

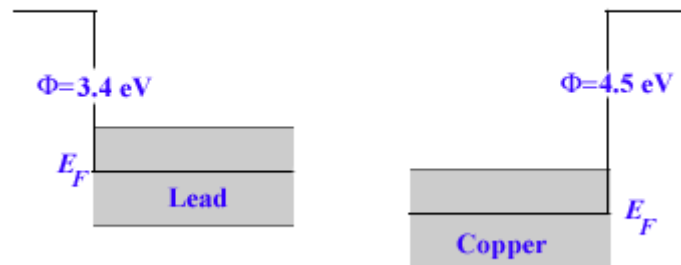
814.

Problem 53.45 (RHK)

A drop of lead (work function = 3.4 eV) is in close contact with a sheet of copper (work function = 4.5 eV). We have to find the contact potential difference that appears across the lead copper interface. We have to draw energy diagram, showing the relative Fermi levels both before and after the two metals are joined together.

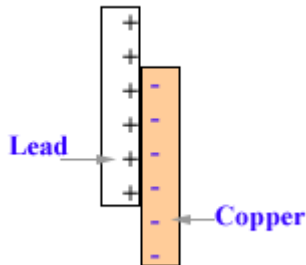
Solution:

We have shown in the diagram the respective valence band of lead and copper relative to zero potential outside these metals. The work function of lead and the work function of copper = 4.5 eV.



When a drop of lead is in close contact with a sheet of copper, initially electrons will flow from lead to copper

at their junction as it is energetically favourable for electrons to flow from the valence band of lead to the valence of copper.



The lead side of the junction will develop positive charge and the copper side of the junction will develop negative charge. Thus a contact potential difference of

magnitude 1.1 V ($4.5 - 3.4$) will develop across the lead-copper junction such that the Fermi levels of both lead and copper become equal and then the flow of electrons across the junction will cease.

