Heat Treatment of Metals

MSE-S305

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Critical temperatures and Phase boundaries in Fe-Fe_3C Phase Diagram

- ***Critical temperature*** **shows the temperature at which phase changes occur in steel either on *heating* or *cooling*, indicating by the arrest of temperature change at that point of heating or cooling.**

- **Generally, *upper* and *lower* critical temperatures are symbolised by Ac_3 and Ac_1, respectively, to denote critical temperatures on heating.**

(The *"c"* is from the French word *chauffage*, stands for *heating*)

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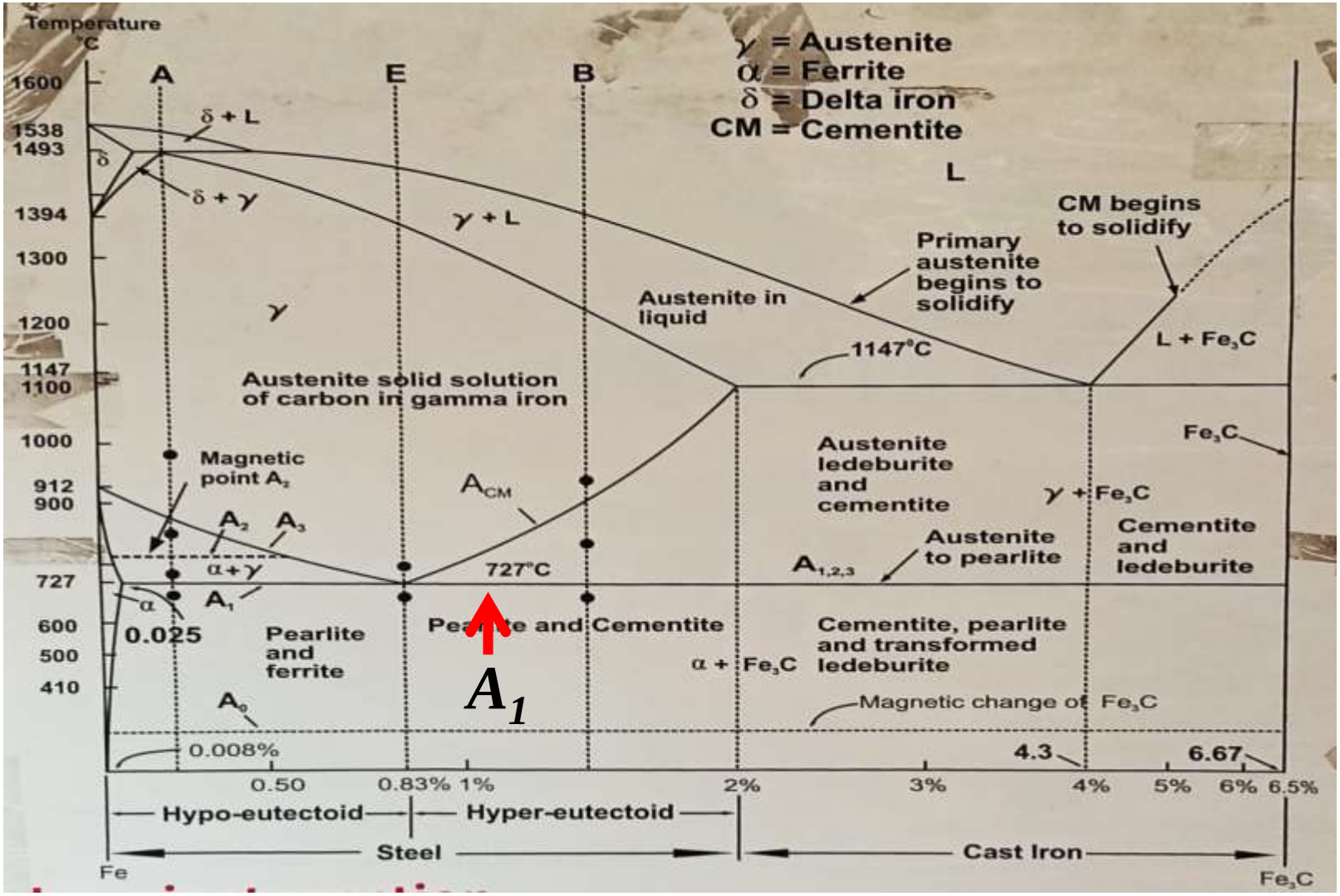
- **Similarly, *Ar_3* and *Ar_1*, are used to denote critical temperatures on cooling.**
(The *"r"* is from the French word *refroidissement*, stands for *cooling*).

