ANSWERS

dipole- dipole IMF

CλeMis+ry: http://genest.weebly.com

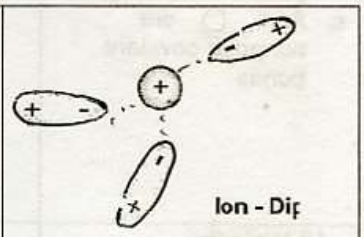
Stop in for help every day at lunch and Tues, Wed., &Thurs after school!

After-hours question? Email me at home: eugenest@madison.k12.wi.us

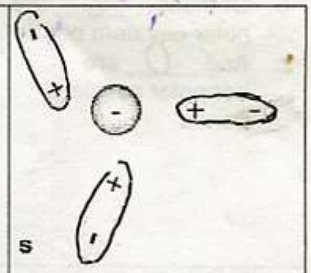
Name_____

Period_____

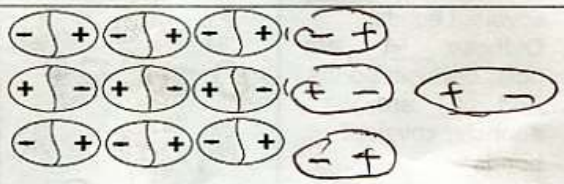
1. How many molecules are here? 4
2. How many molecules here have a + end AND a - end 3
3. How many molecules here are cations (just purely +): 1
4. How many molecules here are anions (just purely -): 0
5. How many of these are "dipoles"? 3
6. Draw little dashed lines on the picture to connect things that feel attracted to each other.



7. How many molecules are here? 4
8. How many molecules here have a + end AND a - end 3
9. How many molecules here are cations (just purely +): 0
10. How many molecules here are anions (just purely -): 1
11. How many of these are "dipoles"? 3
12. Draw little dashed lines on the picture to connect things that feel attracted to each other.



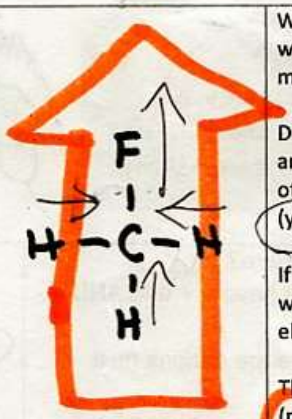
13. Extend this picture by adding five more molecules that look identical to the nine molecules already here. Important: make them point in the correct direction which their attraction causes.



14. Define IMF:

"stickiness" - intermolecular forces

the attraction between molecules

15. Write the electronegativity number next to each atom. a. This atom has 4 covalent bonds b. Of these, 4 are polar covalent bonds c. And 0 are nonpolar covalent bonds		Write arrows next to each bond to show which end of the bond the electrons go more towards Does this molecule have a negative end and positive end that are opposite to each other? (yes/no) If you answered "yes", draw a hollow arrow which shows which end the negative electrons are mostly going towards. This molecule is (polar / nonpolar)
16. Write the electronegativity number next to each atom. a. This atom has 2 covalent bonds b. Of these, 2 are polar covalent bonds c. And 0 are nonpolar covalent bonds		Write arrows next to each bond to show which end of the bond the electrons go more towards Does this molecule have a negative end and positive end that are opposite to each other? (yes/no) If you answered "yes", draw a hollow arrow which shows which end the negative electrons are mostly going towards. This molecule is (polar / nonpolar)
17. Write the electronegativity number next to each atom. a. This atom has 4 covalent bonds b. Of these, 4 are polar covalent bonds c. And 0 are nonpolar covalent bonds	O=C=O non polar	Write arrows next to each bond to show which end of the bond the electrons go more towards Does this molecule have a negative end and positive end that are opposite to each other? (yes/no) If you answered "yes", draw a hollow arrow which shows which end the negative electrons are mostly going towards. This molecule is (polar / nonpolar)

