Purpose. Learn to predict trends. Learn to predict which atoms are larger.

WARMUP

"periods" are rows

"groups" are columns
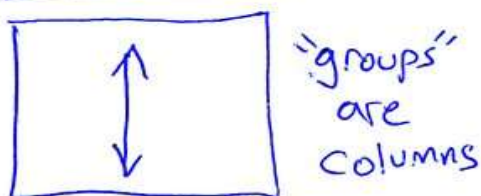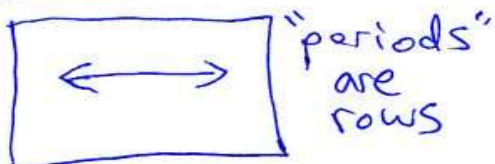
#1 IONIZATION ENERGY is the amount of energy needed to steal an electron from atom

#2 RADIUS IS A MEASURE OF HOW LARGE AN ATOM IS

#3 ELECTRONEGATIVITY is how hard an element pulls an electron if the electron is shared

should say: "electronegativity is how hard an element pulls an electron if the electron is shared between two elements"

1. Define the verb "ionize".

   to form an ion by adding or removing electrons

2. Choose one of the three choices. " In neutral atoms..."
   a. # of e > # of p
   b. **# of e = # of p** (circled)
   c. # of e < # of p

3. Choose one of the three choices. For all anions
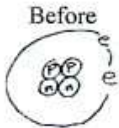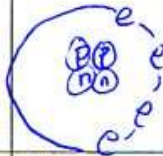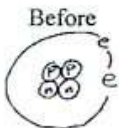   a. **# of e > # of p** (circled)
   b. # of e = # of p
   c. # of e < # of p

4. What is true about the number of particles in an atom that has a neutral charge?

   # of electrons = # of protons

5. Back in October we learned that the periodic table tells us the charge of Na in a compound is Na+. Circle the ion that each element below forms when in a compound, according to the periodic table:
   a. Calcium: Ca^+ **(Ca^{2+})** Ca^{3+}
   b. Aluminum Al^+ Al^{2+} **(Al^{3+})**
   c. Oxygen: O^- **(O^{2-})** O^{3-}

6. In the after box redraw what ^4_2He will look like after **gaining** **two** electrons. The charge before _____ The charge after _____ It became a (anion / cation)	Before	After	HighLow Letter symbol for the *after* atom? $^4_2He^{2-}$
7. In the after box redraw what ^4_2He will look like after **losing two** electrons. The charge before _____ The charge after _____ It became a (anion / cation)	Before	After	HighLow Letter symbol for the *after* atom? $^4_2He^{2+}$

8. If an atom is helium how many protons does it have? _**2**_

9. If an atom has 10 protons what element is it? _**Neon.**_

10. If the atom's mass number is 18 how many nucleons does it have? **18**.

11. For an atom with atomic number =9, charge of zero, and 10 neutrons...
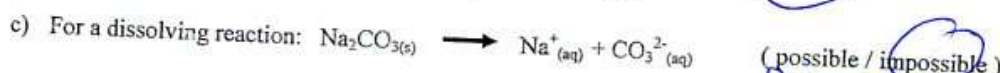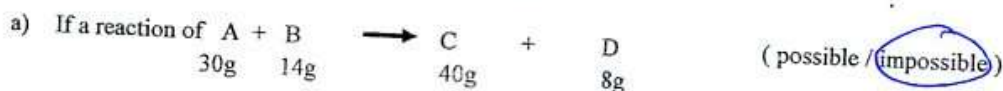   a. mass number _**19**_
   b. number of protons? _**9**_
   c. number of electrons _**9**_
   d. symbol of the element, with highLow numbers _$^{19}_9F$_.

12. **The Law of Conservation of Mass** says that if nothing enters or leaves a system, the total ___MASS___ in that system must be the same before and after any change.
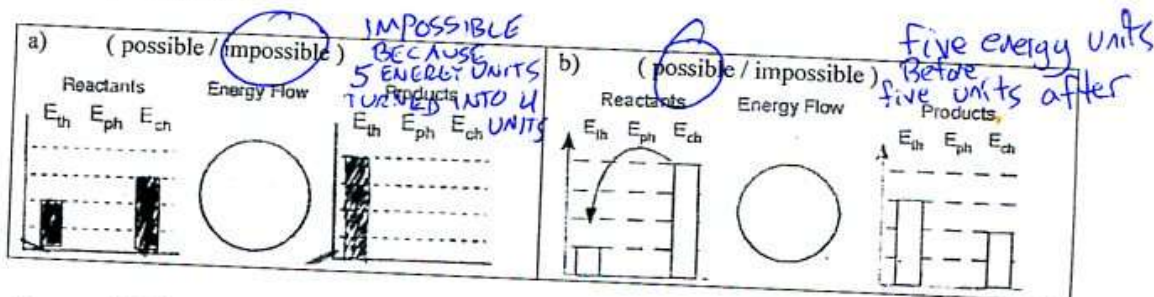Based on this Law, mark the following as possible or not:

a) If a reaction of A + B $\longrightarrow$ C + D
   30g   14g   40g   8g   (possible / impossible)

b) If a reaction of W + X $\longrightarrow$ Y + Z
   14g   16g   15g   15g   (possible / impossible)

c) For a dissolving reaction: $Na_2CO_{3(s)} \longrightarrow Na^+_{(aq)} + CO_3^{2-}_{(aq)}$ (possible / impossible)
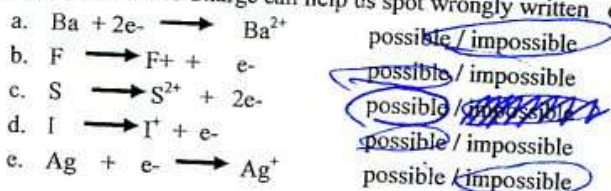   Because one Sodium versus two Sodiums

