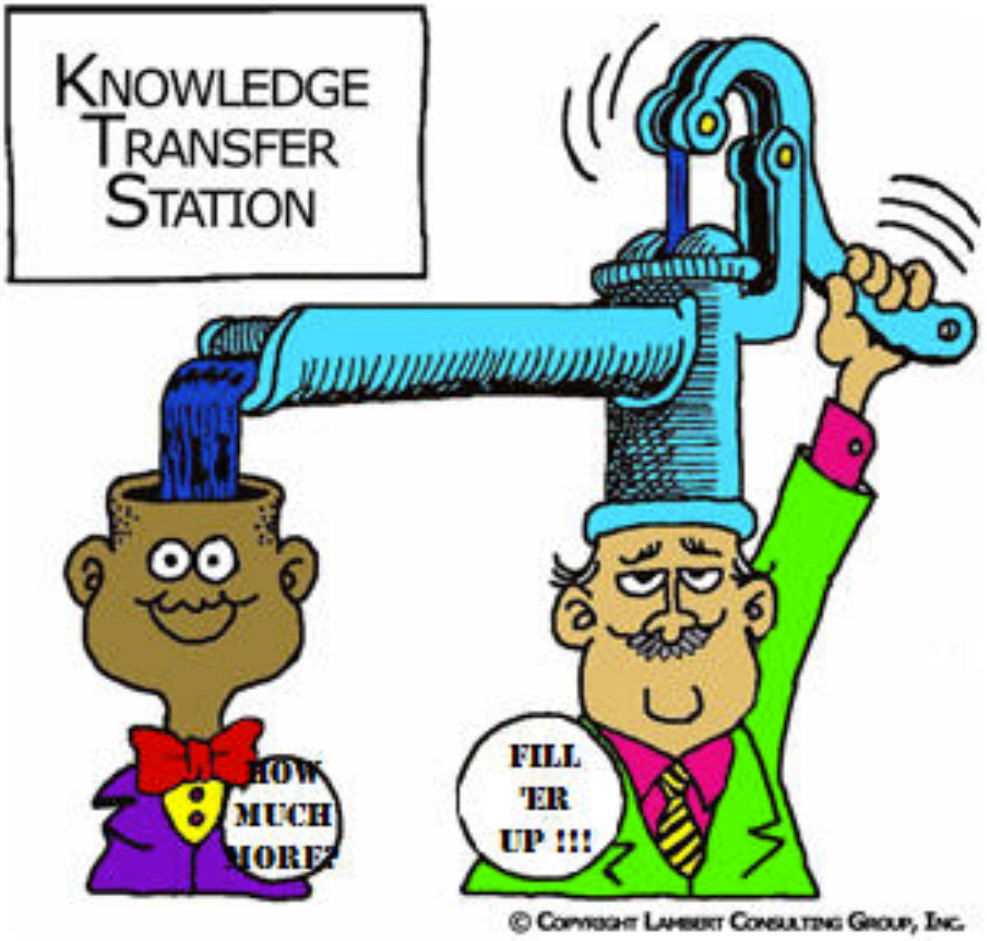
Does A Person Learn This Way?