ANSWERS KEY

THING 1

Nothing But Percent Yield Problems

Name

1. If your theoretical yield of water was 45.8 moles but only 36.1 moles formed, what is your percent yield?

$$\%\ \text{yield} = \frac{36.1}{45.8} \times 100$$

$$\% = 78.8\%$$

2. If your percent yield was 62.2% and you actually obtained 81.4 grams of product, what was your theoretical yield?

$$62.2\% = \frac{81.4\text{g} \times 100}{x}$$

NOW SOLVE FOR x

$$x = \frac{81.4 \times 100}{62.2}$$

$$x = 131$$

3. If your theoretical yield of water was 4.59x10-5 grams but only 4.51x10-5 grams formed, what is your percent yield?

$$\frac{4.51 \times 10^{-5}\ \text{grams}}{4.59 \times 10^{-5}\ \text{grams}} \times 100 = 98.2\%$$

THING 2

Nothing but Theoretical Yield problems

Name KEY

4. Write the balanced reaction of Oxygen gas and hydrogen gas to form water.

$$2H_{2(g)} + O_{2(g)} \rightarrow 2H_2O$$

5. If 803 moles of oxygen gas react, how many moles of water should form, in a perfect world?

$$803\ \text{mol}\ O_2 \times \left(\frac{2\ \text{mol}\ H_2O}{1\ \text{mol}\ O_2}\right) = \quad \text{mol}\ H_2O$$

6. If 38.9 grams of hydrogen react, what is your theoretical yield, in grams, of water?

$$\frac{38.9\ \text{grams}\ H_2}{1} \times \left(\frac{1\ \text{mol}\ H_2}{2.02\ \text{g}\ H_2}\right) \times \left(\frac{2\ \text{mol}\ H_2O}{2\ \text{mol}\ H_2}\right) \times \left(\frac{18.02\ \text{g}\ H_2O}{1\ \text{mol}\ H_2O}\right) =$$

7. If 5.30 moles of oxygen react, what is your theoretical yield, in moles, of water?

$$\frac{5.30\ \text{mol}\ O_2}{1} \times \left(\frac{2\ \text{mol}\ H_2O}{1\ \text{mol}\ O_2}\right) = 10.6\ \text{mol}\ H_2O$$

8. If you mix 100. g of H2 and 100. g of O2, and O2 is the limiting reactant, how many grams of water is the theoretical yield?

$$\frac{100.\text{g}\ O_2}{1} \times \frac{1\ \text{mol}\ O_2}{32.00\ \text{g}\ O_2} \times \frac{2\ \text{mol}\ H_2O}{1\ \text{mol}\ O_2} \times \frac{18.02\ \text{grams}\ H_2O}{1\ \text{mol}\ H_2O} =$$

ANSWERS!

THING 3

Nothing but Limiting Reagent problems

For each of the following unbalanced chemical equations, suppose 10.0 grams of each reactant is used. Show by calculation which reactant is limiting. Remember to balance the reaction first.

$$CO_{(g)} + 2H_{2(g)} \rightarrow CH_3OH_{(l)}$$

#1 $\frac{10.0\text{ g CO}}{1} \times \frac{1\text{ mol CO}}{28.01\text{ g CO}} \times \frac{1\text{ mol } CH_3OH}{1\text{ mol CO}} \times \frac{32.05\text{ g } CH_3OH}{1\text{ mol } CH_3OH} = 11.4\text{ g } CH_3OH$

#2 $\frac{10.0\text{ g } H_2}{1} \times \left(\frac{1\text{ mol } H_2}{2.02\text{ g } H_2}\right) \times \left(\frac{1\text{ mol } CH_3OH}{2\text{ mol } H_2}\right) \times \left(\frac{32.05\text{ g } CH_3OH}{1\text{ mol } CH_3OH}\right) = 79.3\text{ g } CH_3OH$

ANSWER: CO is the Limiting Reactant

$$2Al_{(s)} + 3I_{2(s)} \rightarrow 2AlI_3$$

#1 $\frac{10.0\text{ g Al}}{1} \times \left(\frac{1\text{ mol Al}}{26.98\text{ g Al}}\right) \times \left(\frac{2\text{ mol } AlI_3}{2\text{ mol Al}}\right) \times \left(\frac{407.6\text{ g } AlI_3}{1\text{ mol } AlI_3}\right) = 151\text{ g } AlI_3$

