

Chapter 8 – Phase Diagrams Outline

Phase Diagram (binary) Review

Three common uses of phase diagram:

1. Identify phases that exist for a given overall chemical composition and temperature.
2. Determine the chemical composition of individual phases at a particular temperature for an overall chemical composition.
3. Determine the relative weight fractions of individual phases at a particular temperature for an overall chemical composition.

Phase diagram nomenclature:

phase	liquidus
solidus	solid solubility limit
eutectic	eutectoid
peritectic	peritectoid
transformation	inverse lever rule
primary solid solution	maximum solid solubility
intermediate phase	intermetallic compound
microstructural constituent	noneutectic
proeutectic	proeutectoid

Iron-iron carbide phase diagram:

Fe-Fe₃C binary equilibrium diagram:

- note critical C composition values for the peritectic line that are missing on the figure:
0.09 / 0.16 / 0.53
- note this diagram has most of the major transformations that occur in materials systems:



polymorphic (allotropic) transformation

Fe-Fe₃C phase diagram nomenclature:

ferrite (α)	austenite (γ)
delta-ferrite (δ)	cementite (Fe ₃ C)
pearlite	proeutectoid
hypereutectoid	hypoeutectoid
plain carbon	

Steel Microstructures (microconstituents):

fine pearlite	medium pearlite
coarse pearlite	martensite
spheroidite	tempered martensite
upper bainite	lower bainite
proeutectoid ferrite	proeutectoid cementite