Heat Treatment of Metals

MSE-S305

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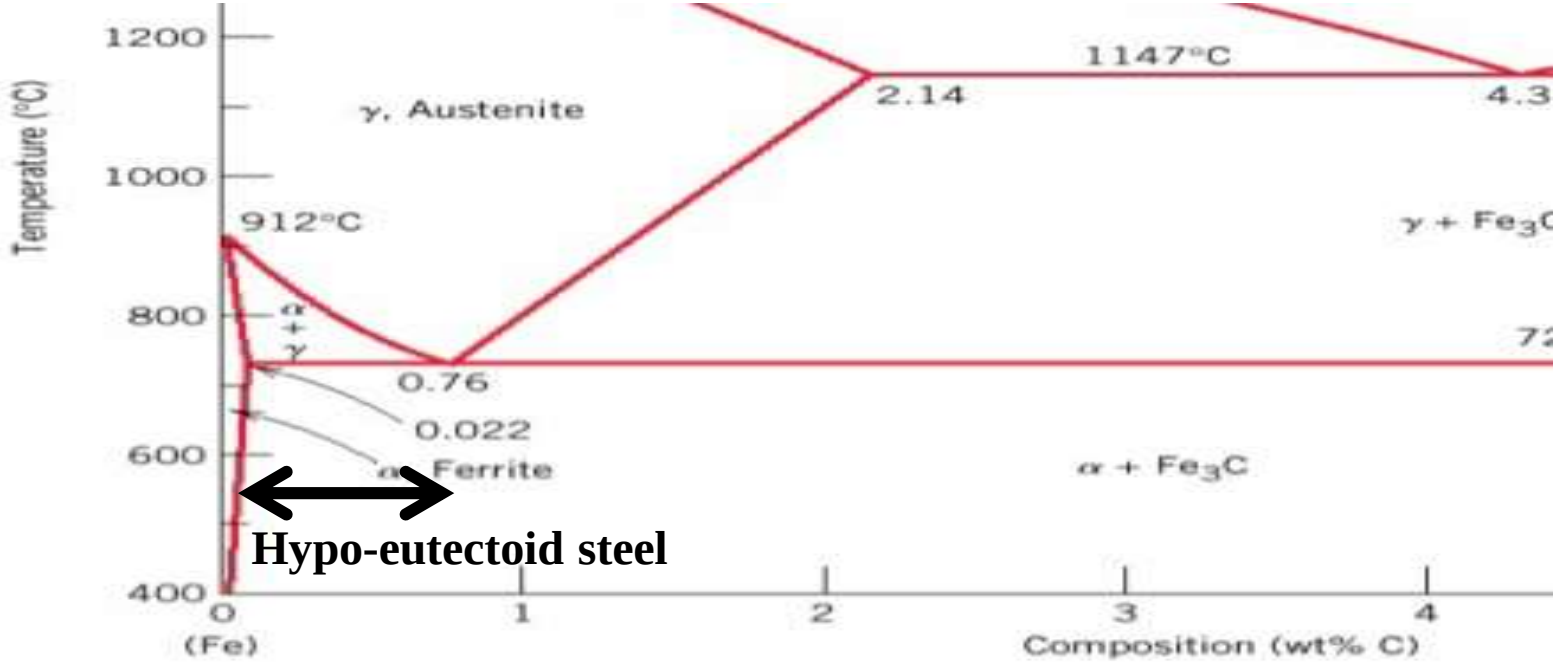
Mechanism of Formation of Austenite of Hypo eutectoid and Hyper eutectoid steel

