Chemistry 221 Oregon State University

Worksheet 9

1. Draw a properly-filled electron orbital diagram for Ag.
2. Why does silver prefer to be Ag(I) over Ag(II)?
3. Draw a properly-filled electron orbital diagram for Cu.
4. Why is Cu(I) common in crystals and solutions?
5. Write electron configurations for the following elements and ions:
6. Si
7. Ti (IV)
8. Hf(IV)
9. P5+
10. Sb3-
11. In3+
12. Fe (III)
13. Nd
14. Arrange the following elements and ions into isoelectronic groups and write the electron configuration of each group:

Si4+, B5-, Cl-, Li+, F-, Al3+, V(V), S2-, Be2+, Ne, O2-, Ar, F-, He, Ca2+, Na+, H-

1. Calculate the De Broglie wavelength of various objects at various velocities using the equation:



|  |  |  |  |
| --- | --- | --- | --- |
| Object | mass (kg) | v (m/s) | λ (m) |
| baseball | 0.145 | 30 |  |
| electron | 9.11∙10-31 | 1000 |  |
| Yorkshire Terrier | 3.84 | 10 |  |
| A man | 91.4 | 3 |  |
| Proton | 1.67∙10-27 | 100 |  |

1. Why are the de Broglie wavelengths of large objects so small?
2. What is shielding and how does it affect chemical reactivity for metals and non-metals?
3. Calculate the effective nuclear charge (Zeff) felt by valence electrons in each of the following atoms given that :

Zeff = (Nuclear charge – number of core electrons)

1. Al
2. Sr
3. Br
4. S
5. O
6. Ge
7. How is the trend in Zeff reflected in the electronegativity of atomic species?
8. Arrange the following groups of atoms in order of growing size:
9. Li, Na, Rb, Fr
10. S, Te, O, Po
11. Na, Mg, P, S
12. Li, B, O, F
13. What happens to the size of an atom when it becomes a cation? What about an anion? Why is this trend observed?