

# **Phase Transformation in Metals**

## **MSE-S304**

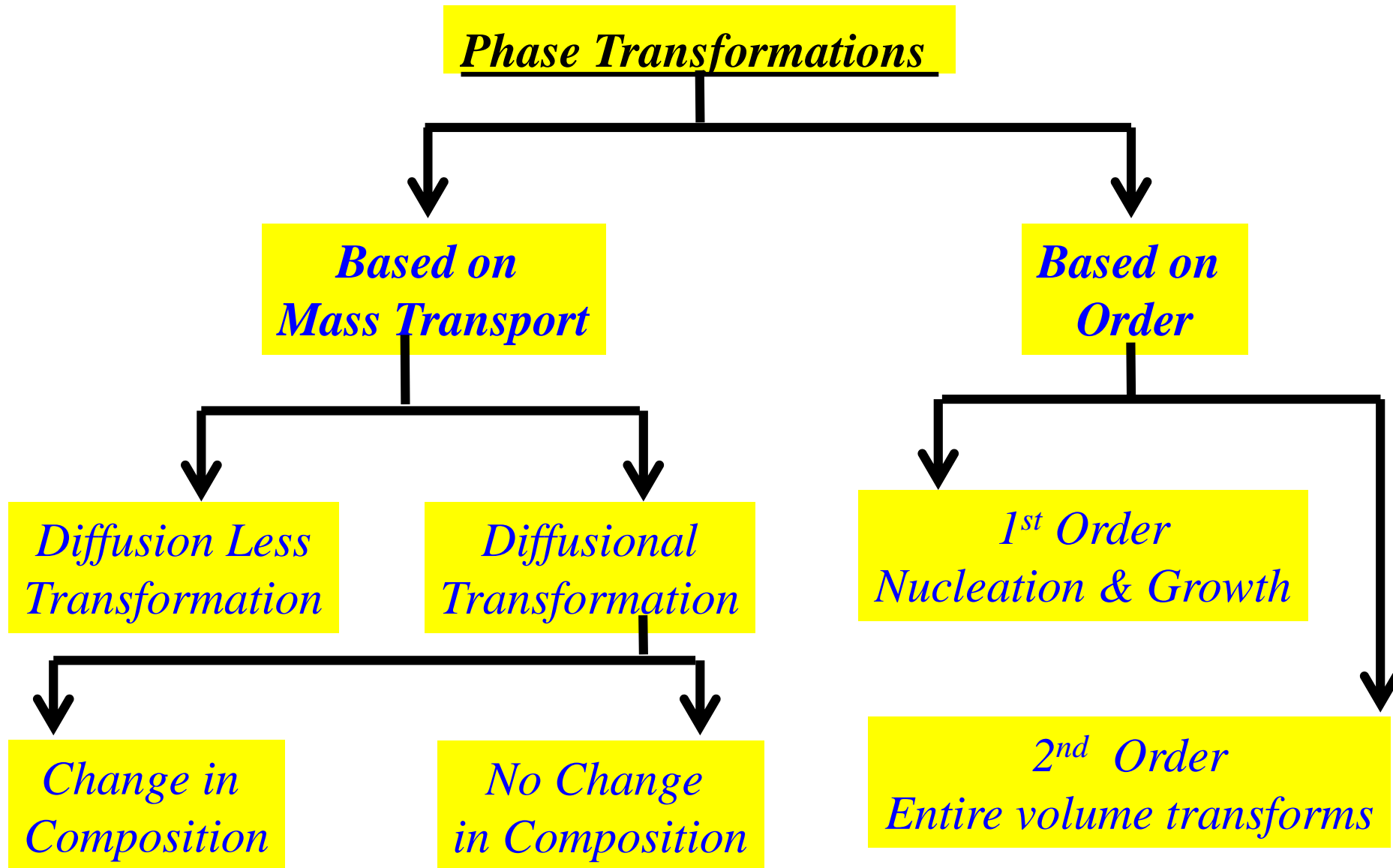
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# Classification of Phase Transformations

- Phase transformations can be classified as *Homogeneous and Heterogeneous*.
- Phase transformations can also be classified as *Diffusional and Diffusionless*.
- Phase transformations can also be classified as *Diffusion Controlled or Interface Controlled*.
- In some transformations there are *compositional changes* while in some other there are *no composition changes*.

# Classification of Phase Transformations



# Classification of Phase Transformations

## *Phase Transformations*

```
graph TD; A["Phase Transformations"] --> B["Heterogeneous Transformations  
(Nucleation & Growth)"]; A --> C["Homogeneous Transformations  
(Spinodal Decomposition)  
(Order-Disorder Transformation)"]; B --> D["Growth Controlled by Heat Transfer  
(Solidification of Pure Metals)"]; C --> E["Growth Controlled by Heat & Mass Transfer  
(Solidification of Alloys)"]; C --> F["A Thermal Growth  
(Martensitic Transformations)"]; C --> G["Growth Controlled by Thermally activated movements of atoms"];
```

*Heterogeneous Transformations*  
(Nucleation & Growth)

*Homogeneous Transformations*  
(Spinodal Decomposition)  
(Order-Disorder Transformation)

*Growth Controlled by Heat Transfer*  
(Solidification of Pure Metals)

*Growth Controlled by Heat & Mass Transfer*  
(Solidification of Alloys)

*A Thermal Growth*  
(Martensitic Transformations)

*Growth Controlled by Thermally activated movements of atoms*

# Classification of Phase Transformations

*Growth Controlled by  
Thermally activated movements of atoms*

```
graph TD; A["Growth Controlled by Thermally activated movements of atoms"] --> B["Short Range Transport (Interface Controlled)"]; A --> C["Long Range Transport"]; C --> D["Continuous Reaction (Precipitation Dissolution)"]; C --> E["Discontinuous Reaction (Eutectoid Reactions)"];
```

*Short Range Transport  
(Interface Controlled)  
{Massive Transformations,  
Polymeric Transformations,  
Recrystallization etc. }*

*Long Range Transport*

*Continuous Reaction  
(Precipitation Dissolution)*

*Discontinuous Reaction  
(Eutectoid Reactions)*