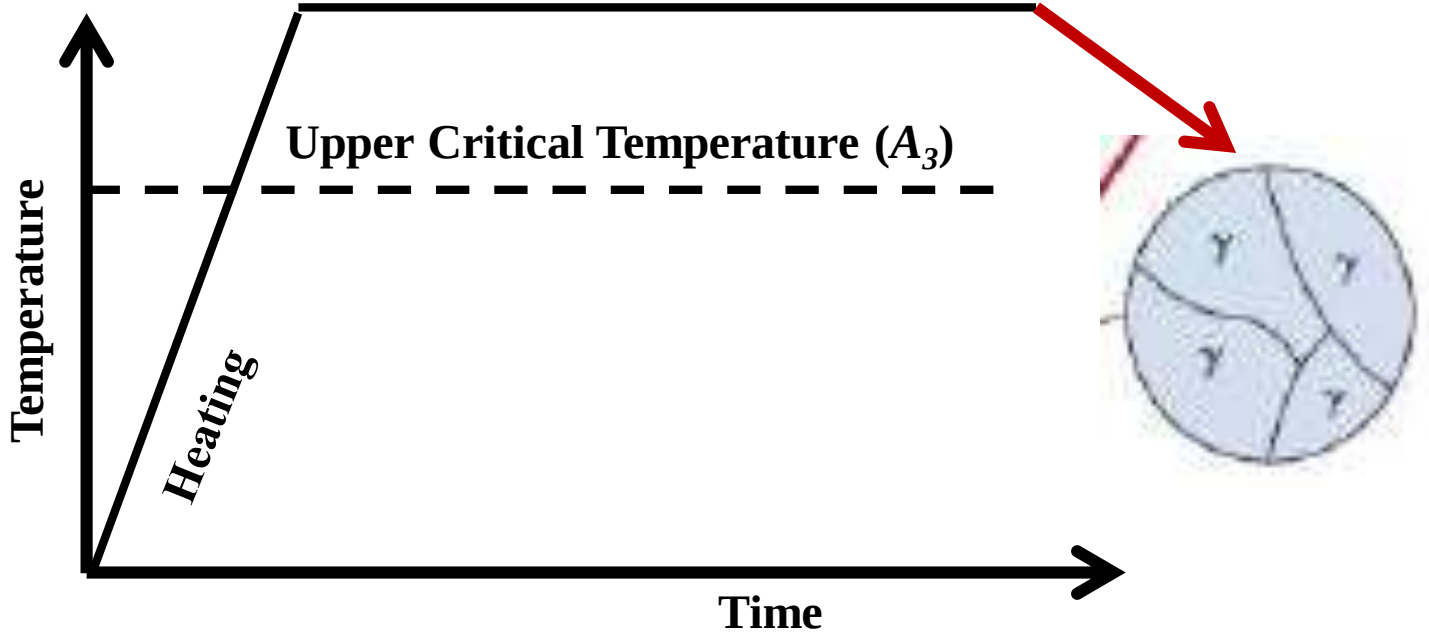
Hypo-eutectoid steels

➢**If a plain carbon steel contains more than *0.008 %C* and less than *0.8 %C*, it is called a *Hypo-eutectoid steel*.**



