_3$	C_2H_3OCl	$C_9H_8O_4$	HCl
MW = 138.12	MW = 78.49	MW = 180.15	MW= 36.45

Mass Calculations: Reactant ⟶ Product

- **How many grams of aspirin are theoretically produced from 6.0 g of salicylic acid with an excess of acetyl chloride, C_2H_3OCl?**
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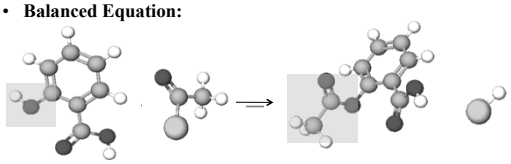
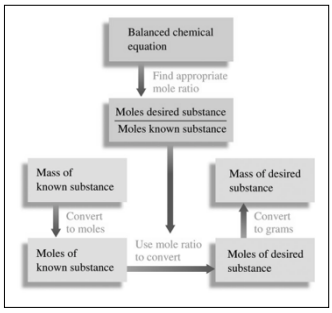
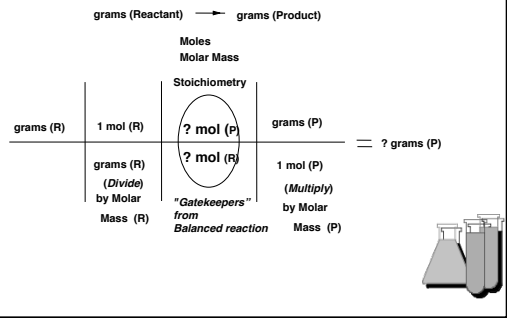


$C_7H_6O_3$	C_2H_3OCl	$C_9H_8O_4$	HCl
MW = 138.12	MW = 78.49	MW = 180.15	MW= 36.45

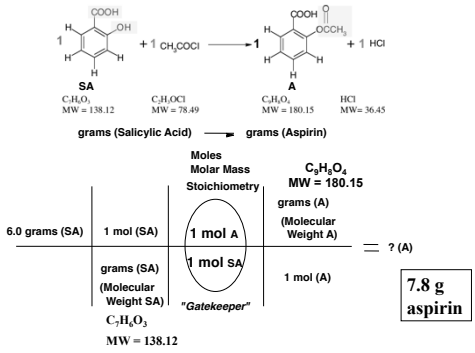
Mass Calculations: Reactants → Products



Theoretical (Yield) Mass Calculations
Reactant → Product



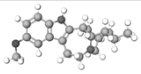
Mass Calculations:



Percent Yield

- **In synthesis as in any experiment, it is very difficult and at most times impossible to be perfect. Therefore the actual yield (g) is measured and compared to the theoretical calculated yield (g). This is the percent yield:**
- **% Yield = actual (g) / theoretical (g) x 100**

QUESTION

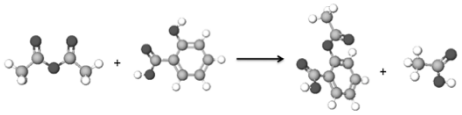


- **A synthetic reaction produced 2.45g of Ibogaine, $C_{20}H_{26}N_2O$, a natural product with strong promise in treating heroin addiction (at least in Europe), the calculated theoretical yield was 3.05g, what is the % yield?**

A) 19.7% B) 39.4% C) 80.3% D) 160.6%

QUESTION

- **How many grams of aspirin are theoretically produced from 5.0 g of salicylic acid reacting with an excess of acetic anhydride, $C_4H_6O_3$?**
- **Balanced Equation:**



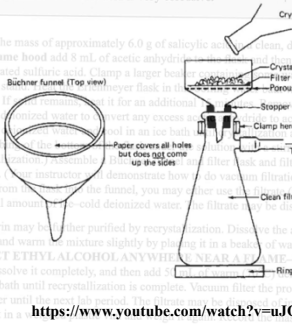
A) 3.8 g B) 5.0 g C) 6.5 g D) 7.8 g

QUESTION

✿ **Noelle's synthesis of aspirin, $C_9H_8O_2$, produced 5.90g. The calculated theoretical yield was 6.50g; what is her % yield?**

A) 47.5% B) 80.3% C) 90.6% D) 110%

Vacuum Filtration



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

Aspirin Synthesis

1. **Select partner(s); working in a group of 2-3.**
2. **Get equipment from stockroom.**
3. **Follow instructions carefully and be mindful of your safety. WEAR eye protection.**
4. **DO NOT begin re-crystallization portion in the experiment's instructions**

Equipment

From the stockroom:
- Beaker clamp
- filter flask
- Büchner funnel
- ice bath – in lab

From the common drawer:
- ring stand and ring
- wire gauze
- Bunsen burner

From your drawer:
- 125 mL Erlenmeyer flask
- large beaker

Procedure

This procedure must be carried out in the fume hood. Acetic anhydride is an irritant and sulfuric acid is very corrosive.

Record the mass of approximately 6.0 g of salicylic acid in a clean, dry 125 mL erlenmeyer flask. **In the fume hood** add 8 mL of acetic anhydride to the flask and then slowly add 10 drops of concentrated sulfuric acid. Clamp a larger beaker containing some water and a boiling chip or two to a ring stand. Heat the Erlenmeyer flask in this boiling water bath with occasional stirring for 15 minutes. If solid remains, heat it for an additional 15 minutes. Remove the flask and slowly add 20 drops of deionized water to convert any excess acetic anhydride to acetic acid. Add about 20 mL of ice–cold deionized water and cool in an ice bath until crystallization appears to be complete. (Hint: slow rubbing of the bottom of the flask under the solution with a stirring rod sometimes speeds up crystallization.) Assemble a Büchner funnel and filter flask and filter the crystals by vacuum filtration. (Your instructor will demonstrate how to do vacuum filtration.) If you wish to rinse the residue from the flask into the funnel, you may either use the filtrate (the solution in the filter flask) or a small amount of ice–cold deionized water. The filtrate may be disposed of in the hood sink.

The aspirin may be further purified by recrystallization. Dissolve the aspirin in about 20 mL of ethyl alcohol, and warm the mixture slightly by placing it in a beaker of water which has been heated. **DO NOT GET ETHYL ALCOHOL ANYWHERE NEAR A FLAME–HIGHLY FLAMMABLE!!** Stir to dissolve it completely, and then add deionized water. Cool the mixture in an ice bath until recrystallization is complete. Vacuum filter the product and allow it to dry on the filter paper until the next lab period. Then weigh your aspirin in the sink. When your aspirin is dry, put it in a weighed plastic vial and weigh it again. Record the mass. Calculate the percent yield.

Store filtered crude aspirin in lab drawer and weigh next week.

Solid aspirin should be disposed in the **organic** solid waste

Chem 108: Lab

Due <u>Today: Gas Stoichiometry</u>
Complete Report form replacement pages pp. 58-60.

Include clear calculations with units.