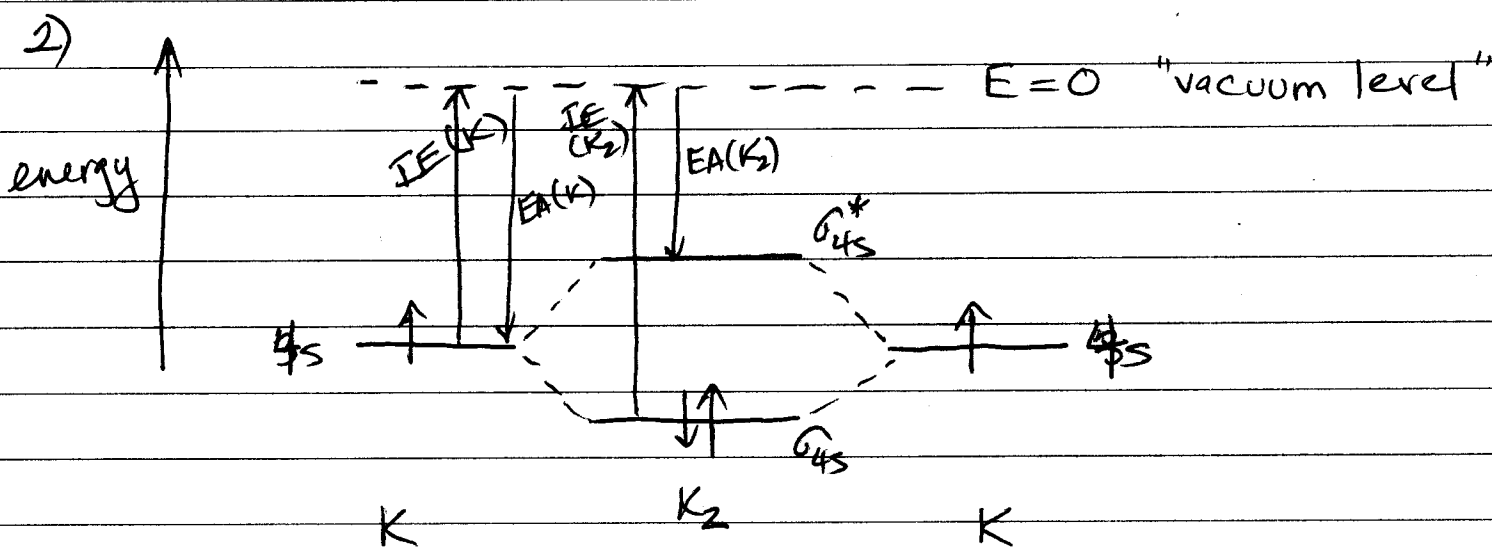


i) The molecular orbital model tells us about magnetic properties, excited state bond strengths and can handle odd numbers of electrons.

b) On the left side of the periodic table, the nuclear charges  $Z_{eff}$  are relatively low so the primary objective in placing electrons from p-orbitals that bond is to avoid repulsion with the  $\sigma_s$  electrons. Therefore,  $\pi_{2p}$  orbitals which have electron density off the bond axis are a better choice.

On the right side of the periodic table,  $Z_{eff}$  is large and the electrons want to be on the bond axis so that they spend more time close to the nuclei. Hence,  $\sigma_{2p}$  is lower in energy than  $\pi_{2p}$ .



IE of  $K_2$  is larger.

Excited state of  $K_2$  would have  $\sigma_{4s}^1 \sigma_{4s}^{*1}$ . Bond order =  $\frac{1-1}{2} = 0$   
 We would expect  $K_2$  to dissociate (fall apart) upon light absorption.