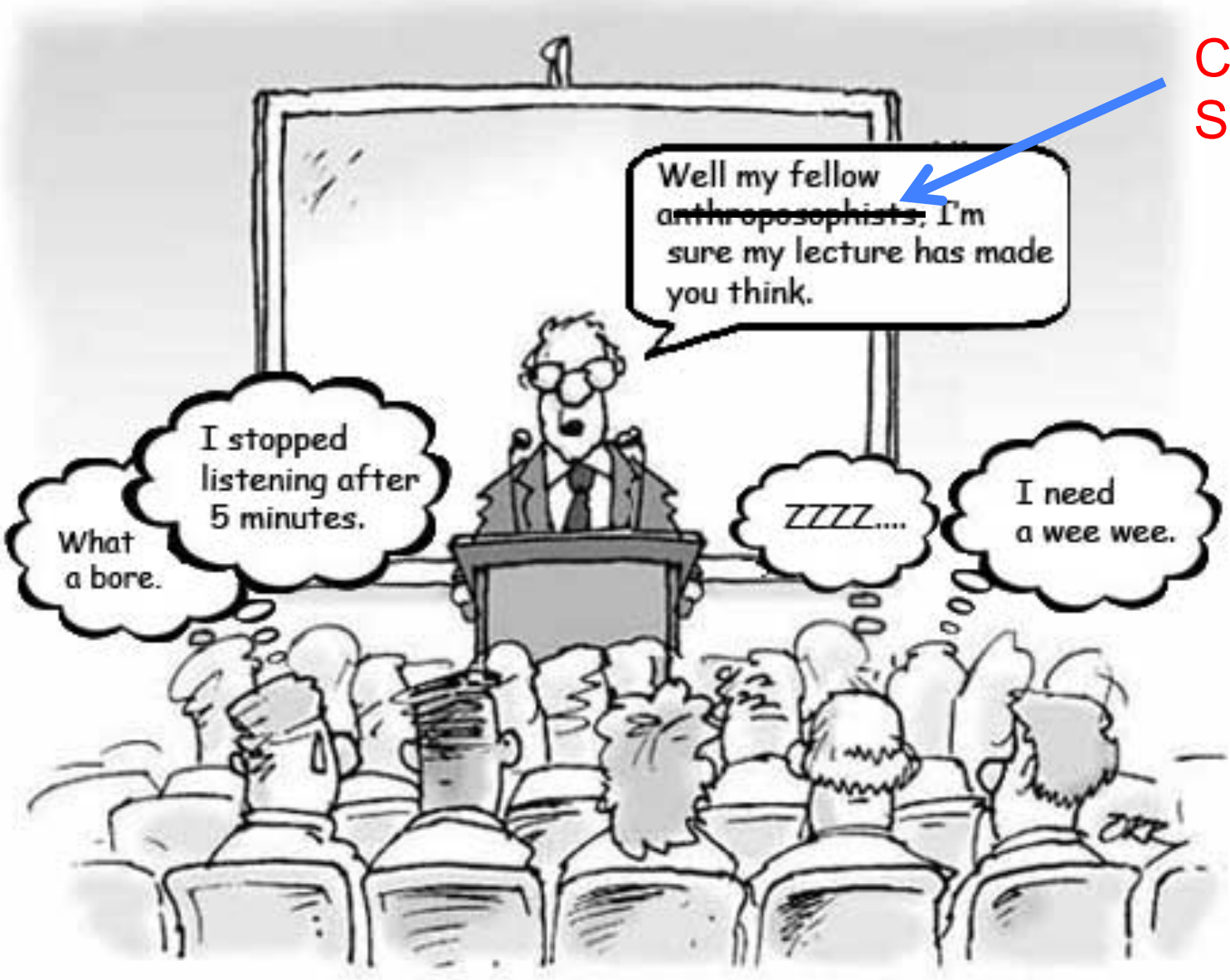
Yes?

or

No?

Student Teacher

http://pmblog.ninethsense.com/2013/12/kill-concept-of-knowledge-transfer-and.html



Chemistry Students

https://ed240s12a.wikispaces.com/Mindtool+-+Jonassen

We learn 20% of what we hear.

We Learn:

10%	of what we read
20%	of what we hear
30%	of what we see
50%	of what we see and hear
60%	of what we write
70%	of what we discuss
80%	of what we experience
95%	of what we teach

What is the best way to learn chemistry?

