Name_____ Period_____

Pre AP Chemistry Fall Final Stations Review

Station: Cow

A. Calculate percent abundance. Show your work here. Box your answer.

20% → Cu-65
80% - Cu-63

$63(x) + 65(y) = 63.4$
$x + y = 1$
$x = 1 - y$

$63(1-y) + 65y = 63.4$
$63 - 63y + 65y = 63.4$
$63 + 2y = 63.4$
$2y = 0.4$
$y = 0.2 = 20\%$

B. Isotope Notations:

$^{65}_{29}Cu$ → Cu-65 $^{63}_{29}Cu$ → cu63

C. The force present in these samples is metallic, which is an intramolecular force.

Station: Dolphin

1. A. increasing atomic radius Ne, O_2, S, Al, Mg, Zn, Ca

B. increasing electronegativity Ne, Ca, Mg, Zn, Al, S, O_2

C. increasing ionization energy Ca, Mg, Zn, Al, S, O_2, Ne

2. core electrons block (shield) the positive pull of the protons from the valence electrons

Station: Narwhal

Charge: -2 Mass number: 81 # of e⁻: 36

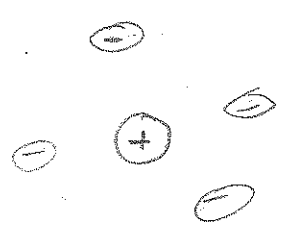
1. Element: Selenium B. #protons: 34 # neutrons: 47

C. Isotope Notation: $^{81}_{36}Se^{-2}$

D. ~~Shorthand notation~~ of the NEUTRAL atom: $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^4$

E. Description: The atom is mostly empty space with a dense positive center (nucleus)

Labeled Drawing:



Station: Llama

1. Correct: ↑↓ ↑↓ ↑ ↑ ↑ (1s, 2s, 2p)
2. Hund's rule violation: ↑↓ ↑↓ ↑↓ ↑ — (1s, 2s, 2p)
3. Pauli Exclusion Principle violation: ↑↑ ↑↑ ↑ ↑ ↑ (1s, 2s) ← no two can have the same spin in the same orbital
4. Aufbau Principle Violation: ↑↓ ↑↓ ↑↓ ↑ ($1s^2$, 2p) & skipping 2s (Aufbau is all about the order you fill)

Station: Starfish

Metals		Nonmetals	
1. Name	2. Family and/or group #	1. Name	2. Family and/or group#
Mg - magnesium	2A Alkaline earth metal	Ne - Neon	18 Noble gas
Ca - calcium	2A Alkaline earth metal	Cl - Chlorine	17 halogens
Li - lithium	1A alkali metal	S - sulfur	16 oxygen group
Na - Sodium	alkali metal	H - hydrogen	group 1

3. Least reactive is Ne because full outer shell

4. Element	Anion symbol and charge	Anion name
Chlorine	Cl^{-1}	Chloride
Sulfur	S^{-2}	Sulfide

5. Element	Cation symbol and charge	Cation name
Calcium	+2	calcium
Lithium	+1	Lithium

Ocelot Station

Lewis Structure	Shape Name	Polarity	Types of IMFs
A: SO_2	bent	polar	LDF + D.D.
B: IF_5	Square Pyramidal	polar	LDF + D.D.
C: BH_3	trigonal planar	nonpolar	LDF
D: COH_2	trigonal planar	polar	LDF + D.D.

Station: Clownfish

1. Energy= $\frac{700\,nm}{1} \cdot \frac{1\,m}{10^{-9}\,nm} = 7.0\times10^{-7}\,m$ $c = \lambda\nu$

$\frac{3.00\times10^{8}\,\frac{m}{s}}{7.0\times10^{-7}} = \frac{7.0\times10^{-7}\,m \cdot \nu}{7.0\times10^{-7}\,m}$

$\nu = 4.29\times10^{14}\,\frac{1}{s}$

$E = h\nu$

$E = 6.626\times10^{-34}\,J\cdot s \times 4.29\times10^{14}\,\frac{1}{s}$

$E = 2.84\times10^{-19}\,J$

2. Calculations:

$\nu = 7.80\times10^{14}\,\frac{1}{s}$

$c = \lambda\nu$

$3.00\times10^{8}\,\frac{m}{s} = \lambda\, 7.80\times10^{14}\,\frac{1}{s}$ $\lambda = 3.85E^{-7}\,m \cdot \frac{1\,nm}{10^{-9}\,m}$ $384.6\,nm$

When the frequency is 7.80×10^{14} Hz, the color is ultra violet

3. Energy = $E = h\nu$

$E = 6.626\times10^{-34}\,J\cdot s \times 7.80\times10^{14}\,Hz = 5.17\times10^{-19}\,J$

Giraffe

	A) Formula	B) Name
1	$Mg_3(PO_4)_2$	magnesium phosphate
2	$Co_2(SO_4)_3$	cobalt(III) sulfate
3	NH_4OH	ammonium hydroxide
4	Ag_2SO_4	silver sulfate
5	$MgCl_2$	magnesium chloride → ionerd + ide

Cl^{-1}
NO_3^{-1}
PO_4^{-3}
OH^{-1}

cations Ag^{+1}, Na^{+1}, NH_4^{+1}, Pb^{+2}, Co^{+3}, Mg^{+2} anions SO_4^{-2}, CO_3^{-2}

Emu

Name of substance	Chemical formula	Steric number	Nonbonding domains	Name of shape	Polar?
Carbon dioxide	CO_2	2	0	linear	no
Methane	CH_4	4	0	tetrahedral	no
Ammonia	NH_3	4	1	trigonal pyramidal	yes
Boron trifluoride	BF_3	3	0	trigonal planar	no
Phosphorus pentabromide	PBr_5	5	0	trigonal bipyramidal	no

Parrot

Chemical symbol or formula	Chemical name	Intramolecular force
$C_{12}H_{22}O_{11}$	sucrose	Covalent
Pb	lead	metallic
O_2	Oxygen	Covalent
NaCl	Sodium chloride	ionic

Bond Type	Valence electrons are	Properties	
Covalent	Shared	brittle	
Ionic	transfered	brittle	
Metallic	Sea of electrons	malleable	

Oyster

Part A) 1) Labeled drawing of the molecule:

2) Bond angles: 104.5°.

