8. Fe-C System

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Fe - C System

Allotropes of Fe

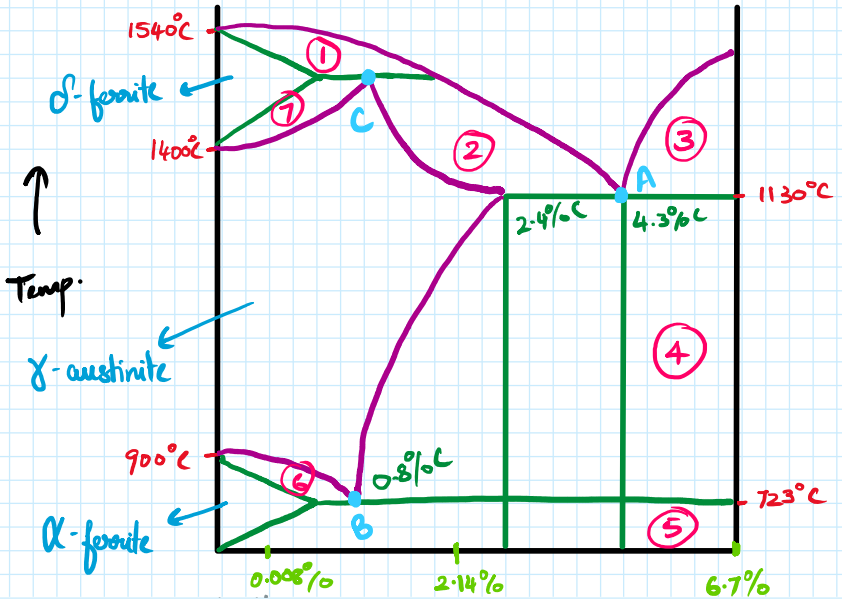
- α - ferrite: 0 - 900°C
- γ - austinite: 900°C - 1400°C
- δ - ferrite: 1400°C - 1540°C

Mixing of C with Fe

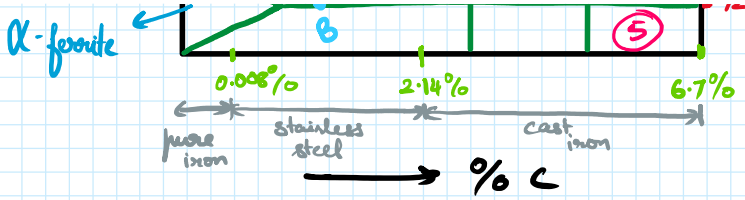
- 0.008% C → Pure iron
- 0.008 - 2.14% C → Stainless steel
- 2.14% - 6.7% → Cast iron

$Fe + 6.7\%\ C \longrightarrow Fe_3C$ (cementite)

0.8% C	723°C
2.4% C	1130°C
4.3% C	1130°C



1. liquid + δ - ferrite
2. liquid + γ - austinite
3. liquid + cementite
4. γ - austinite + cementite
5. α - ferrite + cementite
6. α - ferrite + γ - austinite
7. γ - austinite + δ - ferrite



Point A: Eutectic point

C% = 4.3% C , T = 1130°C

liquid + γ-austinite + cementite

P = 3, C = 2

F = C - P + 1

= 2 - 3 + 1

F = 0 } invariant

Point B: Eutectoid point

C% = 0.8% C, T = 723°C

γ-austinite + α-ferrite + cementite

P = 3 , C = 2

F = C - P + 1

= 2 - 3 + 1

F = 0 } invariant

Point C: Peritectic point

C% = 0.16% C, T = 1498°C

liquid + δ-ferrite + γ-austinite

P = 3, C = 2

F = C - P + 1

= 2 - 3 + 1

F = 0 } invariant

SHORTCUT

Eutechite = γ + cem + L

Eutectoid = γ + cem + α

Peritectic = γ + δ + L

SUMMARY

	TEMPERATURE	C%	PHASES	F = C - P + 1
Eutectic point [2 solid + 1 liquid]	1130°C	4.3%	3: γ + cem + L	0
Eutectoid point [3 solid]	723°C	0.8%	3: γ + cem + α	0
Peritectoid point [2 solid + 1 liquid]	1498°C	0.16%	3: γ + δ + L	0

NOTE:

Only point with all 3 phases solid → eutectoid point