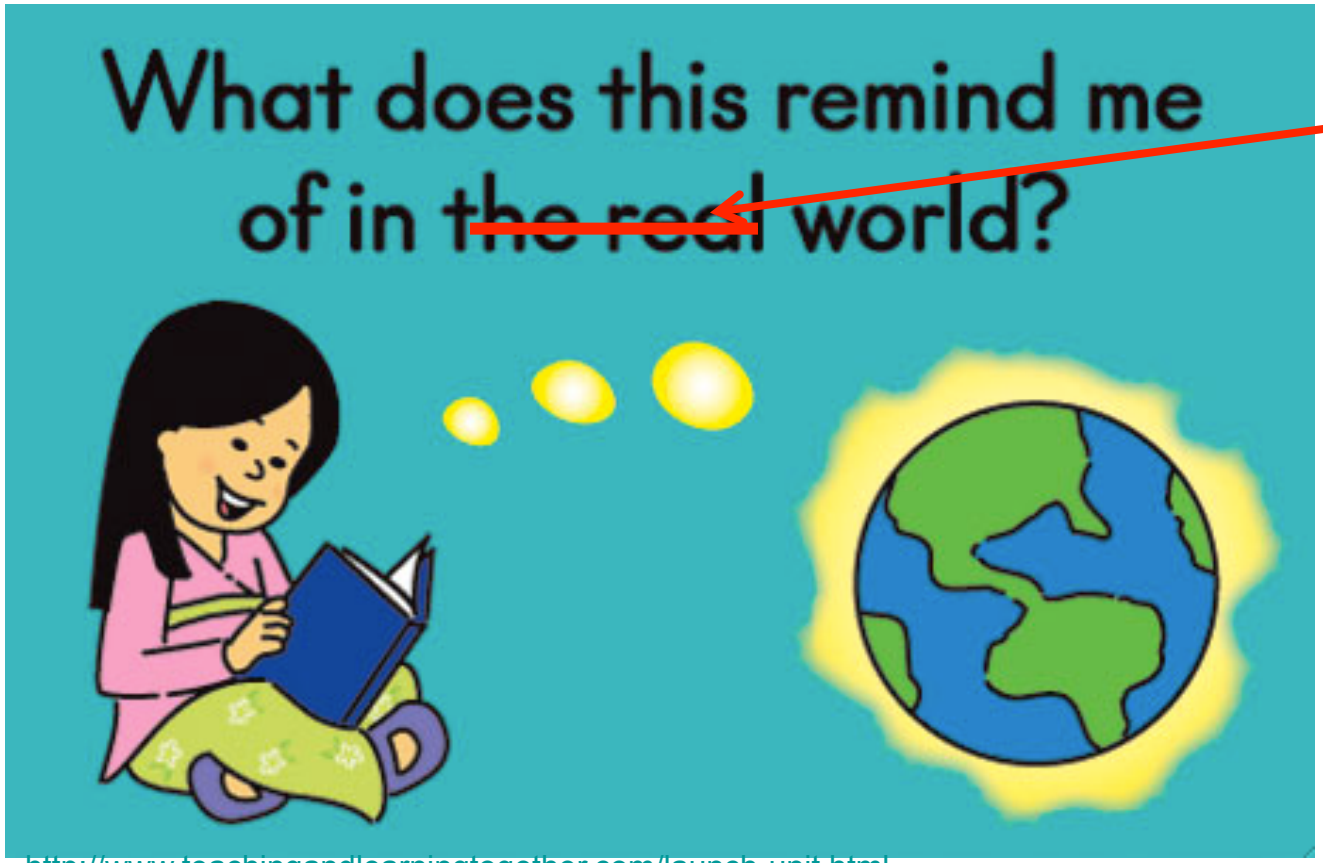
a) Sit passively in lecture and stay awake

b) Re-write your notes

c) Do experiments in lab and discuss with your lab partner

d) Discuss and try to teach someone what you learned

How Does A Person Learn?



YOUR

http://www.teachingandlearningtogether.com/launch-unit.html

Learning occurs by *ACTIVELY MAKING CONNECTIONS*.
When students interact with other students to clarify, explain, and understand, they are actively building their own minds, making connections, learning.

"*You don't really understand something until you can explain it to your grandmother.*"

- Einstein

We learn ____ % of what we teach.

Work in the SAME Group of 4 or 5

Form your Group next Tuesday:

1. your Lab partner
2. Student from another lab section (not your grandmother)
3. At least 1 person with a mobile device with internet

- Studies show students who work in cooperative GROUPS tend to get BETTER GRADES and enjoy course more than students who work individually and competitively.
- Work in teams in industry
- Build and develop social skills (introduce self, listen, encourage, check, accountable)

Coordinator – make sure all group members know their responsibilities and understand problem solution

Recorder – write ideas, possible solutions, and final answer

Checkers – check solution for accuracy before submitting

"Problem solving is what you do when you don't know what to do, otherwise it is not a problem."