#2 $\frac{10.0\text{ g } I_2}{1} \times \left(\frac{1\text{ mol } I_2}{253.8\text{ g } I_2}\right) \times \left(\frac{2}{3}\right) \times \left(\frac{407.6\text{ g } AlI_3}{1\text{ mol } AlI_3}\right) = 10.7\text{ g } AlI_3$

ANSWER: I_2 is the LIMITING REACTANT

THING 4

Mixed Problem – Do this one last

11. Titanium (IV) oxide is a white compound that is used as a coloring pigment. High quality white paper contains it, in fact. An UNBALANCED reaction that prepares it is $TiCl_{4(g)} + O_{2(g)} \rightarrow TiO_{2(s)} + Cl_{2(g)}$. If 243 grams of $TiCl_{4(g)}$ react and 49.0 grams of $TiO_{2(s)}$ form, find the following:

a. The balanced reaction equation.

$$TiCl_4 + O_2 \rightarrow TiO_2 + 2Cl_2$$

b. The theoretical yield of $TiO_{2(s)}$

$\frac{243\text{ g } TiCl_4}{1} \times \left(\frac{1\text{ mol } TiCl_4}{189.7\text{ g } TiCl_4}\right) \times \left(\frac{1\text{ mol } TiO_2}{1\text{ mol } TiCl_4}\right) \times \left(\frac{79.9\text{ g } TiO_2}{1\text{ mol } TiO_2}\right) = 102\text{ grams } TiO_2$ theoretical yield

~~c. The percent yield of $TiO_{2(s)}$~~

$$\%\text{yield} = \frac{49.0}{102\text{g}} \times 100 = 48.0\%$$

BULLETIN BOARD

Take down your square by Thursday

The following people have 0 / 100 on a major test:

Test 5
RC, sd, sl, AJ,
Test 6
CC, na, sd, rh, fj, jm, bs, as, MA,KF, AJ, SK
Test 7
JDV, KE, na, ab, rh, aj, sl, ts, bt, JC, KF, TI, AJ, SK, FP

The last day for fixing late anything is this Thursday (June 5).

TEXTBOOKS!

phone calls home start tomorrow

Today:

1) ANSWERS TO the rooster sheet

2)Your choice:

sit in a circle with Mr Genest, checking the review homework

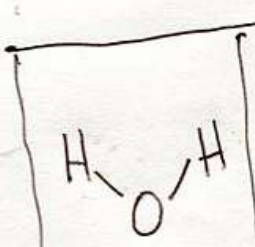
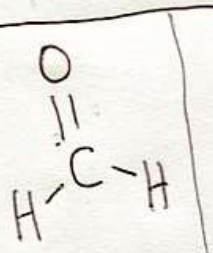
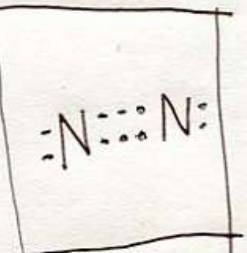
Work at your station on Molecule Graffiti

3) Back to seats for lecture at _____:50

June 3, 2014

PURPOSE: WHAT THREE THINGS CAUSE STICKINESS?

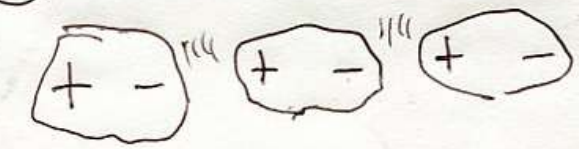
#1 WARMUP

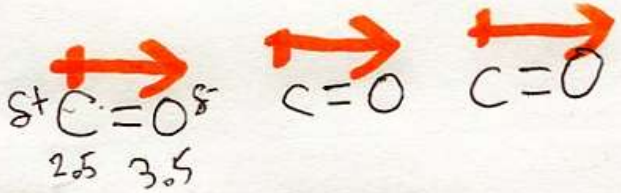
			
HOW STICKY PHASE	LIQUID	GAS	GAS
	very sticky	medium sticky	barely sticky

#2 There are three kinds of IMF (intermolecular force)