13. **The Law of Conservation of Energy** says that if nothing enters or leaves a system, the total ___ENERGY___ in that system must be the same before and after any change.
Use this law to spot any fibs below:

a)   (possible / impossible)   IMPOSSIBLE BECAUSE 5 ENERGY UNITS TURNED INTO 4 UNITS
   Reactants   Energy Flow   Products
   E_{th} E_{ph} E_{ch} E_{th} E_{ph} E_{ch} UNITS

b)   (possible / impossible)   five energy units Before five units after
   Reactants   Energy Flow   Products
 E_{th} E_{ph} E_{ch} E_{th} E_{ph} E_{ch}

14. **The Law of Conservation of Charge** is similar to the two laws above. It says that if nothing enters or leaves a system, the total ___CHARGE___ in that system must be the same before and after any change.

15. The Law of Conservation of Charge can help us spot wrongly written equations for ions.

   a. $Ba + 2e- \longrightarrow Ba^{2+}$ possible / impossible
   b. $F \longrightarrow F+ + e-$ possible / impossible
   c. $S \longrightarrow S^{2+} + 2e-$ possible / impossible
   d. $I \longrightarrow I^+ + e-$ possible / impossible
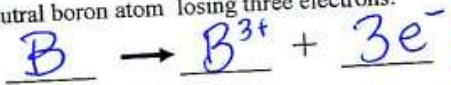   e. $Ag + e- \longrightarrow Ag^+$ possible / impossible

16. Write a balanced equation for neutral Mg losing two electrons (In the first blank, write Mg. You don't need to write the high low numbers, just the charge, if any):
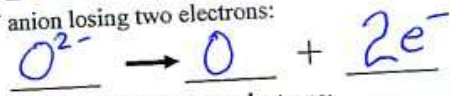
   $Mg \longrightarrow Mg^{2+} + 2e^-$
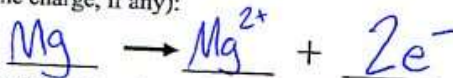
17. Write a balanced equation for neutral chlorine atom gaining one electron:

   $Cl + e^- \longrightarrow Cl^-$
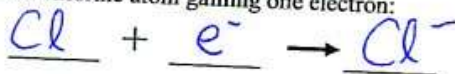
18. Write a balanced equation for a neutral boron atom losing three electrons:

$$B \rightarrow B^{3+} + 3e^-$$

19. Write a balanced equation for O^{2-} anion losing two electrons:

$$O^{2-} \rightarrow O + 2e^-$$

20. Write a balanced equation for Iron(III) ion gaining three electrons:

$$Fe^{3+} + 3e^- \rightarrow Fe$$

21. In the after box redraw what this atom will look like **after losing** one electron. The charge before ___O___ The charge after ___+1___ It became a (anion / cation)	Before $\rightarrow$ After (1p 1n 1e)	(1P 1N 0e)	HighLow Letter symbol for the *after* atom? $^2_1H^+$

22. In the after box redraw what this atom will look like after **gaining** one electron. The charge before ___O___ The charge after ___-1___	Before $\rightarrow$ After		HighLow Letter symbol for the *after* atom? $^1_1H^-$

a.

23. Choose one of the three choices. For all cations
    a. # of e > # of p
    b. # of e = # of p
    c. # of e < # of p

24. What is true about the number of particles in any cation?

CATIONS ALWAYS HAVE MORE PROTONS THAN ELECTRONS

25. What is true about the number of particles in any anion?

More electrons than protons

1. If an atom has 12 protons and 10 neutrons, how many nucleons does it have? __22__

2. If an atom has 5 protons and 6 neutrons what is the mass of the atom? __11__

3. If an atom is oxygen how many protons does it have? __8__

4. If an atom has 4 protons what element is it? __Beryllium__

5. If an atom weighs 12 amu's how many nucleons does it have? __12__

6. If an atom has 2 protons and it has 5 nucleons, how many neutrons does it have? __3__

7. If an atom has 40 nucleons and has 10 neutrons, how many protons does it have? __30__

8. For an atom with 14 protons and 15 neutrons and 18 electrons

   a. mass number __29__
   b. atomic number __14__
   c. number of electrons __18__
   d. symbol of the element __Si__
   e. charge of the atom __4e⁻__
   f. symbol of the element, with highLow numbers __$^{29}_{14}Si^{4-}$__

   Isabel and Mhammed fixed this ♡♡♡

9. For a neutral atom with mass number of 47, 25 neutrons, and 22 electrons

   a. atomic number __~~22~~ 22__ P
   b. number of protons __~~22~~ 22__
   c. number of electrons __22__
   d. symbol of the element, with highLow numbers __$^{47}_{22}Ti$__

10. For an atom with mass number 55, and has 25 protons and 23 electrons

    a. charge __2+__
    b. atomic number __25__
    c. number of neutrons __30__
    d. symbol of the element, with highLow numbers __$^{55}_{25}Mn^{2+}$__