3) The force is Covalent and it is intra - molecular.

4) Intermolecular forces present are LDF, dipole-dipole, hydrogen bond

Rhinoceros

A) The most electronegative element is fluorine.

B) Chemical formula	C) Chemical name	D) Bond polarity
S_5O_1	pentasulfur monoxide	polar
P_4N_1	tetraphosphorus mononitride	polar
N_5O_6	pentanitrogen hexoxide	polar

E. We still need to know this to know if the molecule is polar: Shape

Reindeer

1) Cards with mistakes:

$\frac{1\,\mu g}{10^{-3} g}$

Why this is wrong: micro is 10^{-6} not 10^{-3}

$\frac{10^{-3}\,mL}{1\,L}$

Why this is wrong: One with prefix!

$?\,lump = \frac{2.3\,L}{} \cdot \frac{1\,mL}{10^{-3}\,L} \cdot \frac{3.3\,g}{1\,mL} \cdot \frac{1\,\mu g}{10^{-6}\,g} \cdot \frac{1\,lump}{4.86\times10^{7}\,\mu g} =$

Calculated answer: D) 156 lumps

2) Record this info: Box dimensions: 8in x 8in x 5.9in Width of paper: 0.76 m

A) Surface area of Box: (8in x 8in x2) + (5.9in x 8in x4) = 316.8 in^2

B) Show all work.

$?\,m = \frac{Hanukkah}{} \cdot \frac{8\,night}{1\,Hanukkah} \cdot \frac{1\,present}{1\,night} \cdot \frac{1\,box}{1\,present} \cdot \frac{316.8\,in^2}{1\,box} \cdot \frac{2.54\,cm}{1\,in} \cdot \frac{2.54\,cm}{1\,in}$

$\frac{10^{-2}\,m}{1\,cm} \cdot \frac{10^{-2}\,m}{1\,cm} \cdot 0.76\,m = 2.15\,m$

Skunk Station

A) Boiling is when there is a change of state from liquid to gas.

B) Fraction-style ratios for the molar mass of 1-octanol.

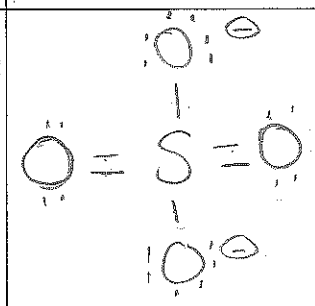
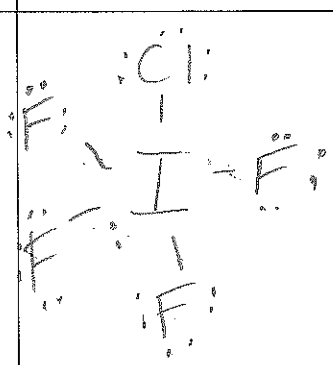
$\frac{130\,g\ octanol}{1\,mol\ octanol}$	$\frac{1\,mol\ octanol}{130\,g\ octanol}$

C) Convert 356 kiloJoules (mole) into calories (mg)

$? \frac{cal}{mg} = \frac{356\,kJ}{mol} \cdot \frac{10^{3}\,J}{1\,kJ} \cdot \frac{1\,cal}{4.184\,J} \cdot \frac{1\,mol}{130\,g\ octanol} \cdot \frac{10^{-3}\,g}{1\,mg} = 0.654\,\frac{cal}{mg}$

Moose Station

Shape	Shape Name	Polarity	Types of IMFs
A.	tetrahedral	non	LDF
B.	linear	non	LDF
C.	square pyramidal	polar	LDF, D.D.
D.	see saw	polar	LDF, D.D.

Molecule	Lewis Structure	Formal Charge	# of Bonding Domains	# of Non-Bonding Domains	Steric Number	Hybridization
SO_4^{-2} 6 + 24 + 2 32 24 Shape letter: _____		S = 6-6-0 = 0 O = 6-2-4 = 0 ⊖O = 6-1-6 = -1	4	0	4	sp^3
$ICIF_4$ 7 + 7 + 4 4x7 42 Shape letter: 32		I: 7-5-2 = 0 F: 7-1-6 = 0 Cl: 7-1-6 = 0	5	1	6	sp^3d^2

Alligator Station

Part A) When a solid changes to a liquid, that phase change is called melting.

When a liquid changes to a gas, that phase change is called boiling.

When a liquid changes to a solid, that phase change is called freezing.

When a gas changes to a liquid, that phase change is called condensing

B1) Intermolecular force(s) for ethanol LDF, D.D. + Hydrogen bond Intermolecular force(s) for propanal LDF, D.D.

B2) Propanal has a lower boiling point which means it has weaker intermolecular forces holding its molecules together.

B3) Explanation: Ethanol has LDF, dipole-dipole, hydrogen bonds and 26e⁻. Propanal has LDF and dipole-dipole and 32e⁻. Even though propanal has more electrons, the ethanol has a higher boiling point because the net forces are greater due to the addition of the hydrogen bond.