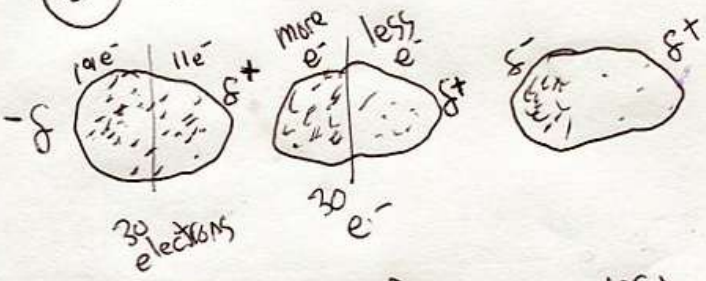
(Sometimes called stickiness)

A. Dipole Interaction





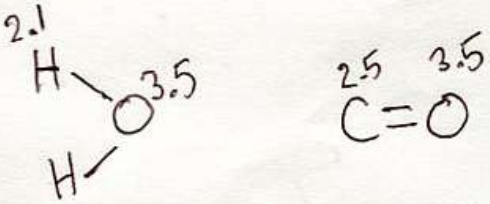
B. Van der Waals



Van der Waals force is very weak stickiness.

It is caused when one molecule temporarily puts a charge on its neighbors making them lopsided and slightly polar

© Hydrogen Bonding



This occurs when the e^- run very far to one end of the bond. It makes the attractive charge very large.

IMF	~~[illegible]~~ who has it
hydrogen bond	any molecule where H touches O, N, or F directly
dipole	most molecules happens whenever the molecule is polar
van der Waals	non polar molecule.

all three types of IMF

CheMis+ry: http://genest.weebly.com

Stop in for help every day at lunch and Tues, Wed., &Thurs after school!

After-hours question? Email me at home: eagenest@madison.k12.wi.us

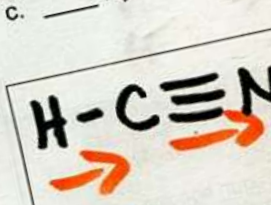
Name_____

Period_____

HERE ARE SOME HINTS FOR TONIGHT'S HomewK

1. Draw small arrows next to each bond to show the polarity of the bond. Draw a large hollow arrow to show the polarity of the molecule.
2. Match the type of intermolecular force with the correct definition:
   a. ____ van der Waals force
   b. ____ Dipole Interactions
   c. ____ Hydrogen Bonding
   x. the strongest type of intermolecular force
   y. the weakest intermolecular force
   z. the medium strength intermolecular force

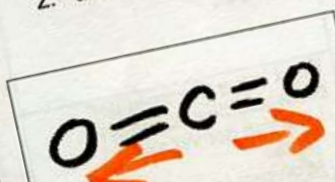
If the molecules in the first square are correctly oriented, write CORRECT in the empty square. Otherwise, redraw the molecules in the second square.



What is the strongest IMF present in *this* molecule?
- ☐ just van der Waals
- ☒ dipole
- ☐ hydrogen bonding

How can you tell?
the polar bonds don't cancel out. AND N is NOT next to H

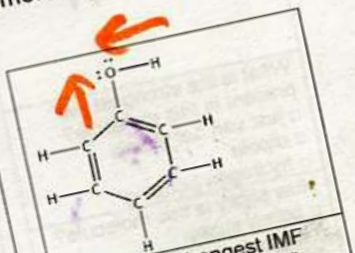
How sticky is this molecule?
- ☐ barely sticky
- ☐ normal stickiness
- ☐ very sticky



What is the strongest IMF present in *this* molecule?
- ☒ just van der Waals
- ☐ dipole
- ☐ hydrogen bonding

How can you tell?
Nonpolar Molecule so it has Van der Waals

How sticky is this molecule?
- ☐ barely sticky
- ☐ normal stickiness
- ☐ very sticky



What is the strongest IMF present in *this* molecule?
- ☐ just van der Waals
- ☐ dipole
- ☒ hydrogen bonding

How can you tell?
"H" is directly next to "O"

How sticky is this molecule?
- ☐ barely sticky
- ☐ normal stickiness
- ☐ very sticky