Worksheet – The Periodic Table

1. Ba is in what group?
2. Ne is in what group?
3. I is in what group?
4. K is in what group?
5. Ag and Au are in what group?
6. What element is in the fourth period and an alkali metal?
7. What element is in the third period and a halogen?
8. Atomic size actually increases from right to left along a period. Why?
9. Why is N larger than F when F has more protons and electrons?
10. Which is larger? Ra or At or Ca?
11. How many valence electrons does an atom of Si, K, Ba, Ne, and S have?
12. Draw Lewis dot structures (electron dot formulas) for atoms of Na, O, He, P, and Ba.
13. Define Ionization Energy IE in your own words.
14. Why do metals have such low IE's?
15. Why do nonmetals have such high IE's?
16. Why does Fluorine have a higher IE than Iodine?
17. What is the ionic charge for Al, Sr, Br, K, and P?
18. What is the electron configuration for K^{+1} ion? What about S^{2-} ion? What noble gas are these two ions isoelectronic with?
19. What is N^{-3} ion isoelectronic with? What about Cl^{-}?
20. True or False? Metals tend to lose electrons and become + cations.

Answers

1. Ba is an alkaline earth metal.
2. Ne is a noble gas.
3. I is a halogen.
4. K is an alkali metal.
5. Ag and Au are transition metals.
6. K
7. Cl
8. Along the row we are just filling in the same level, so it is not getting any bigger. Just like putting beads on a necklace the necklace does not get any bigger (longer). But as we add electrons to the outer level we are also adding protons to the nucleus and they are positively charged. So the positive charge is going up. So there is more positive charge which pulls negative electrons closer. So it pulls the outer level closer making the atom smaller as we move from left to right along a row. Thus we get larger from right to left.
9. F has 9 protons while N has only 7. 9 positive protons can pull the electrons closer than 7 protons. So F is actually smaller than N. It may have more mass, but it is smaller.
10. Ra
11. Si – 4, K – 1, Ba – 2, Ne – 8, S – 6 valence electrons
12. Na has one dot, O has 6 dots, He has 2 dots, P has 5 dots, and Ba has 2 dots.
13. IE is the energy needed to remove the outer most electron from an atom.
14. Metals want to lose their outer electrons, so it takes very little energy to remove one of them as it wants to lose it anyway. This makes a metal happy.
15. Nonmetals want to gain more outer electrons, so it is really hard to pull an electron from their outer level. It makes them mad. They hold on really tight to their outer electrons so high energy to remove one.
16. F is a small atom and its outer electrons are very close to the nucleus. The positive protons have a good amount of attraction to those outer electrons holding them tight, so the IE is very very high for F. Iodine is a big fat atom with the outer electrons far away, far away from the positive pull of the protons. So it is easier to remove an outer electron from an I atom than an F atom.
17. Al is +3, Sr is +2, Br is -1, K is +1, and P is -3.
18. K^{+1} is $1s^2 2s^2 2p^6 3s^2 3p^6$ because it lost the $4s^1$ electron.
    S^{2-} is $1s^2 2s^2 2p^6 3s^2 3p^6$ because it gained 2 electrons.
    Both of these ions are isoelectronic with Argon. (They all have 18 electrons)
19. N^{3-} is isoelectronic with Ne. Cl^- is isoelectronic with Ar.
20. True