Name: _____

SCH 4C - Atomic Models Test

1. Using the table, place each name that represents a scientist or group of scientists in chronological order (this means in order of oldest to most recent). Then in the second column, indicate the main points or discovery that goes with each model. Point form is preferred. Include in your answer two fundamental laws studied in this course and the main points in Dalton's Model.

Alchemists, Bohr, Dalton, Democritus, Empedocles, Rutherford, Thomson

Name	Main Points or Discovery
Democritus	proposed the existence of atoms
Empedocles	proposed the four humour model of matter: earth air fire and water
Alchemists	played with chemistry and discovered The Law of Constant Composition: when elements combine to form compounds they do so in a fixed proportion by mass. Law of Conservation by Mass: in a chemical reaction, matter is neither created nor destroyed
Dalton	atoms are hard and indestructible each element has its own type of atoms that are all the same but different from other elements, particularly with respect to mass atoms combine in small whole number ratios to form compounds
Thomson	discovered the electron (proposed the plumb pudding model of the atom)
Rutherford	discovered the nucleus (hard dense positive center to the atom)
Bohr	fixed locations for electron orbits (explained line spectra)

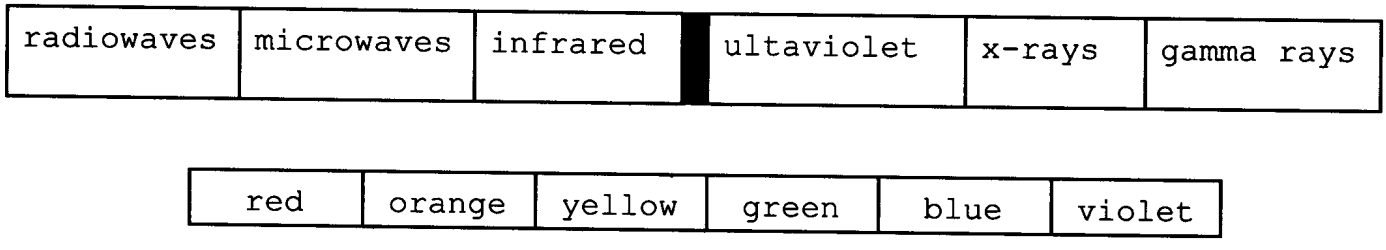
2. What observation lead Rutherford to believe that atoms were composed of mostly empty space?

most alpha particles pass straight through the gold foil as if there were nothing there

3. What observation lead Rutherford to believe that atoms contain a dense positively charged nucleus?

the occasional alpha particle is deflected (only a positive to positive repulsion with the alpha particle could cause this)

4. Place labels in the following diagram to show a complete electromagnetic spectrum in order. Label in order from the least energetic type of radiation to the most energetic type of radiation.

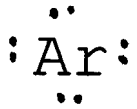
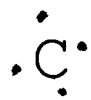
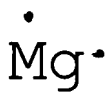


Indicate one use or danger for each of the seven main types of electromagnetic radiation.

Type	Use or Danger
radiowaves	uses for communication
microwaves	used to warm food (and for communication)
infrared	used for night vision goggles
visible light	used by our eyes to see
ultraviolet	causes sunburns that can lead to skin cancer
x-rays	used for medical imaging
gamma rays	dangerous radiation, causes cancer (also for a gamma ray knife)

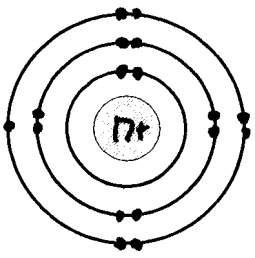
5. Draw lewis dot diagrams for each of the following atoms. Please use the periodic table to help you with this.



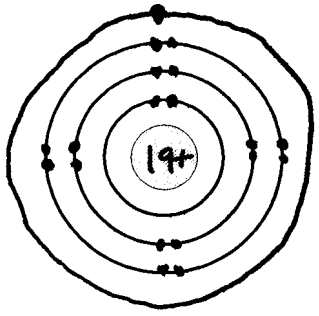





6. Add electrons to each of the following diagrams to represent Bohr-Rutherford diagrams for each of the following atoms or ions. Remember the 2, 8, 8, idea and if necessary the way of short-forming electrons that correspond to the elements from the Sc to Zn columns etc. Draw in extra shells if necessary

