Periodic Table Trends [ANS]

1) What are the elements that have some metallic and some non-metallic properties called? **Metalloids**

2) How did Mendeleev's presentation of a periodic table allow for the discovery of more elements? **He arranged elements by atomic mass, left some blanks due to trend.**

3) On the basis of their positions of the periodic table, predict which member of each of the following pairs will be more metallic:
   a) Si or **Ge** b) As or **Ge** c) Ba or **Cs** d) **Be** or B

4) In which energy level are the valence electrons of the following elements found:
   a) I **(5^{th})** b) Ca **(4^{th})** c) Ga **(4^{th})** d) F **(2^{nd})** e) Fr **(7^{th})**

5) How many valence electrons are there in:
   a) N **(5)** b) P **(5)** c) As **(5)** d) Sb **(5)** e) Bi **(5)**

6) Write the electron dot symbols (Lewis dot) for:
   a) Ga **(3 e-)** b) Ge **(4 e-)** c) As **(5 e-)** d) Se **(6 e-)**

7) Explain the reason why sodium forms only ions with a +1 charge while calcium forms only ions with a +2 charge. **Because sodium needs to lose only 1 e- to reach the electron configuration of a noble gas (Ne), while Calcium needs to lose 2 e- to reach the electron configuration of a noble gas (Ar).**

8) Using the periodic table, identify each of the following:
   a) an element which has 7 electrons in each neutral atom. **N**
   b) an elements which has 7 electrons in its outer energy shell. **F, Cl, Br, I, At**
   c) an elements for which the second energy level is half filled. **Carbon**
   d) a main group of elements which forms ions by losing only "s" electrons. **Alkali / Alkaline metals**

9) Which elements in the following sets should have the largest atomic radius? Explain.
   a) B, **Li** or F **- lowest number of p+, so weakest nuclear charge, therefore largest atomic radius due to less attraction of p+ towards e-.**

   B) **K**, Na or Li **– Higher number of energy levels, and higher shielding effect (inner electrons of K are blocking nuclear attraction towards the 4^{th} energy level valence electrons).**

10) The following is a block of elements on fictitious periodic table.

A	B	C	D
E	F	G	H
I	J	K	L

a) Which element has the largest atomic Radius? Why? **I (largest # of energy levels, larger shielding effect due to inner e- blocking nuclear charge towards 3rd energy level valence electrons)**

b) Which element has the smallest atomic radius? Why? **D (smallest # energy levels, highest number of protons in the lowest energy level, so stronger nuclear charge towards electrons – pulls electrons in more)**

11) a) Which atom in each of the following pairs has the higher ionization energy?

i) Cs or **Au** ii) S or **P** iii) **Mg** or Al

iv) **Rn** or At v) **Ne** or Kr vi) Rb or **Sr**

b) In each of the following pairs, which has the higher ionization energy?

i) **O** or S ii) **Ge** or Se iii) **Mg** or Rb

iv) **Xe** or Cs v) **Ne** or Kr vi) **P** or Si