Problem Solving Model 1:

- Understand the Problem
- Devise a Plan
- Carry out the Plan
- Look Back

G. Bodner, “Problem Solving: The Difference Between What We Do and What We Tell Students To Do,” U. Chem. Ed., 2003, **7**, 37.

"Problem solving is what you do when you don't know what to do, otherwise it is not a problem."

Problem Solving Model 2:

- Read the Problem
- Read the Problem AGAIN
- Write down what you think is the relevant information
- Draw a picture, make a list, write an equation or formula to help you begin to understand the problem
- Try Something (*Trial And Error*)
- Try Something ELSE
- *SEE where this gets you*

Continued …

G. Bodner, "Problem Solving: The Difference Between What We Do and What We Tell Students To Do," U. Chem. Ed., 2003, **7**, 37.

"Problem solving is what you do when you don't know what to do, otherwise it is not a problem."

Problem Solving Model 2: Continued …

- TEST intermediate results to see whether you are making any progress toward an answer
- Read the Problem AGAIN
- When appropriate, strike your forehead and say, "Son of a …"
- Write down "an" answer (not necessarily "**the**" answer)
- TEST the answer to see if it makes SENSE
- Start over if you have to, *CELEBRATE* if you don't

G. Bodner, "Problem Solving: The Difference Between What We Do and What We Tell Students To Do," U. Chem. Ed., 2003, **7**, 37.

Chem 1A Review

Substances have different Properties

Elements – metals and non-metals

Compounds – ionic and molecular - chemical forces

- atoms combine in whole number ratios – use mole ratios
- bonding, structure, shape, and Properties

Chemical Reactions - use mole ratios

balance equation - conservation of mass law

energy - exothermic/endothermic

Predict whether a double replacement, single replacement reaction occurs – Net Ionic Equation (solubility table - Properties)

Chemical calculations, e.g., theoretical yield

convert mass to moles - use mole ratios

Your drink is too strong. Would you use water or oil to make it less strong?

http://kubarz.com.au/cocktails/a-strong-drink-for-the-strong-you-the-four-horsemen-cocktail/

Why does your olive oil and vinegar salad dressing separate after shaking it?

http://www.sciencephoto.com/media/220209/view

Your drink is too strong. Would you use water or oil to make it less strong?

Why does your olive oil and vinegar salad dressing separate after shaking it?

Structure and Shape Tells Us About Properties

E.g., polarity, solubility, m.p., b.p., viscosity

Atom --> Valence electrons --> Bonds --> Structure --> Shape --> **Properties**

Atoms Form Compounds: Ionic and Molecular

Objective: draw Lewis structure, determine shape and polarity

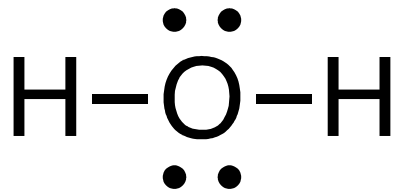
Method:

1. Determine chemical formula

Water

H_2O

2. Draw Lewis structure



3. Determine shape using VSEPR theory

2 bonding pairs + 2 lone pairs = BENT

4. Determine polarity

POLAR

Apply "Like Dissolves Like" rule

VSEPR Theory Summary

# of e.p.	# of b.p.	# of l.p.	Shape	Example
4	4	0	Tetrahedral	CH_4
4	3	1		
4	2	2	Bent	H_2O
3	3	0	Trigonal Planar	BH_3
2	2	0		CO_2

Treat a double or triple bond like a single bond.

Objective: Determine the solubility of a substance

You spilled this substance on the floor.
Would you use water or oil to clean it up?

1. acetone (finger nail polish remover) C_3H_6O
2. Vinegar $C_2H_4O_2$
3. Vegetable oil $C_{18}H_{36}O_2$
4. Baking soda $NaHCO_3$

Which compound(s) is/are soluble in water? Give reasons.

Which compound(s) is/are soluble in oil? Give reasons.

What's That Smell?