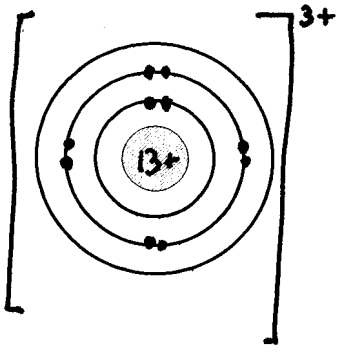
Cl



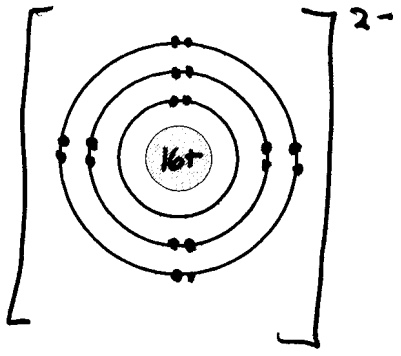
K



Al^{3+}

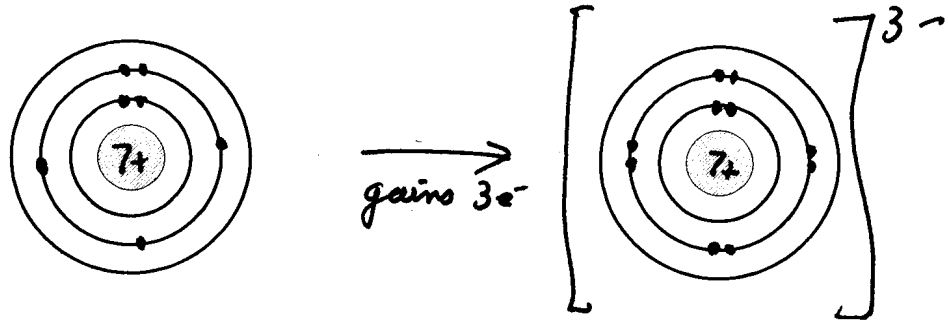


S^{2-}



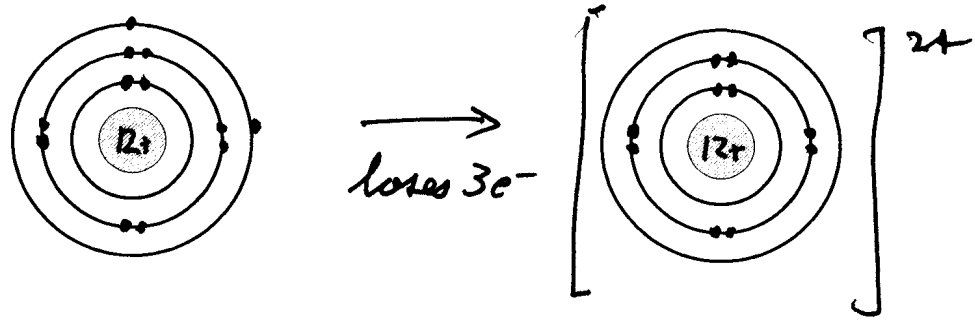
7. Show how the Bohr-Rutherford diagram changes as nitrogen follows the octet rule to become like the nearest noble gas. Be sure to include the resulting charges on the final diagram.

N



8. Show how the Bohr-Rutherford diagram changes as magnesium follows the octet rule to become like the nearest noble gas. Be sure to include the resulting charges on the final diagrams

Mg



9. Show the resulting ions and charges when each of the following elements follows the octet rule. The first one is done as an example

Atom	Ion
$_{15}P$	P^{3-}
$_{56}Ba$	Ba^{2+}
$_{5}B$	B^{3+}
$_{9}F$	F^{1-}
$_{54}Xe$	Xe°
$_{31}Ga$	Ga^{3+}
$_{14}Si$	$Si^{4+/4-}$
$_{52}Te$	Te^{2-}
$_{11}Na$	Na^{1+}
$_{85}At$	At^{1-}

Atom	Ion
$_{87}Fr$	Fr^{1+}
$_{35}Br$	Br^{1-}
$_{55}Cs$	Cs^{1+}
$_{16}S$	S^{2-}
$_{7}N$	N^{3-}
$_{8}O$	O^{2-}
$_{6}C$	$C^{4+/4-}$
$_{2}He$	He°
$_{82}Pb$	$Pb^{4+/4-}$
$_{38}Sr$	Sr^{2+}