

## 1) Short answers

- a) Name one reason why we are studying the molecular orbital model when we were already able to determine molecular bonding and geometry using Lewis dot diagrams.
- b) Explain why the energy of the  $\pi_{2p}$  orbitals is lower than  $\sigma_{2p}$  on the for elements on the left side of the periodic table while it is reversed for elements on the right side.

## 2) Molecular Bonding

- a) Draw a correlation diagram showing the orbital filling of dipotassium  $K_2$  in its ground state.
- b) Add the vacuum level (i.e. where electrons are free) to your diagram as we did in lecture and call this the zero of energy. Label with arrows both the EA and IE for potassium and dipotassium. Which is larger, the IE of K or  $K_2$ ?
- c) Compute the bond order for the first excited state of  $K_2$ . Predict the result when light absorption promotes an electron from  $\sigma$  to  $\sigma^*$  to create the lowest excited state.