Catalyst 1/14/13

1. What needs to occur between atoms in order for an ionic bond to occur?

2. Draw the Lewis dot structure of Nitrogen

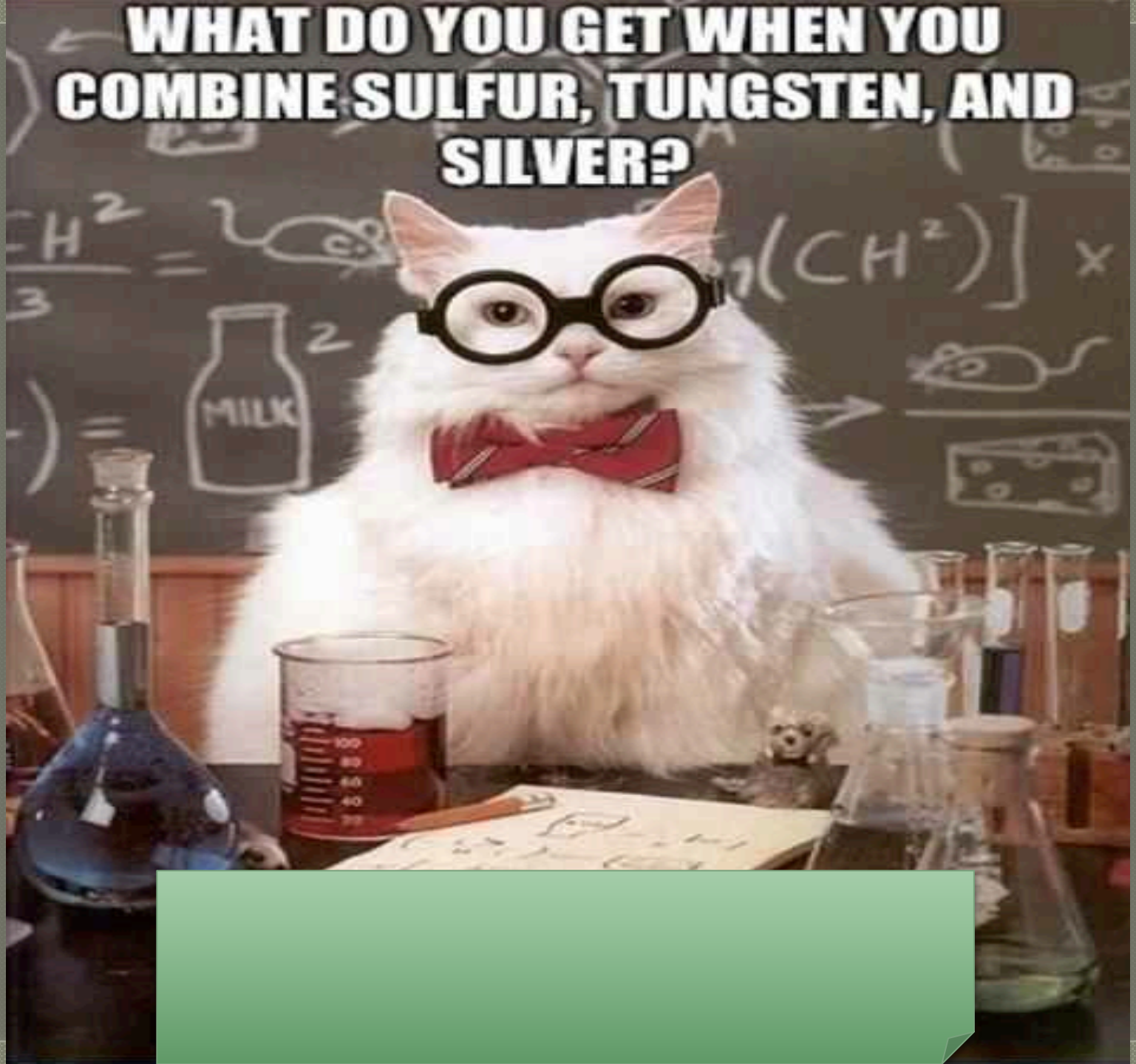
3. **BLAST from the PAST!** How many significant figures do the following values have?

