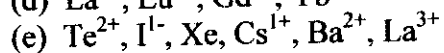
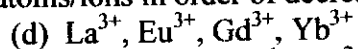
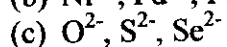
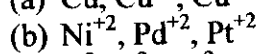
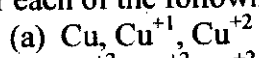


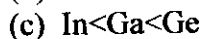
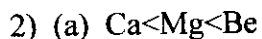
PERIODICITY & MOLECULAR BONDING THEORY
(Chemistry 11 IB)

- 1) Arrange the following groups of atoms in order of increasing size:
 - (a) Be, Mg, Ca
 - (b) Te, I, Xe
 - (c) Ga, Ge, In
- 2) Arrange the atoms in question (1) in order of increasing first ionization energy.
- 3) The first ionization energy of Ge, As, and Se are 0.7622, 0.9444, and 0.9409 MJ/mol, respectively. Explain why these values are such in terms of electronic configuration.
- 4) For each of the following pairs of elements: **Li & K** **S & Sc**
Pick the atom with:
 - (a) More favorable electron affinity.
 - (b) Higher Ionization energy
 - (c) Larger size
- 5) The electron affinity of Na is -52.9 kJ/mol. Is it possible to add one electron to sodium to make an Na^{-1} ion? Why or why not?
- 6) Using the element P as an example, write the equation for the process in which the energy change will correspond to the ionization energy. (ie. Write a chemical equation where the P atom will undergo a loss of electrons).
- 7) Predict the atomic number (A), of the next alkali metal after francium, and give its ground-state electron configuration.
- 8) An electron is excited from the $n=1$ ground state to $n=3$ for a hydrogen atom. Which of the following statements are true? Give corrected statements for those that are deemed false.
 - (a) It takes more E to ionize the electron from $n=3$ than from the ground state.
 - (b) The electron is further away from the nucleus on average in the $n=3$ state than in the $n=1$ state.
 - (c) The wavelength of light emitted if the electron drops from $n=3$ to $n=2$ will be shorter than the wavelength of light emitted if the electron drops from $n=3$ to $n=1$.
 - (d) The wavelength of light emitted when the electron returns to the ground state from $n=3$ is the same as the wavelength of light absorbed to go from $n=1$ to $n=3$.
 - (e) For $n=3$, the electron is in the first excited state.
- 9) Without using your Data Booklet, predict the order of increasing electronegativity for each of the following groups of atoms:
 - (a) C, N, O
 - (b) S, Se, Cl
 - (c) Si, Ge, Sn
 - (d) Tl, S, Ge
- 10) Without using your Data Booklet, predict which bonds in each of the following groups will be most polar:
 - (a) C-F, Si-F, Ge-F
 - (b) P-Cl, S-Cl
 - (c) S-F, S-Cl, S-Br
 - (d) Ti-Cl, Si-Cl, Ge-Cl

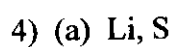
11) For each of the following groups, place the atoms/ions in order of decreasing size:



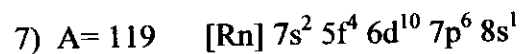
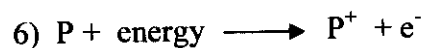
Answers:



3) Se has lower IE b/c it has 2 e⁻ in the same 4p orbital.



5) Yes, would have to be an exothermic reaction



8) (a) False – n=3 state has e⁻ further from nucleus, therefore easier to ionize.

(b) True

(c) False – Short wavelength implies higher frequency. ΔE from n=3 to n=2 is smaller than that of n=3 to n=1, therefore wavelength should be longer.

(d) True

(e) False – n=3 is the 2nd excited state.

