Hume - Rothery Rule →

* William Hume-Rothery give some rule for solid solubility.
* Solubility is nothing but metal to metal combination.

Metal + Metal
↓ ↘
Base metal Impurity

Aim

* To obtained the particular homogeneous structure or homogeneous solid solution. So there are some rules.

1. Atomic size factor
2. Chemical Affinity
3. Relative valancy factor
4. Crystal structure.

1. Atomic size factor -

* It plays an important role in the solubility.
* It is the difference of atomic size of solute (•) and solvent (o)
* If the difference is <15% (less than) then it is said good solubility, and if it is >15% (more than), it is said limited solubility of solute.

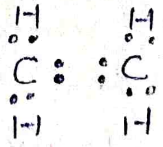
Ex - Cr - Ni (solid solubility) is good because size is same.

2. CHEMICAL AFFINITY FACTOR →

* It is nothing but the bonding tendancy of element i.e chemical affinity.
* So greater the chemical affinity of two metal, greater is the solubility i.e greater will be the tendancy of compound formation.

such as - C, H

C_2H_2



3. Relative Valancy factor →

Valancy plays an important role in the combination of two metal.

So Valancy is the combining capacity of element such as in Metals → no. of electrons in the outermost orbit.

Eg - Aluminium (3 atom in outer cell)
V = 3

In case of non metal

Valancy = 8 − (No. of electron in outermost orbit)

Eg - Oxygen atom (6 atom in outer cell)

8 − 6 = 2, V = 2

In case of solute & solvent metals valancy

* A metal of higher valancy can dissolve with the metal of lower valancy. such as Al & O it will give Al_2O_3.

4. Crystal structure factor →

* Metals with the same crystal structure have high solubility. where as differences in crystal structure having limited solubility.

So we can determine the solubility of one metal into another by considering all these fact These four factor combining which is known as the hume Rothery Rule of solid solubility.