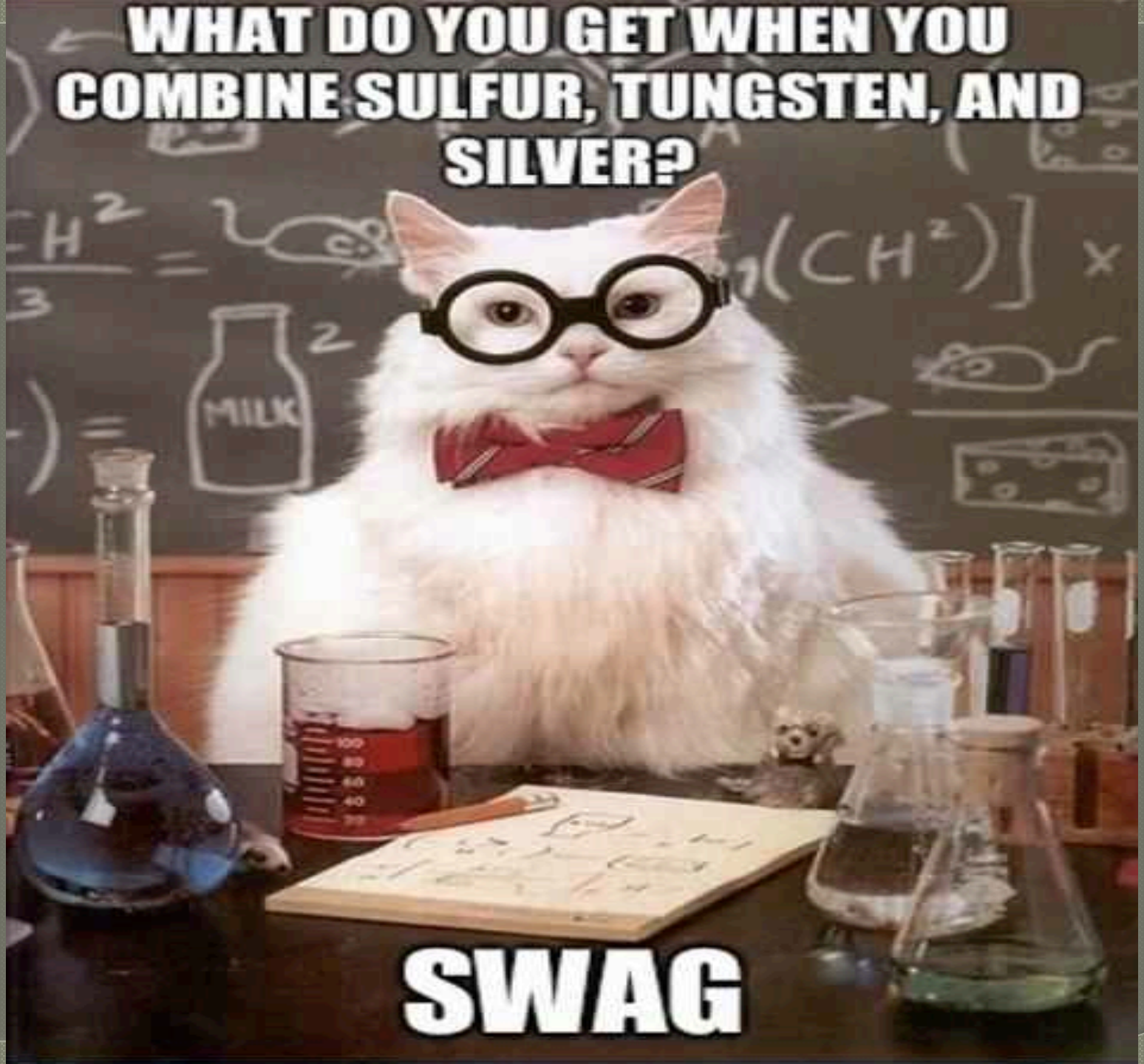
   A. 9.300 m

   B. 0.003 cm

Agenda 1/14/13

- Catalyst
- Cartoon of the Day
- Announcements
  - Benchmark#2 on January 29th
  - Midterm coming soon (February?)
  - Packet#6 DUE Wednesday, 1/16/13
- Introduction to Covalent Compounds
- Exit Slip
- Electronegativity
- Class Practice


