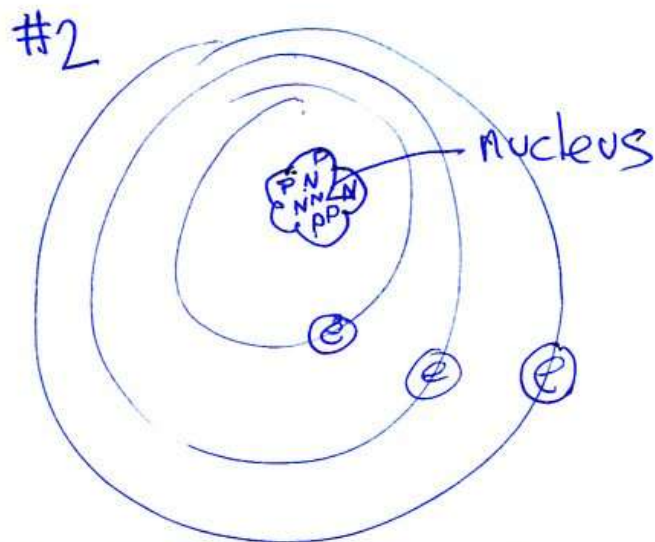


Purpose How far away  
do we draw Bohr orbits?

Warmup: Take out this  
(and get ready for short notes)

#1 Nils Bohr worked  
in Denmark. He  
decided atoms have  
electrons moving  
in circles around  
the nucleus.



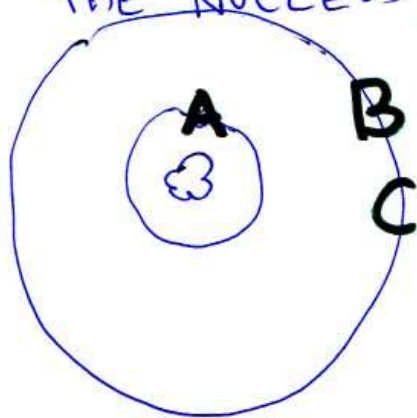
~~#~~ If you add more  
protons, the electron should  
get pulled in closer  
and the radius should shrink

#3 IMAGINE AN ATOM  
WHICH GOT IONIZED

electron	ionization energy
A	1000
B	90
C	90

MY GUESS FOR WHAT  
THE ATOM LOOKS LIKE

ELECTRON "A" WAS  
HARD TO STEAL. IT'S  
PROBABLY CLOSEST TO  
THE NUCLEUS.

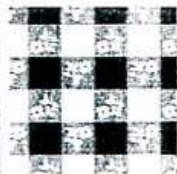


### Apply Rules for Atomic Trends

CleMistry: <http://genest.weebly.com>

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

Our last Test will be Friday, May 27.



A  
Name  
S  
Period  
N  
W

### All Trends

Draw on this Periodic Table some arrows and numbers with a crayon or marker to show the following

1. Show which direction in a period the ionization energies increase
2. Show which direction in a period the atomic radius increases
3. Show which direction in a period the electronegativity increases
4. Show which direction in a period the charge of the nucleus increases

PERIODIC TABLE OF THE ELEMENTS																	
1 H Hydrogen 1.00794																	2 He Helium 4.00260
3 Li Lithium 6.941	4 Be Beryllium 9.0122											5 B Boron 10.811	6 C Carbon 12.011	7 N Nitrogen 14.007	8 O Oxygen 15.999	9 F Fluorine 18.998	10 Ne Neon 20.180
11 Na Sodium 22.990	12 Mg Magnesium 24.305											13 Al Aluminum 26.982	14 Si Silicon 28.086	15 P Phosphorus 30.974	16 S Sulfur 32.06	17 Cl Chlorine 35.453	18 Ar Argon 39.948
19 K Potassium 39.098	20 Ca Calcium 40.078	21 Sc Scandium 44.956	22 Ti Titanium 47.88	23 V Vanadium 50.942	24 Cr Chromium 51.996	25 Mn Manganese 54.938	26 Fe Iron 55.845	27 Co Cobalt 58.933	28 Ni Nickel 58.693	29 Cu Copper 63.546	30 Zn Zinc 65.38	31 Ga Gallium 69.723	32 Ge Germanium 72.63	33 As Arsenic 74.922	34 Se Selenium 78.96	35 Br Bromine 79.904	36 Kr Krypton 83.8
37 Rb Rubidium 85.47	38 Sr Strontium 87.62	39 Y Yttrium 88.906	40 Zr Zirconium 91.224	41 Nb Niobium 92.906	42 Mo Molybdenum 95.94	43 Tc Technetium 98.906	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.905	46 Pd Palladium 106.42	47 Ag Silver 107.868	48 Cd Cadmium 112.411	49 In Indium 114.818	50 Sn Tin 118.710	51 Sb Antimony 121.757	52 Te Tellurium 127.6	53 I Iodine 126.905	54 Xe Xenon 131.29

