

Due February 11, 1999

1. What electronic states can you derive from the following configurations. (Give the term symbols, specifying the angular momentum (L) and spin multiplicity.)

- a) $1s2p$ b) $1s^2(3p)^2$ c) $1s^22p3p$
d) $1s^22s^22p^63s3d$ e) $1s2s^22p6(3d)^2$

In each case, indicate which state is the lowest in energy.

2. For each of the following indicate what J states are possible (*i.e.*, complete the term symbols).

- a) 1D b) 3P c) 3S
d) 4P e) 2F f) 1G

3. a) Calculate the $1s \rightarrow 2p$ transition energy of the He^+ .

b) Positronium consists of an electron (e^-) and a positron (e^+). Calculate the ionization potential of this system.

c) What is the Bohr radius of the $1s$ orbital of positronium?