WHAT DO YOU GET WHEN YOU COMBINE SULFUR, TUNGSTEN, AND SILVER?
MILK


WHAT DO YOU GET WHEN YOU COMBINE SULFUR, TUNGSTEN, AND SILVER?
MILK
SWAG

Class Points

Your class can earn class points if:

everyone in class:

- Comes to class quietly and on time
- Stays focused and on task during class
- Leaves classroom neat and organized
- Students are teaching other students
- Majority of class participates
- Follows all classroom expectations and procedures
- And more…

P3: 47 pts (on time, on task, teaching each other)

P4: 46 pts (on time, neat room, focused)

P6: 56 pts (on time, neat room)

Objective 1/14/13

We will be able to

- Explain why covalent bonds form and describe the properties of covalent compounds



Why do atoms form bonds?

How do ionic bonds form?

How do ionic bonds form?

The atom of one element loses electrons while the atom of another element gains electrons.

Electrons are TRANSFERRED.

Quick Review: Octet Rule

- Atoms gain, lose, or **SHARE** electrons in order to have **8** valence electrons.

Covalent Bonds

- Atoms of different elements **share electrons** to form a **covalent bond**. They share electrons in order to have **8** valence electrons.

- Atoms **share** electrons by **overlapping** their orbitals.

Types of Covalent Bonds

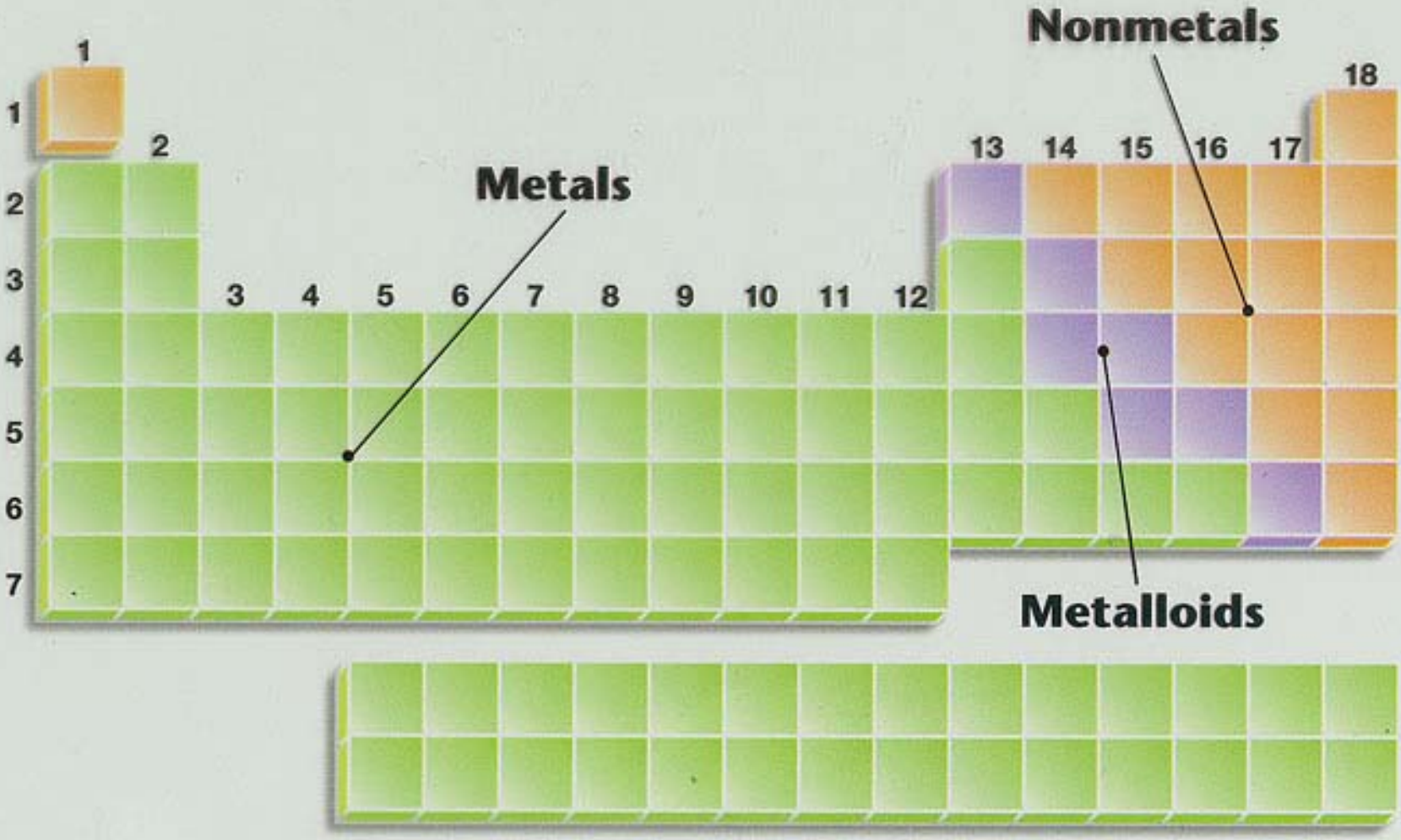
- In single bonds, atoms share **2** electrons
- In double bonds, atoms share **4** electrons
- In triple bonds, atoms share **6** electrons
- All **single bonds** have **sigma** bonds.
- **Double bonds** have **1** sigma bond and **1** pi bond.
- **Triple bonds** have **1** sigma bond and **2** pi bonds.

π <- pi

σ <- sigma

Properties of Covalent Compounds

- Low melting point
- Low boiling point
- Poor conductor of electricity

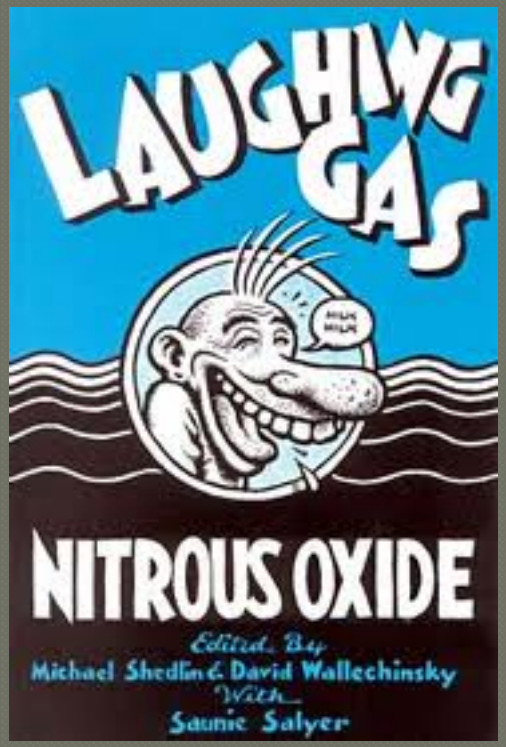

Nonmetals
Metals
Metalloids
1
2
3
4
5
6
7
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18

Covalent compound: CO - carbon monoxide

FUN FACT!

Did you know that CO binds to hemoglobin (where oxygen is normally found in blood) 200 times stronger than oxygen does? That's why it's so poisonous!

