

Some questions and answers for Ch 8 (Heat Treatment of Steels):

1- **A phase diagram is:**

- a. graph of compositions
- b. graph of transition temperatures
- c. plot of reaction times
- d. graph of temperature, solubility, and composition

Ans: (d) A graph of temperature, solubility/phases and composition

2- **When does a steel have a microstructure of 100% ferrite?**

Ans: Steel is 100% ferrite when the carbon content is low enough to keep the structure in the alpha iron range on the IC diagram (below 0.08 at room temperature) and the system is in equilibrium.

3- **What are the minimum requirements for quench hardening of a steel?**

Ans: To harden a steel, you need:

1. sufficient carbon content
2. heat to the right austenitizing temperature
3. quench fast enough to prevent formation of equilibrium products

4- **When would you use a softening heat treatment on a steel?** Ans: Softening heat treatments are used to soften hardened steel tools that need rework. They are used on hardened steels that did not achieve desired hardness. They are then rehardened. Cold worked steels also are softened for forming, etc.

5- **What is steel hardenability and how is it measured?**

Ans: Steel hardenability is the ease with which a particular steel can be quench hardened.

6- **Which of the following is a selective hardening process?**

- a. martempering
- b. recrystallization
- c. austempering
- d. tempering
- e. induction
- f. normalizing

Ans: (e) induction hardening

7- **What is the purpose of tempering after quench hardening?**

Ans: Tempering after hardening reduces the trapped carbon in the BCT structure and eliminates brittleness, increases ductility and toughness.