- ***A_1*: The upper limit of the *ferrite/cementite* phase field. Below this temperature, *Austenite* does not exist.**

- **Horizontal line going through the *eutectoid point*.**

Critical temperatures and Phase boundaries in Fe-Fe_3C Phase Diagram



Critical temperatures and Phase boundaries in Fe-Fe_3C Phase Diagram

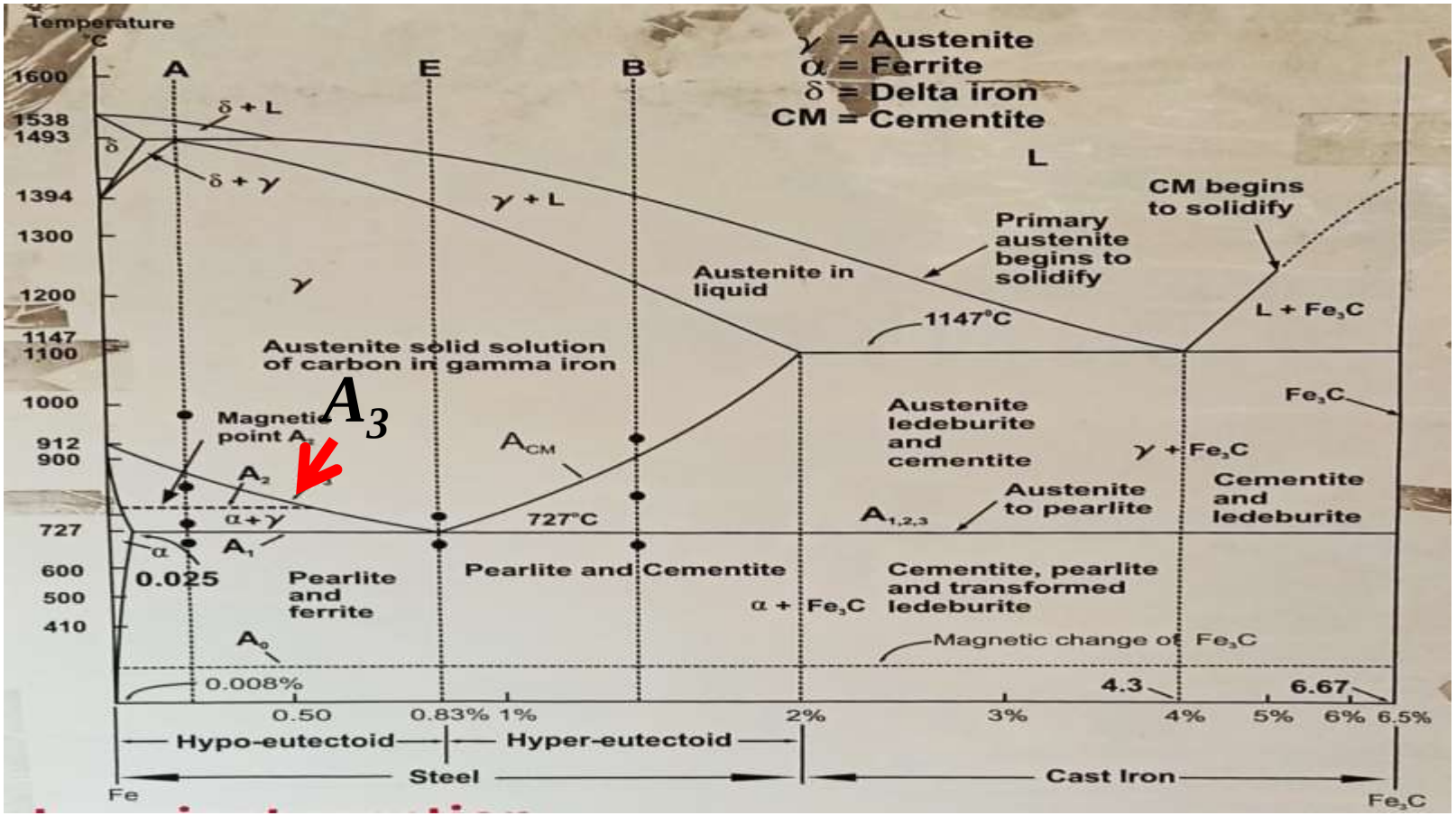
- ***A_2:*** **The temperature where iron looses its magnetism (so-called *Curie temperature*).**

- ***Curie temperature (768°C): The temperature at which paramagnetic β–iron transform to ferromagnetic α–iron.***

- ***β–iron:*** **β–iron is a non-magnetic version of α–iron, is identical to α–iron in *crystal structure*, and exist from *768°C to 912°C*.**

Critical temperatures and Phase boundaries in Fe-Fe_3C Phase Diagram

➢ ***A_3*: The boundary between the *austenite (γ-ferrite)* and the *austenite/ferrite* phase field.**



Critical temperatures and Phase boundaries in Fe-Fe_3C Phase Diagram

- ***A_{CM}*: The boundary between the *austenite (γ-ferrite)* and the *austenite/cementite* field.**