Covalent compound: N_2O – dinitrogen monoxide



Periodic Table of Elements

Atomic # / Symbol / Name / Atomic Mass

C Solid
Hg Liquid
H Gas
Rf Unknown

Metals: Alkali metals, Alkaline earth metals, Lanthanoids, Actinoids, Transition metals, Poor metals
Nonmetals: Other nonmetals, Noble gases

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1 H Hydrogen 1.00794																	2 He Helium 4.002602
2	3 Li Lithium 6.941	4 Be Beryllium 9.012182											5 B Boron 10.811	6 C Carbon 12.0107	7 N Nitrogen 14.0067	8 O Oxygen 15.9994	9 F Fluorine 18.9984032	10 Ne Neon 20.1797
3	11 Na Sodium 22.98976928	12 Mg Magnesium 24.3050											13 Al Aluminium 26.9815386	14 Si Silicon 28.0855	15 P Phosphorus 30.973762	16 S Sulfur 32.065	17 Cl Chlorine 35.453	18 Ar Argon 39.948
4	19 K Potassium 39.0983	20 Ca Calcium 40.078	21 Sc Scandium 44.955912	22 Ti Titanium 47.867	23 V Vanadium 50.9415	24 Cr Chromium 51.9961	25 Mn Manganese 54.938045	26 Fe Iron 55.845	27 Co Cobalt 58.933195	28 Ni Nickel 58.6934	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.64	33 As Arsenic 74.92160	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.798
5	37 Rb Rubidium 85.4678	38 Sr Strontium 87.62	39 Y Yttrium 88.90585	40 Zr Zirconium 91.224	41 Nb Niobium 92.90638	42 Mo Molybdenum 95.96	43 Tc Technetium (97.9072)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.90550	46 Pd Palladium 106.42	47 Ag Silver 107.8682	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.760	52 Te Tellurium 127.60	53 I Iodine 126.90447	54 Xe Xenon 131.293
6	55 Cs Caesium 132.9054519	56 Ba Barium 137.327	57–71	72 Hf Hafnium 178.49	73 Ta Tantalum 180.94788	74 W Tungsten 183.84	75 Re Rhenium 186.207	76 Os Osmium 190.23	77 Ir Iridium 192.217	78 Pt Platinum 195.084	79 Au Gold 196.966569	80 Hg Mercury 200.59	81 Tl Thallium 204.3833	82 Pb Lead 207.2	83 Bi Bismuth 208.98040	84 Po Polonium (208.9824)	85 At Astatine (209.9871)	86 Rn Radon (222.0176)
7	87 Fr Francium (223)	88 Ra Radium (226)	89–103	104 Rf Rutherfordium (261)	105 Db Dubnium (262)	106 Sg Seaborgium (266)	107 Bh Bohrium (264)	108 Hs Hassium (277)	109 Mt Meitnerium (268)	110 Ds Darmstadtium (271)	111 Rg Roentgenium (272)	112 Uub Ununbium (285)	113 Uut Ununtrium (284)	114 Uuq Ununquadium (289)	115 Uup Ununpentium (288)	116 Uuh Ununhexium (292)	117 Uus Ununseptium	118 Uuo Ununoctium (294)

For elements with no stable isotopes, the mass number of the isotope with the longest half-life is in parentheses.

57 La Lanthanum 138.90547	58 Ce Cerium 140.116	59 Pr Praseodymium 140.90765	60 Nd Neodymium 144.242	61 Pm Promethium (145)	62 Sm Samarium 150.36	63 Eu Europium 151.964	64 Gd Gadolinium 157.25	65 Tb Terbium 158.92535	66 Dy Dysprosium 162.500	67 Ho Holmium 164.93032	68 Er Erbium 167.259	69 Tm Thulium 168.93421	70 Yb Ytterbium 173.054	71 Lu Lutetium 174.9668
89 Ac Actinium (227)	90 Th Thorium 232.03806	91 Pa Protactinium 231.03588	92 U Uranium 238.02891	93 Np Neptunium (237)	94 Pu Plutonium (244)	95 Am Americium (243)	96 Cm Curium (247)	97 Bk Berkelium (247)	98 Cf Californium (251)	99 Es Einsteinium (252)	100 Fm Fermium (257)	101 Md Mendelevium (258)	102 No Nobelium (259)	103 Lr Lawrencium (262)