Mechanism of Formation of Austenite of Hypo eutectoid and Hyper eutectoid steel

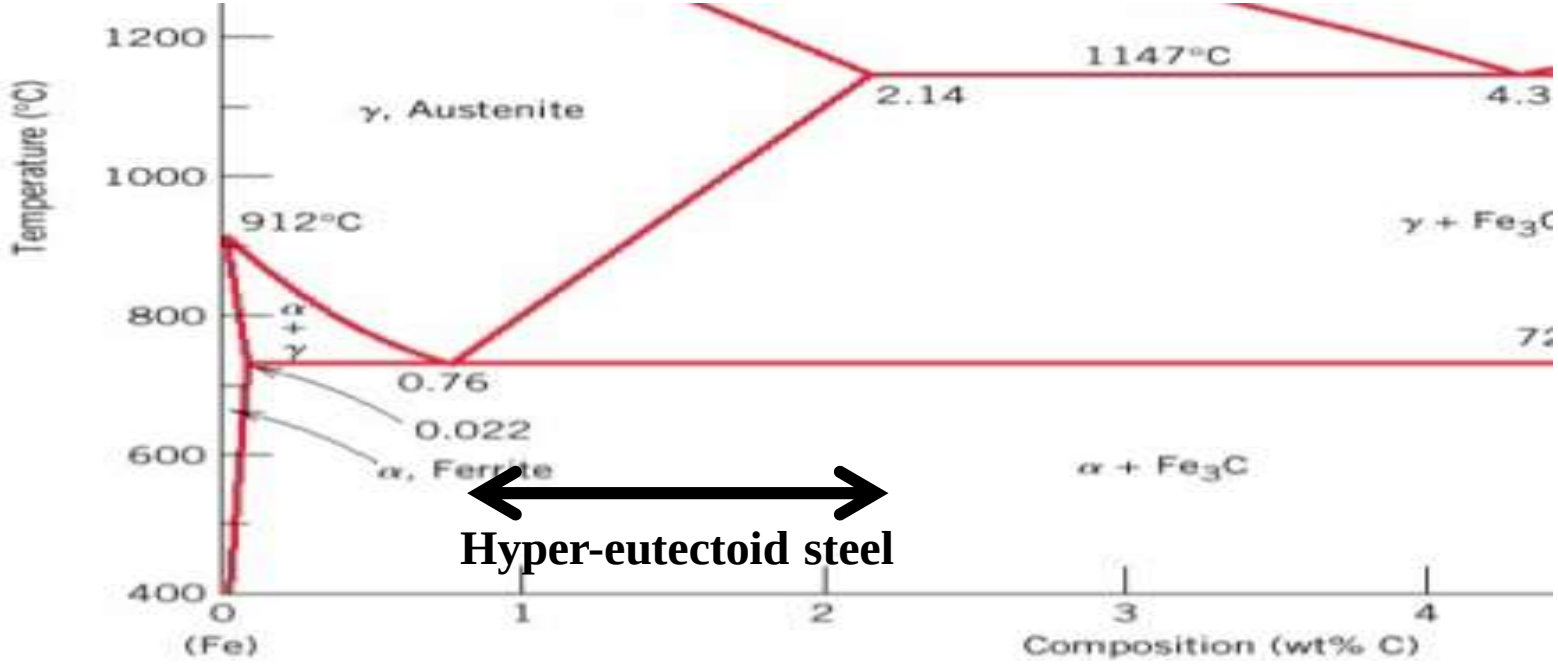
➢**If a Hypo-eutectoid plain carbon steel is heated to *austenitic temperature* for a sufficient time, it's structure will become *Homogeneous austenite*. This Process is called *Austenitizing*.**