RTX9339PJS

Code name for "just-cooked-bacon-cheeseburger-like" fragrance
("Buy•ology", Martin Lindstrom, 2008, p. 148)

I'm

Hungry!

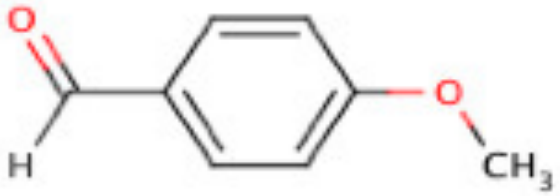
http://aht.seriouseats.com/archives/2009/02/the-original-tops-in-pasadena-ca.html

"One of the most direct assaults on the senses arising from environmental pollution comes from the stinks of civilization." (Ref: Sienko and Plane, "Chemistry", 1977, p. 685-687)

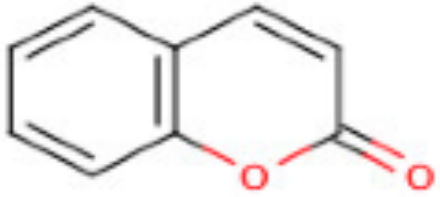
Odor classification is highly subjective.

The relation of odor to the chemical structure is ***not*** simple.

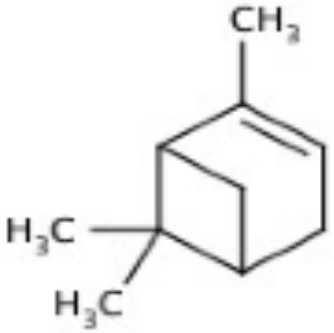
Class: Spicy
Example: Anisaldehyde



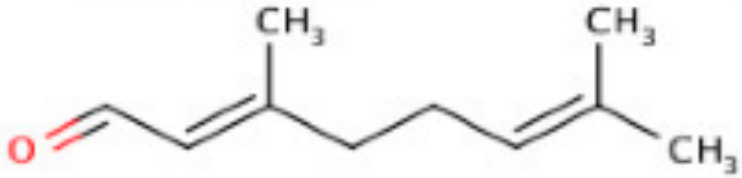
Class: Flowery