During Classwork Time

1. Stay focused on the assignments you are given.
2. Do the questions INDEPENDENTLY (on your own).
3. Keep the noise level down.
4. Ask THREE before you ask ME.
5. You may put earphones on and listen to music quietly as you do your work.
6. **You must finish a certain number of questions** (depends on the person) by the end of the period.

DO NOT FORGET YOUR STAMPS! You cannot get them once you leave the class.

Exit Slip

QUIETLY and INDEPENDENTLY answer the following on **Notability** and **email** it to gutierrezbr@elizabeth.k12.nj.us with "p4 (or p6) ES 1/14" on the subject line. I must receive it by the end of the period. **If you are talking or copying, you will not receive credit.**

1. Briefly explain why covalent bonds form.
2. What is the main difference between a covalent bond and an ionic bond?

Objective

We will be able to

- Determine the type of bond two elements will form based on the differences between electronegativity

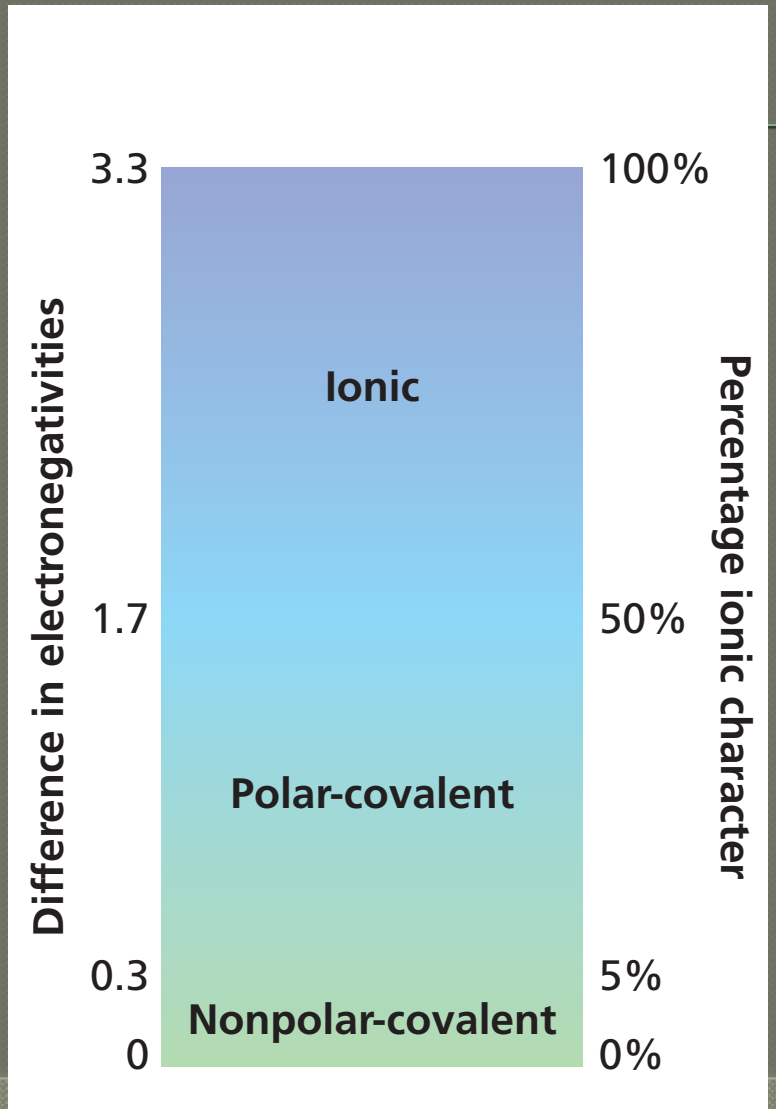
Electronegativity

Electronegativity is an atom's ability to **attract electrons in a chemical bond**.

