Assignment 7

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. Due on 2018-10-17, 23:59 IST.

1) Which of the following techniques can be used to experimentally assist in determining the phase diagram of an alloy system?

- EPMA
- SEM
- XRD
- Optical microscope

No, the answer is incorrect.
Score: 0
Accepted Answers:
EPMA
SEM
XRD
Optical microscope

2) What are the precautions one must take during thermal analysis to determine the phase diagram?

- Local temperature fluctuations should be avoided.
- Rate of cooling/heating must be as fast as possible as it is independent of equilibrium condition.
- Compositional analysis must be accurate.
- No reaction with crucible or contamination of any kind should take place.

No, the answer is incorrect.
Score: 0
Accepted Answers:
Local temperature fluctuations should be avoided.
No, the answer is incorrect.
Score: 0

Accepted Answers:
It measures volume change upon heating or cooling.

4) For the construction of binary phase diagram of Pb and Mg, consider the situation: At about 470°C, compound PbMg₂, liquid (80 atom % Mg) and β- phase (92 atom % Mg) are in equilibrium. Where is phase coexistence going to occur?

No, the answer is incorrect.
Score: 0

Accepted Answers:
At the invariant point

5) Regarding Gibbs Triangle, which of the following statements is/are correct? 2 points

No, the answer is incorrect.
Score: 0

Accepted Answers:
It is for ternary alloys.
The corner represents the pure element.
The sides represent the binary alloys.

6) To experimentally determine Solvus line; what is generally done? 2 points

No, the answer is incorrect.
Score: 0

Accepted Answers:
Quenching from high temperature to room temperature
Temperature dependent XRD
Measurements of the electrical resistivity of material

7) Isopleth in a ternary phase diagram is 2 points

No, the answer is incorrect.
Score: 0

Accepted Answers:
Isothermal section depicting phases at a fixed temperature
Liquidus plot
8) Use following ternary diagram A-B-C for answering questions 8-9. Each division on AB, BC and CA axes is equivalent to 10 wt %.

What is the composition of alloy at point P?

- 30%A, 60%B, 10%C
- 60%A, 30%B, 10%C
- 60%A, 40%B
- 40%A, 50%B, 10%C

No, the answer is incorrect.
Score: 0

Accepted Answers:
Vertical section depicting phases at various temperatures

9) What is true of alloys whose compositions fall along Line AX?

- The composition of alloys is fixed.
- The alloys will have fixed B:C ratio irrespective of A content.
- Alloys will have fixed A content.
- Alloys will have fixed B and C contents

No, the answer is incorrect.
Score: 0

Accepted Answers:
The alloys will have fixed B:C ratio irrespective of A content.

10) Which of the following is the cooling curve for an alloy solidifying through a mixed liquid and solid region (e.g. in an isomorphous system)?

No, the answer is incorrect.
Score: 0
11. The maximum number of degrees of freedom that can co-exist in a ternary system with four phases is

- 0
- 1
- 2
- 3

No, the answer is incorrect.
Score: 0
Accepted Answers:
(c)

12. Which of the following is/are the variable(s) determine the microstructure of an alloy with equilibrium cooling conditions:

- Composition of the alloy
- Size of the alloy component

2 points
13 Consider a ternary alloy which contains 40 % A, 20 % B, 40 % C (all in atom %). The alloy solidifies through a ternary eutectic reaction leading to formation of a mixture of α (80 % A, 5 % B, 15 % C), β (10 % A, 70 % B, 20 % C) and γ (10 % A, 20 % B, 70 % C) phases. What will be the mole fractions of α, β and γ in the microstructure?

- Xα=0.13, Xβ=0.17, Xγ=0.44
- Xα=0.43, Xβ=0.44, Xγ=0.13
- Xα=0.18, Xβ=0.13, Xγ=0.20
- Xα=0.43, Xβ=0.13, Xγ=0.44

No, the answer is incorrect.

Score: 0

Accepted Answers:
- Composition of the alloy

Temperature

14 In the measurement of resistivity during phase diagram determination, following may be true?

- Resistivity may follow rule of mixtures for solid solutions.
- Resistivity may show sudden changes for compounds.
- Resistivity may follow rule of mixtures for both solid solutions and compounds
- Resistivity is not a function of composition.

No, the answer is incorrect.

Score: 0

Accepted Answers:
- Resistivity may follow rule of mixtures for solid solutions.
- Resistivity may show sudden changes for compounds.

Thermal analysis is generally suited to determine:

- Solidus boundary in binary alloys
- Solvus boundary in binary alloys
- Liquidus boundary in binary alloys
- Solidification behaviour of pure metals and eutectics

No, the answer is incorrect.

Score: 0

Accepted Answers:
- Solidus boundary in binary alloys
- Liquidus boundary in binary alloys
- Solidification behaviour of pure metals and eutectics