Mechanism of Formation of Austenite of Hypo eutectoid and Hyper eutectoid steel

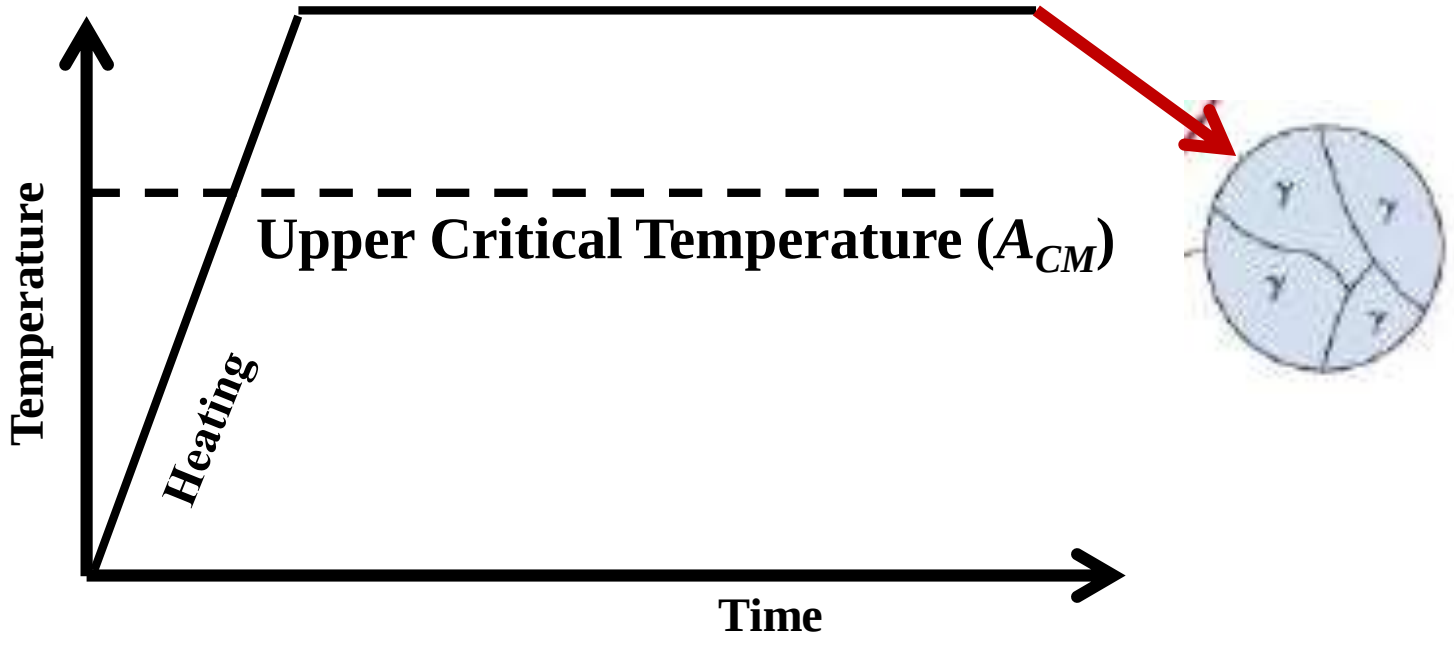
Hyper-eutectoid steels

➢**If a plain carbon steel contains more than *0.8 %C* and less than *2.14 %C*, it is called a *Hyper-eutectoid steel*.**



Mechanism of Formation of Austenite of Hypo eutectoid and Hyper eutectoid steel

➢**If a *Hyper-eutectoid* plain carbon steel is heated to *austenitic temperature* for a sufficient time, it's structure will become *Homogeneous austenite*. This Process is called *Austenitizing*.**



Mechanism of Formation of Austenite of Hypo eutectoid and Hyper eutectoid steel

25 SAT Hypoeutectoid & Hypereutectoid steels →

→ In hypoeutectoid steels, On very slow heating, austenite nuclei are formed just above the eutectoid temp.r. More nuclei will form with inc. in temp.r. Therefore, at first the austenitic grains will ~~form with inc. in~~ grow by the growth of initially formed austenitic grains & then by the growth of newely formed austenite nuclei. The process will continue till the upper critical temp.r (A_3) is reached. The austenite present at this temp.r will be non-homogeneous due to the presence of embedded

26 SUN cementite particles with-in the austenitic grains.

→ For hypoeutectoid steels, growth of primary austenitic grains take place at the expense of proeutectoid ferrite. Further, austenite nuclei are also possibly formed at grain bdry of ferritic grains & cementite dissolves into the ferrite which in turn transforms into austenite.

Mechanism of Formation of Austenite of Hypo eutectoid and Hyper eutectoid steel

→ In the case of hypereutectoid 27 MON
steels, the transformation proceeds in a similar way with the diffᵉ that austenitic grains grow by dissolving proeutectoid cementite.

Theoretically, pearlite must transform to austenite completely at eutectoid temp.ʳ, it does not happen so in practice. Complete dissolution of cementite of pearlite into austenite take place over a range of temp.ʳ

On parallel lines, it has been 28 TUE
experimentally observed that dissolution of proeutectoid ferrite or proeutectoid cementite is not completed at A_3 or Acm respectively. It therefore, becomes essential to heat eutectoid, hypoeutectoid & hypereutectoid steels above A_1, A_3 & Acm respectively, in order to get homogeneous austenite.

Mechanism of Formation of Austenite of Hypo eutectoid and Hyper eutectoid steel