Ionic or Covalent?

- In most cases, you can predict whether a compound is ionic or covalent by checking if the compound has a metal. However, the differences in **electronegativity** will tell you more about the nature of that chemical bond.

Non-polar Covalent, Polar-covalent, or Ionic



- **Non-polar covalent:** 0 to 0.3 electronegativity difference.
- **Polar-covalent:** 0.3 to 1.7 electronegativity difference
- **Ionic:** 1.7 to 3.3 electronegativity difference

Ionic, Polar-covalent, non-polar covalent

- **Non-polar covalent bond:** covalent bond in which the bonding electrons are **shared equally** by the bonded atoms, resulting in a **balanced** distribution of electrical charge. (0 to 0.3 electronegativity difference and 0% to 5% ionic character.)

- **Polar-covalent bond:** covalent bond in which bonded atoms have an **unequal** attraction for the shared electrons. (0.3 to 1.7 electronegativity difference and 5% to 50% ionic character.)

Ionic, Polar-covalent, non-polar covalent

- **Ionic bonding:** one atom **loses** electrons while another gains electrons, forming cations and anions. The atoms are bonded together through an **electrical** attraction. (1.7 to 3.3 electronegativity difference and 50% to 100% ionic character.)

Ionic, polar-covalent, nonpolar covalent

- Example#1: HCl
- H - Hydrogen has electronegativity value of _____
- Cl - Chlorine has electronegativity value of _____
- Electronegativity difference = _____
- 0.9 is between 0.3 and 0.7 so it is _____

Ionic, Polar-covalent, non-polar covalent

- Sample#2:

LiF

Electronegativity Values

H 2.1																	He
Li 1.0	Be 1.5											B 2.0	C 2.5	N 3.0	O 3.5	F 4.0	Ne
Na 0.9	Mg 1.2											Al 1.5	Si 1.8	P 2.1	S 2.5	Cl 3.0	Ar
K 0.8	Ca 1.0	Sc 1.3	Ti 1.5	V 1.6	Cr 1.6	Mn 1.5	Fe 1.8	Co 1.8	Ni 1.8	Cu 1.9	Zn 1.6	Ga 1.6	Ge 1.8	As 2.0	Se 2.4	Br 2.8	Kr 3.0
Rb 0.8	Sr 1.0	Y 1.2	Zr 1.4	Nb 1.6	Mo 1.8	Tc 1.9	Ru 2.2	Rh 2.2	Pd 2.2	Ag 1.9	Cd 1.7	In 1.7	Sn 1.8	Sb 1.9	Te 2.1	I 2.5	Xe 2.6
Cs 0.7	Ba 0.9	La 1.1	Hf 1.3	Ta 1.5	W 1.7	Re 1.9	Os 2.2	Ir 2.2	Pt 2.2	Au 2.4	Hg 1.9	Ti 1.8	Pb 1.8	Bi 1.9	Po 2.0	At 2.2	Rn 2.4
Fr 0.7	Ra 0.7	Ac 1.1	Unq	Unp	Unh	Uns	Uno	Une									

Ce 1.1	Pr 1.1	Nd 1.1	Pm 1.1	Sm 1.1	Eu 1.1	Gd 1.1	Tb 1.1	Dy 1.1	Ho 1.1	Er 1.1	Tm 1.1	Yb 1.1	Lu 1.2
Th 1.3	Pa 1.5	U 1.7	Np 1.3	Pu 1.3	Am 1.3	Cm 1.3	Bk 1.3	Cf 1.3	Es 1.3	Fm 1.3	Md 1.3	No 1.3	Lr

Exit Slip

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1. Indicate if the bond between sulfur and oxygen is going to ionic, polar-covalent, or nonpolar covalent. Show all your work.