Conservation of Charge Name:_____

$$q_{e^-} = -1.6 \times 10^{-19} C \qquad q_{p+} = 1.6 \times 10^{-19} C$$
$$m_{e^-} = 9.11 \times 10^{-31} kg \qquad m_{p+} = 6.67 \times 10^{-27} kg$$

1) Where are protons found in an atom? _____

2) Where are electrons found in an atom?_____

3) Where are neutrons found in an atom?_____

4) What is an atom called when it gains or loses electrons?_____

5) A neutral atom of calcium has 20 protons and 20 electrons: a) calculate the total charge of the nucleus, b) calculate the total charge of the electron cloud, c) lastly, calculate the net charge of the atom of calcium. All answers should be in coulombs.

charge of nucleus	charge of electron cloud	charge of atom

6) If calcium loses 2 electrons, a) calculate the total charge of the nucleus, b) calculate the total charge of the electron cloud, c) lastly, calculate the net charge of the ion of calcium. All answers should be in coulombs.

charge of nucleus	charge of electron cloud	charge of atom

7) For the following atoms, calculate a) the total charge of the nucleus, b) the total charge of the electron cloud, c) net charge on the atom. All answers should be in coulombs.

atom	charge of nucleus (C)	Charge of electron cloud (C)	Charge of atom (C)
Boron			
Lithium			
Nitrogen			
Potassium			
Carbon			

8) Draw a neutral atom of helium-4 labeling the protons with a "p^+", the electrons with an "e^-", and the neutrons with a "n^o".

9) Your school's library is giving away a free one year subscription to your favorite science periodical if you can guess the number of electrons in a jar. You happen to have a charge measuring device and find that the charge inside the jar to be -13 C. What is your guess? (ignore any quantum or relativistic effects)

number of electrons in jar

10) While combing your hair, the comb steals 1.4×10^8 electrons from your hair. Calculate the charge on the comb and on your head of hair. Also calculate the gain in mass of the comb from the extra electrons. (ignore any quantum or relativistic effects)

charge of comb

charge of hair

extra mass on comb

11) Circle what will happen when the following objects are placed near each other.

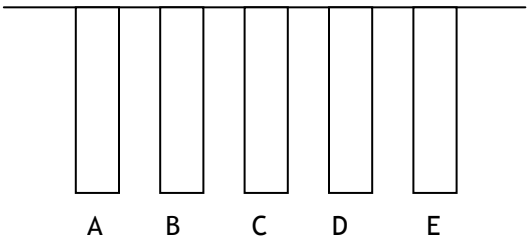
a) A positive ball and a negative ball. (attract repel nothing)

b) A positive ball and a positive ball. (attract repel nothing)

c) A negative ball and a neutral ball. (attract repel nothing)

d) A neutral ball and a neutral ball. (attract repel nothing)

12) Five strips are shown below. The following observations are made. Determine the charge on each strip.



1) E is attracted to B
2) A is positive.
3) A is attracted to B.
4) A and E repel each other.
5) D is attracted to E.
6) D is attracted to C.
7) B and C show no reaction to each other.

charge of A

charge of B

charge of C

charge of D

charge of E