Example: Coumarin



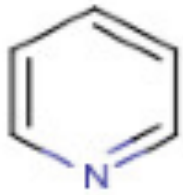
Class: Resinous
Example: Pinene



Class: Fruity
Example: Citral

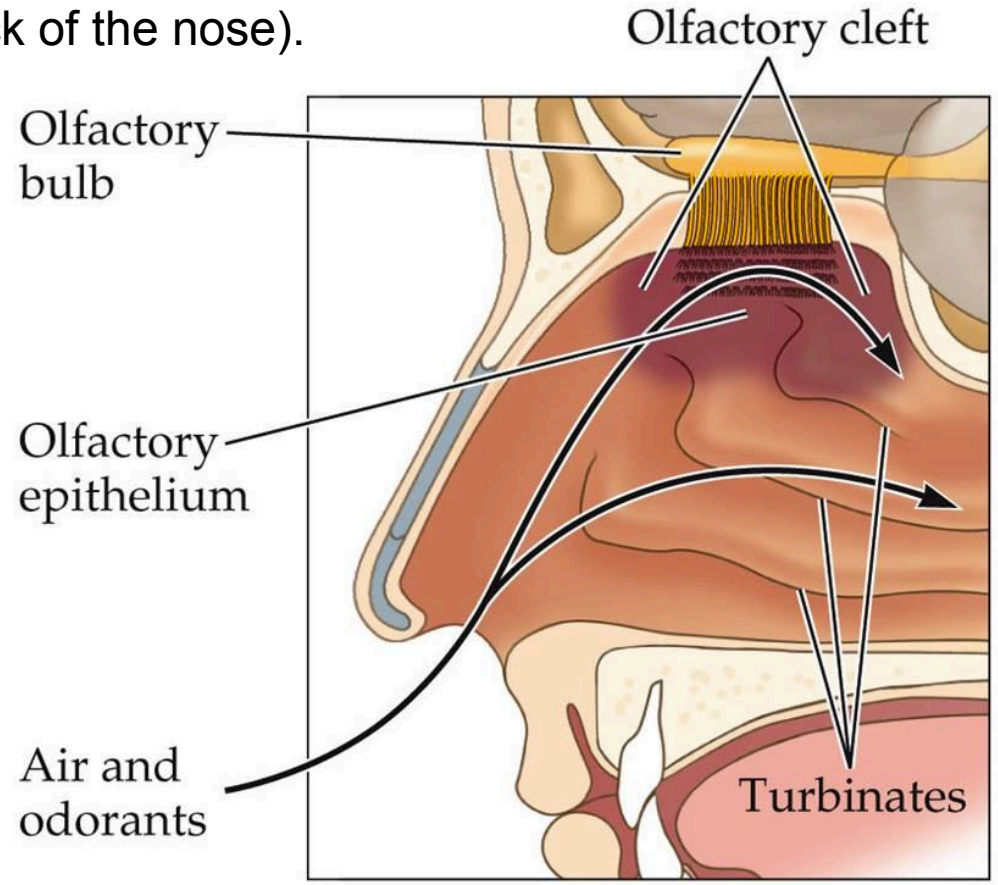


Class: Burnt
Example: Pyridine



Class: Foul
Example: Mercaptans

Sense of ***Smell*** depends on Olfactory cleft (receptors located up and in back of the nose).



https://www.studyblue.com/notes/note/n/olfaction-ch-14/deck/6247889

As few as **8** molecules are needed to trigger the receptor action. (Ref: Sienko and Plane, "Chemistry", 1977, p. 685-687)

Smell detection threshold:

NH_3 = 0.037 mg/l

SO_2 = 0.009 mg/l

HCN = 0.001 mg/l

H_2S = 0.00018 mg/l

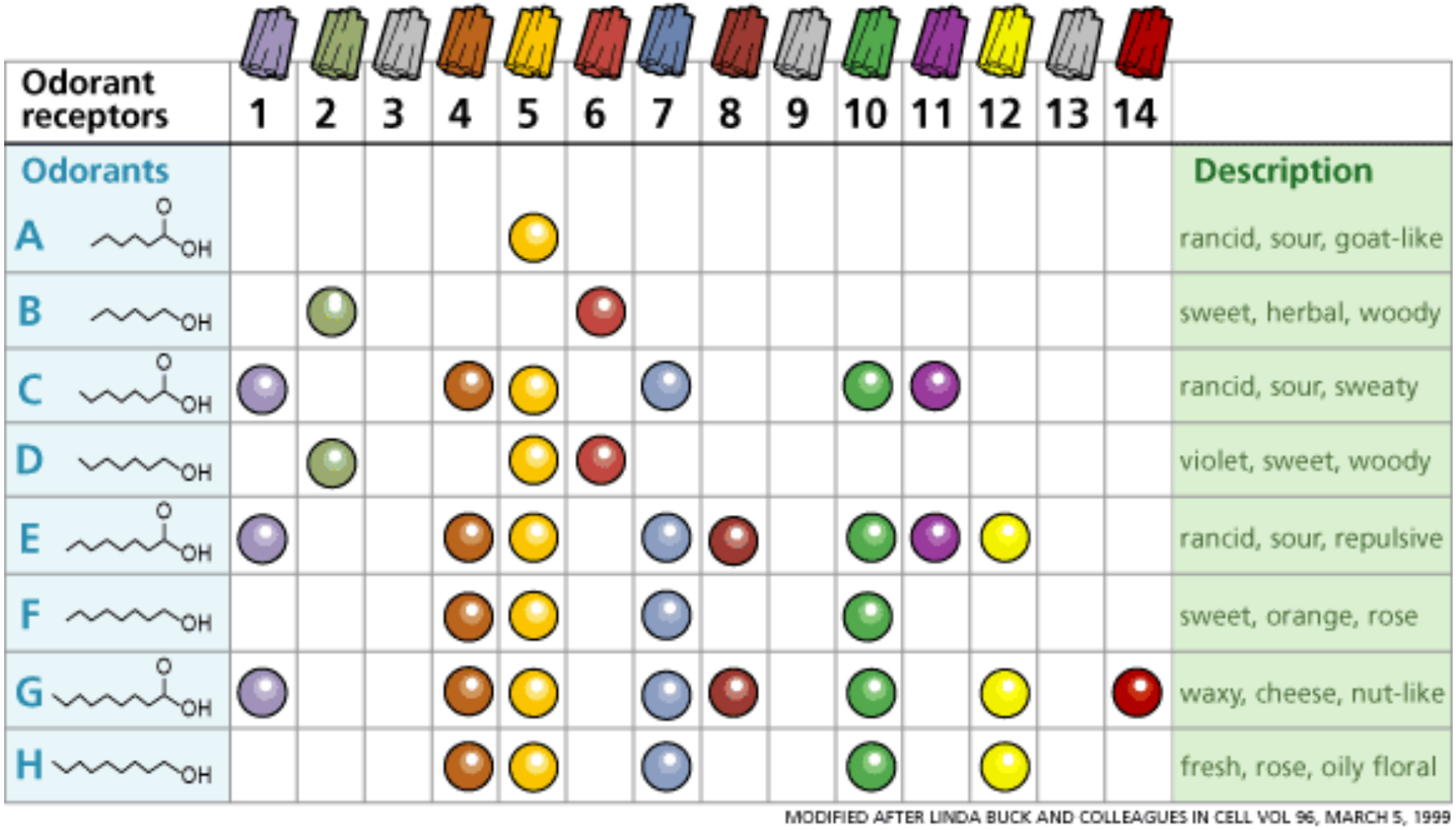
Ethyl mercaptan = 6.6×10^{-7} mg/l (10^9 molecules/ml)

