

Molecular Models of Semiconductors

Apparatus

ball and stick models of Si, P and Al atoms.

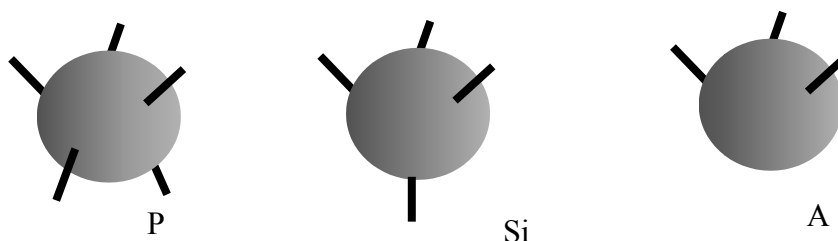
Polystyrene balls with sticks representing the outer shell electrons available for bonding. The balls could be coloured for quick identification.

Action

The students examine the models and put together an n type and a p type semiconductor.

The Physics

Adding P to the Si gives an n type semiconductor, as the fifth outer shell electrons cannot be involved in bonding and hence are free to wander the lattice as charge carriers. The Al impurities give a deficit of bonding electrons, leading to holes as charge carriers.



Accompanying sheet:

Molecular Models of Semiconductors

Examine the ball and stick models of the atoms.

What happens when you put P impurities into Si?
What sort of semiconductor results?

What happens when you put Al impurities into Si?
What sort of semiconductor results?