Exercises 5

Exercise 5.1

a) How do atomic radii change across a period in the periodic table?
b) And within a group?
c) For the same atomic nucleus, what happens to the radius if an electron is removed? And if an electron is added? Why?
d) Without looking up their radii, rank the following atoms in order of increasing atomic radii:Se, Sr, Te, F, Br and Cs.
e) Indicate which is the largest in each of the following pairs: B/F, Cs/Cl, O/Te, B^{3+}/F^{-}, Cs^{+}/Cl^{-}, O^{2-}/Te^{2-} ?

Exercise 5.2

Is the size of the Cl^{-} anion closer to the size of the Li^{+}, Na^{+} or K^{+} cation ? Why ?

Exercise 5.3

Without looking up numerical values, rank the following atoms in ascending order of their first ionization energy: Se, Sr, Te, F, Br and Cs.

Exercise 5.4

Do we have to supply energy to a sulfur atom in the gas phase for it to capture an electron? And for it to capture a second one?

Exercise 5.5

What are the most probable ions formed by Li, Br, Ca, Ti? Why are these ions the most likely?

Exercise 5.6

What charge do aluminum, sulfur and iodine atoms preferably have?

Exercise 5.7

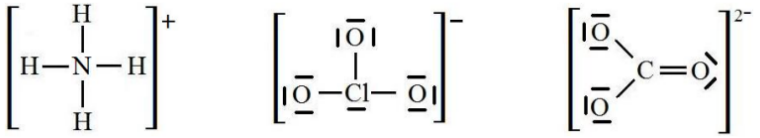
How many bonds do the sodium, magnesium, carbon and chlorine atoms preferably form?

Exercise 5.8

Which of the two Lewis structures of OF_2 (or F_2O) is more likely?

Exercise 5.9

Indicate the formal charges of the atoms of the following ionic structures:



Exercise 5.10
Compare the magnitudes of the lattice energies of the following pairs of ionic compounds using the symbols '>' or '<'.

a) CaO BaO
b) NaI NaCl
c) LiF MgO

Exercise 5.11
Arrange the following ionic compounds NaCl, NaI, MgO, BaO a) in increasing order of lattice energy, b) in increasing order of melting point.