How Smell Works: http://health.howstuffworks.com/smell.htm

2004 Nobel Prize in Medicine to Axel and Buck:

Different odorants are detected by different combinations of receptors and thus have different receptor codes.

http://nobelprize.org/nobel_prizes/medicine/laureates/2004/illpres/index.html



Flavor is a complex sensation comprising taste, odor, roughness, hotness, coldness, pungency, and blandness.

Odor has the greatest influence in Flavor

11 Different Tastes Linnaeus (1754):

Sweet
Sour
Sharp
Salty
Bitter
Fatty
Insipid
Aqueous
Astringent
Viscous
Nauseous

http://brandflair.com/tag/rolling-stones-tongue/

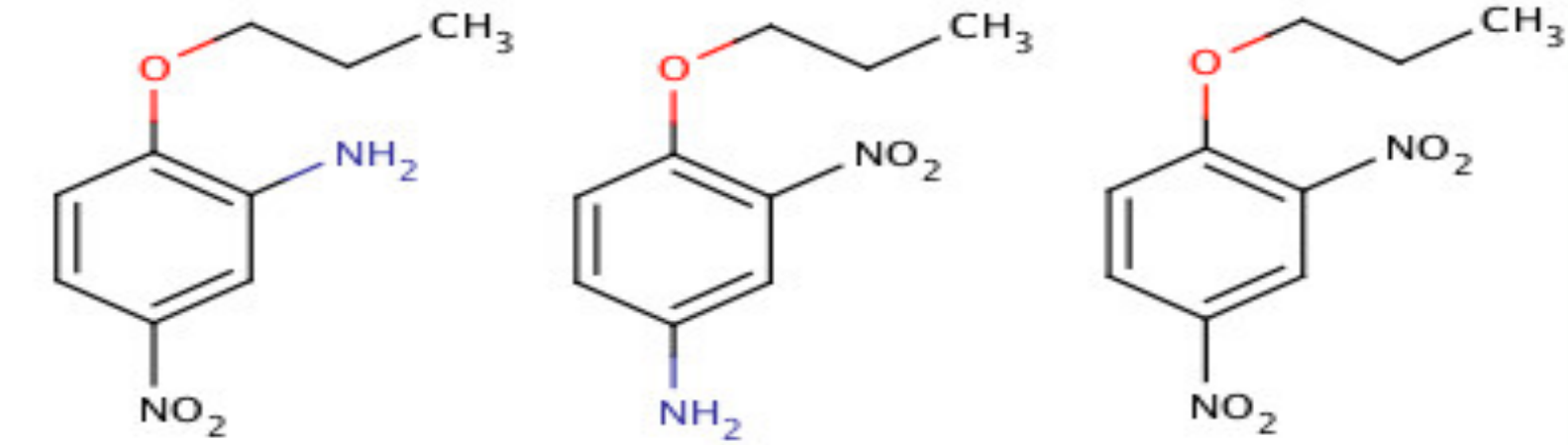
5 Basic Tastes:

