

Non-Elemental - Compounding

Mixing of Two elements

Choi veg | Possibility

Coupling of III-group & V group

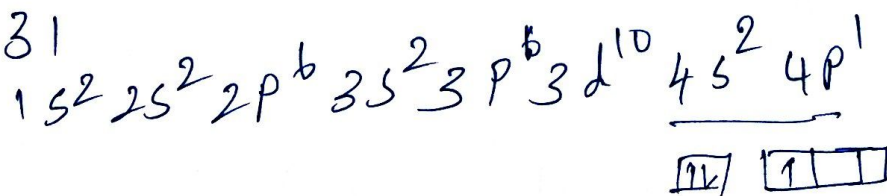
| III | IV | V |
|-----------|----|--------|
| Ga | | P |
| e^- | | e^- |
| deficient | | excess |



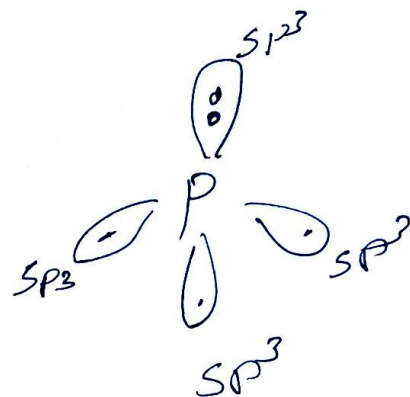
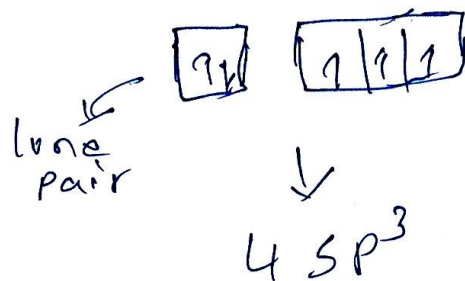
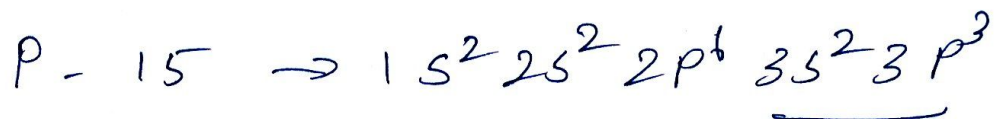
4 - valency e^-

System - Semiconductor
like Si

Ga - 31

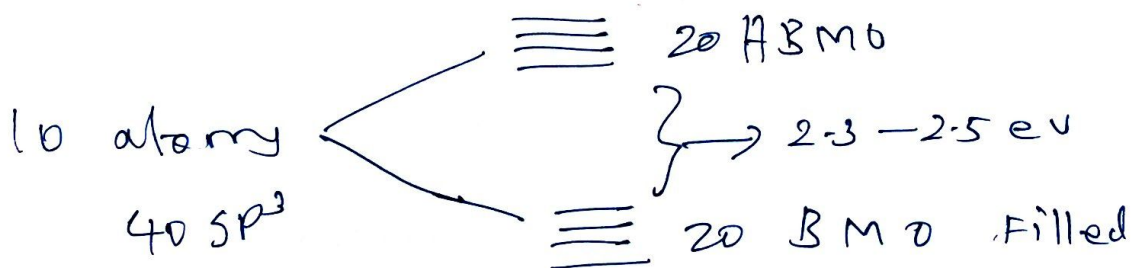


4 sp^3 - orbital



Mixing = 1:1 ratio
of
Ga & P

5 Ga + 5 P Atoms

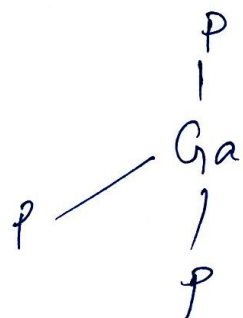


$$e^- = 5 \times 3 = 15$$

$$5 \times 5 = 25$$

$$40 e^-$$

GaP - Tetrahedral - structure



Each P - surrounded by 4 Ga

Each Ga - " 4 P

Smaller the size of Atoms



Greater the extent of overlapping



Greater will be the band gap

Problems

① The band gap in GaAs $<$ GaP ?

