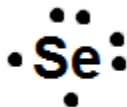
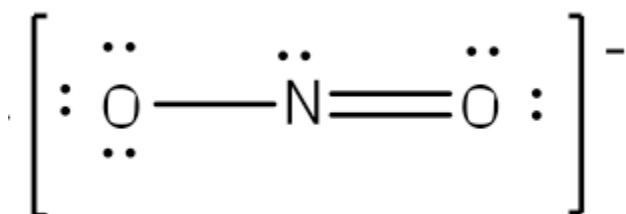


## Chemistry 30 – Electrons and Molecular Forces Practice Test – Solutions

1. a.  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^5$ ; [Ar]  $4s^2 3d^5$   
 b.  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6$ ; [Kr]  $5s^2 4d^{10} 5p^6$
2. [Ar]  $4s^2 3d^{10} 4p^4$   
 a. 6



- b.
- c. 2-
3. CHOOSE THE CLOSEST NOBLE GAS  
 a. Krypton  
 b. Argon



- 4.
5. a. Phosphorus has a lower electronegativity (2.2) than chlorine (3.2), meaning chlorine more strongly attracts electrons. In the bond, this means electrons are held closer to chlorine, giving it a partially negative charge and phosphorus a partially positive charge.  
 b. Chlorine has more protons – so a larger, more positive nucleus – than phosphorus. The more positive nuclear charge attracts chlorine's valence electrons AND the electrons in the bond more strongly than phosphorus can. (Also, because chlorine is smaller, the electrons in the bond can get closer to chlorine, and a smaller distance will increase attraction too.)  
 c.  $\delta^+ \text{P} - \text{Cl} \delta^-$
6. has to be ionic – they dissolve in water because water is polar and can attract the ions in the compound enough to pull them apart, AND it will have a very high melting point because of the strong attraction between ions. This is similar to what we saw for salt (sodium chloride) in the lab.
7. a. dipole-dipole (polar bonds, bent shape)  
 b. London forces (polar bonds, linear shape)  
 c. London forces (polar bonds, trigonal bipyramid)
8.  $\text{NH}_3$ , because it's IMF is hydrogen bonding (polar bonds and trigonal pyramid shape), so it is much more strongly attracted to other  $\text{NH}_3$  molecules than  $\text{CH}_4$ , which has non-polar bonds and a tetrahedral shape and only experiences London forces.
9. Hydrogen chloride, because it is polar, while oxygen is non-polar. Water will be more attracted to itself than oxygen molecules, but can attract the dipoles on hydrogen chloride enough to pull the molecules apart.

10. Hexane is a much larger molecule, so it will have more electrons, more temporary dipoles and much stronger London forces, making it more dense than ethane.