Sweet
Sour
Bitter
Salty
Umami (savory, brothy, meaty)

≈ 9,000 Taste Receptors are located on tongue and soft palate.

Taste Threshold: Sour (acid) 5×10^{-4} M HCl, Salty 0.01 M

(Ref: Sienko and Plane, "Chemistry", 1977, p. 685-687)



Most Compounds are Organic (16 million known)
Organic compounds contain: carbon, hydrogen, oxygen, nitrogen, phosphorous, and sulfur

General Bonding Rules:

Atom	# of bonding pairs	# of lone pairs
C	4	0
N	3	1
O	2	2
H	1	0
F, Cl, Br, I	1	3

Biological Molecules are Organic Compounds

Carbohydrates
Lipids
Proteins
Nucleic acids

Functional Groups Are Small Groups of Atoms Within An Organic Compound

Hydrocarbons
Non-polar

Saturated

Alkanes
C-C

Unsaturated

Alkenes
C=C

Alkynes
C≡C

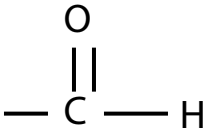
Aromatics

Groups that contain O
Polar

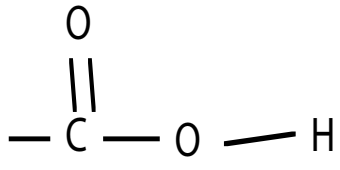
Alcohol
C-O-H

Ether
C-O-C

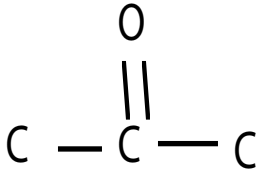
Aldehyde



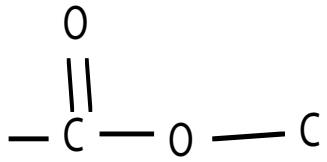
Acid



Ketone

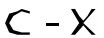


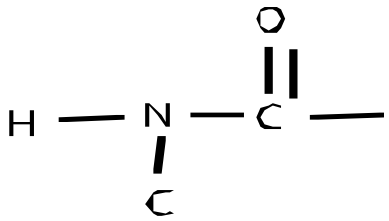
Ester



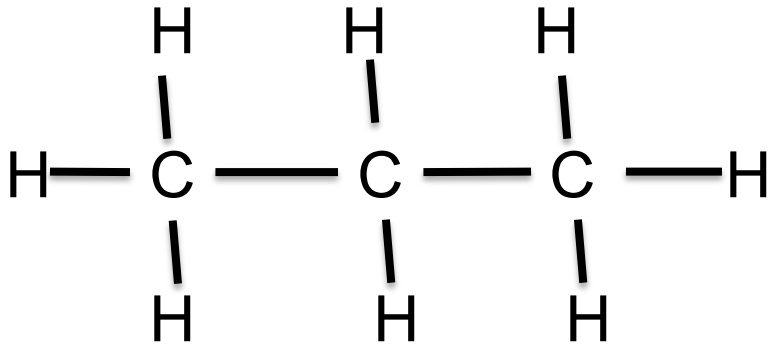
Other Groups: alkyl halides amines amides

X = F, Cl, Br, I





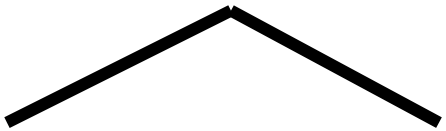
Big Organic Compounds have a ***LOT*** of H's



(you get tired of drawing all the H's in the structure)

Skeletal structure = shortcut to Lewis structure

Each line is a bond



A C is at the end of each bond

The H's bonded to C are <u>not</u> drawn