### Nuclear Charge Trends.

5. This is a measure of how many positive charges are in the nucleus of the atom.

- a) How many protons are in the nucleus of sodium? 11
- b) What is the total positive charge of the nucleus of a sodium atom? 11+

6. In each pair, circle the element that has a greater nucleus charge.

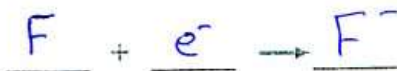
- a) Neon or Helium
- b) Hydrogen or Helium
- c) Gold or Silver

### Atomic Radius Trends.

7. In each pair, circle the element that has a greater radius.

- a) Neon or Helium
- b) Hydrogen or Helium
- c) Magnesium or Potassium

8. Write a balanced equation for neutral fluorine atom gaining one electron:



9. Write a balanced equation for  $S^{2-}$  anion losing two electrons:



### Electronegativity Trends.

10. In each pair, circle the element that has a greater electronegativity.

a) phosphorous or chlorine

b) phosphorous or antimony

c) fluorine or iodine

### Ionization Energy Trends.

11. In each pair, circle the element that has a greater electronegativity.

a) sodium or lithium

b) iron or zinc

c) oxygen or phosphorous

### Ion Radius Trends.

12. When we speak of ion radius, we speak of their most common ions.

The ions for metals are usually ( negative / positive )

The common ions for nonmetals are ( negative / positive ).

Draw on this Periodic Table some arrows with a crayon or marker to show the following

13. Show which direction in a group the ionization energies increase
14. Show which direction in a group the atomic radius increases
15. Show which direction in a group the electronegativity increases
16. Show which direction in a group the charge of the nucleus increases

					2 He 4.003
5 B 10.811	6 C 12.011	7 N 14.007	8 O 15.999	9 F 18.998	10 Ne 20.180
13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.065	17 Cl 35.453	18 Ar 39.948
31 Ga 69.723	32 Ge 72.630	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.80
49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.6	53 I 126.905	54 Xe 131.29
81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po 209	85 At 210	86 Rn 222
113 Uut 284	114 Uuq 285	115 Uup 284	116 Uuq 285	117 Uus 284	118 Uuo 284

Hand-drawn arrows on the periodic table:  
 - Upward arrows in groups 14, 15, and 16.  
 - Downward arrows in groups 14, 15, and 16.  
 - Rightward arrows in groups 14 and 15.  
 - Leftward arrows in groups 14 and 15.  
 - A circle around element 14 (Si) and a circle around element 15 (P).

17. Remember, for electrically charged objects, the two principles of force are:

- attraction decreases with distance
- attraction decreases when charge decreases

In each pair, circle the pair that has a greater attraction.

a) an electron and proton that are 2 nanometers apart or an electron and proton that are 3 nanometers apart

b) an electron and the nucleus of nitrogen or an electron and the nucleus of oxygen

*BECAUSE IT HAS MORE PROTONS, AND IS THEREFORE MORE (+)*

Below each particle group circle the total charge

18.	19.	20.	
(-2/-1/neutral/+1/+2) <u>+2</u>	(-2/-1/neutral/+1/+2) <u>neutral</u>	(-2/-1/neutral/+1/+2) <u>+1</u>	(-2/-1/neutral/+1/+2) <u>-1</u>

22. In which situation below will attraction be stronger? (A/B/no difference)	23. In which situation below will attraction be stronger? (A/B/no difference)
a)	a)
b)	b)
24. In which situation below will attraction be stronger? (A/B/no difference)	25. In which situation below will attraction be stronger? (A/B/no difference)
a)	a)
b)	b)

*SKIP*

26. For which of these properties does aluminum have a greater value than chlorine?

- a) first ionization energy?  
 b) atomic radius?  
 c) electronegativity?

27. Arrange these elements in order of decreasing atomic size: gold, platinum, mercury.

*Platinum, gold, mercury (smallest)*

28. How does the radius of a cation compare with the radius of the neutral atom of the same element?

*the cation is smaller*

29. Arrange these elements in order of decreasing ionization energy: nitrogen, zinc, phosphorous.

*nitrogen, phosphorous, zinc*

30. Write a balanced equation for a calcium ion losing two electrons:

