Test Review for SCH 4C Test – Subatomic Particles, Models of the Atom, Bohr Diagrams, Octet Rule

1. Be familiar with the properties of protons, neutrons and electrons – fill in this table for practice. Multiple choice questions will test your understanding of this table.

name	symbol	charge	mass	location
proton	p^+	1+	1 u	in the nucleus
neutron	n	0	1 u	in the nucleus
electron	e^-	1–	0.00055 u	orbits the nucleus

2. Be able to complete nuclear equations for alpha beta and gamma decay **AS WELL AS NUCLEAR FISSION** (example not shown here) – see text book question from pages 142 to 148. Also see worksheet and quiz on this topic.

$$\overset{18}{\underset{8}{O}} \Rightarrow \overset{14}{\underset{6}{C}} + \overset{4}{\underset{2}{He}}$$ alpha decay

$$\overset{41}{\underset{20}{Ca}} \Rightarrow \overset{41}{\underset{21}{Sc}} + \overset{0}{\underset{1-}{e}}$$ beta decay

$$\overset{192}{\underset{74}{W^*}} \Rightarrow \overset{192}{\underset{74}{W}} + \overset{0}{\underset{0}{\gamma}}$$ gamma decay

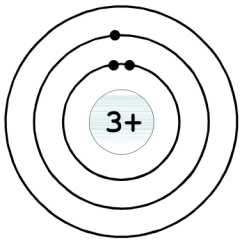
3. Using this table, place each name that represents a scientist or group of scientists in chronological order (this means in order of oldest to most recent). Then in the second column, indicate the main points or discovery that goes with each model. Point form is preferred. Include in your answer (in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

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

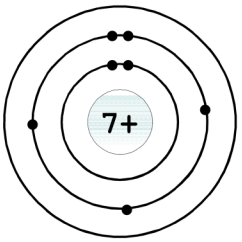
Name	Main Points or Discovery
Democritus	proposed the existence of atoms
Empedocles	proposed the four humour model of matter: earth air fire and water
Alchemists	played with chemistry and discovered The Law of Constant Composition: when elements combine to form compounds they do so in a fixed proportion by mass. Law of Conservation by Mass: in a chemical reaction, matter is neither created nor destroyed
Dalton	all matter is composed of atoms atoms of an element are the same, particularly with respect to mass atoms of different elements are different, particularly with respect to mass atoms combine in simple whole number ratios (H_2O) atoms cannot be destroyed or changed into different types of atoms
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)

4. 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

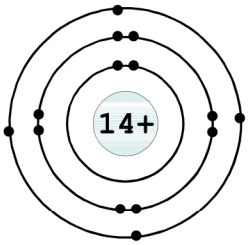
Li



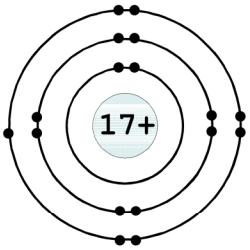
N



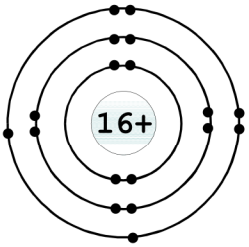
Si



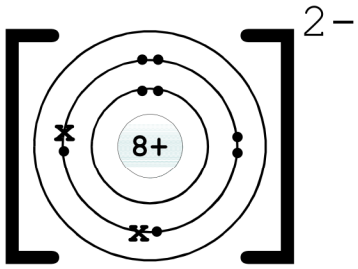
Cl



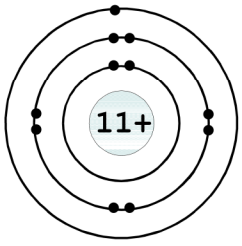
S



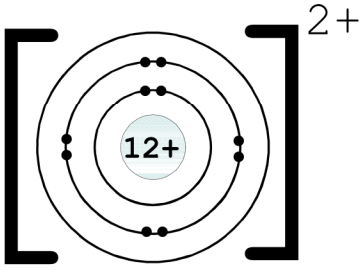
O^{2-}



Na

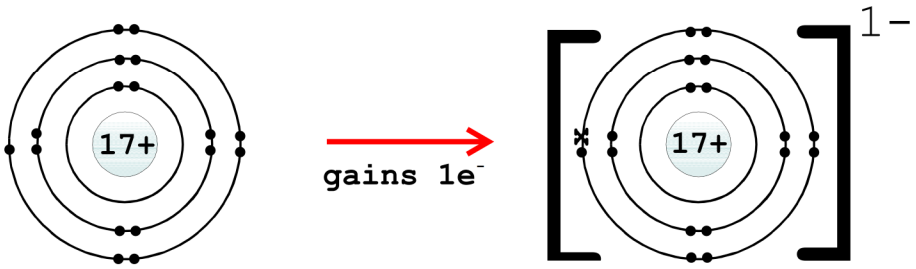


Mg^{2+}



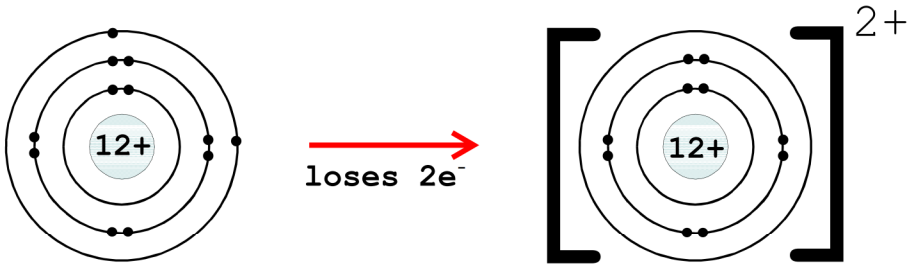
5. Show how the Bohr-Rutherford diagram changes as chlorine follows the octet rule to become like the nearest noble gas. Be sure to include the resulting charges on the final diagram.

Cl



6. 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



7. Fill in the following table to indicate how each of the following atoms behaves when it follows the octet rule to from positive or negative ions. The first three are done as examples.

Atom	Number of Electrons in Valence Shell	Loses or Gains	Number of Electrons Lost or Gained	Resulting Ion
$_{15}P$	5	gains	3	P^{3-}
$_{56}Ba$	2	loses	2	Ba^{2+}
$_{5}B$	3	loses	3	B^{3+}
$_{9}F$	7	gains	1	F^{1-}
$_{54}Xe$	8	-	-	no ion
$_{31}Ga$	3	loses	3	Ga^{3+}
$_{14}Si$	4	loses/gains	4 / 4	Si^{4+} / Si^{4-}
$_{52}Te$	6	gains	2	Te^{2-}
$_{11}Na$	1	loses	1	Na^{1+}
$_{85}At$	7	gains	7	At^{1-}
$_{87}Fr$	1	loses	1	Fr^{1+}
$_{35}Br$	7	gains	7	Br^{1-}
$_{55}Cs$	1	loses	1	Cs^{1+}
$_{16}S$	6	gains	6	S^{2-}
$_{7}N$	5	gains	3	N^{3-}
$_{8}O$	6	gains	2	O^{2-}
$_{6}C$	4	loses/gains	4 / 4	C^{4+} / C^{4-}
$_{2}He$	2	-	-	no ion
$_{82}Pb$	4	loses/gains	4 / 4	Pb^{4+} / Pb^{4-}
$_{1}H$	1	loses	1	H^{1+}