As is larger size than P $[As > P]$

The extent of overlapping

GaAs $<$ GaP

② The band gap of GaP $<$ ~~Ga~~ AlP

Ga is larger size than Al $[Ga > Al]$

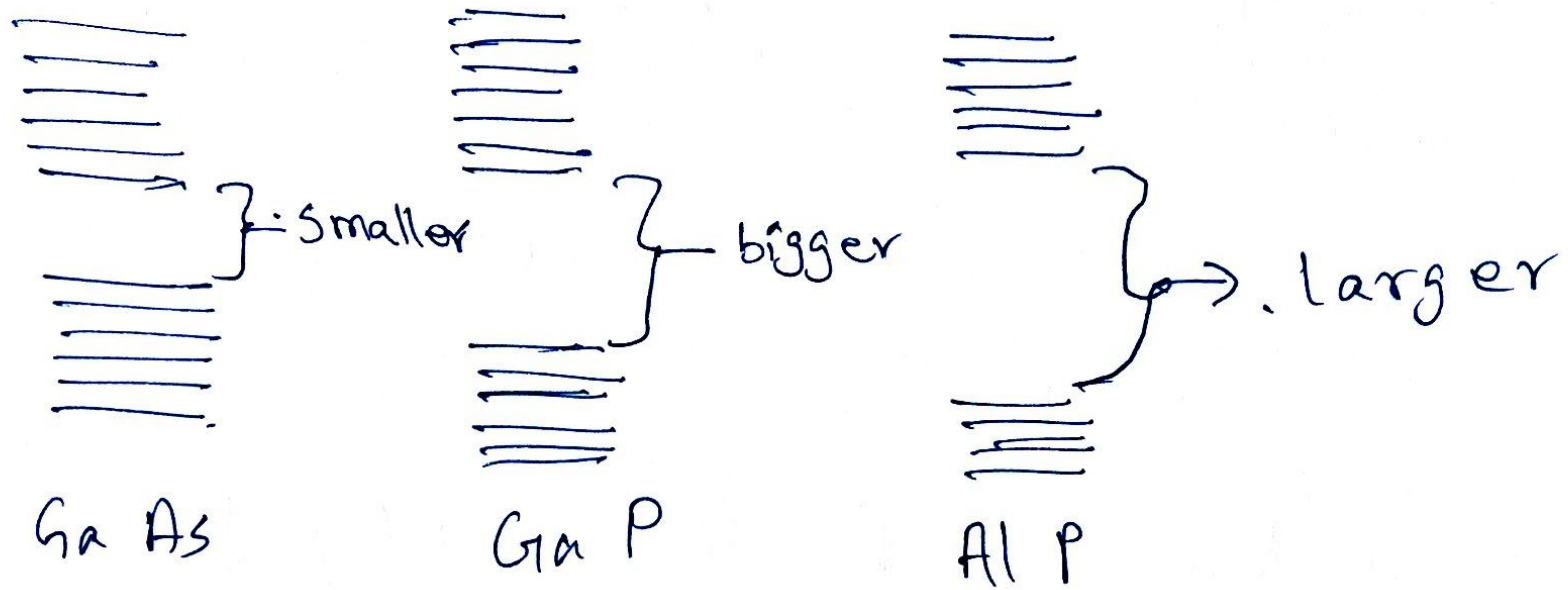
The extent of overlapping

GaP $<$ AlP

Together

GaAs $<$ GaP $<$ AlP

Band gap increases →



Electronegativity (Excluded in 2019 syllabus)

I Unit Conducting Properties of Materials

Quantum Dot
Size Vs optical
properties
Band theory

FET | MOT

