Unit 11 - Week 9

Course outline

How does an NPTEL online course work?
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Week 9
- Phase Diagrams (Introduction)
- Phase Diagrams (Language of Phase Diagrams, Types of Binary Phase Alloys)
- Phase Diagrams (Tie line, Lever Rule, Indentifcation of compositions and weight fractions in two-phase regions)
- Phase Diagrams (Type 1: Isomorphous Alloys, Microstructure evolution in Equilibrium and Noon equilibrium cooling)
- Phase Diagrams (Conguent Melting Alloys, Type II Alloys, Eutectic Reaction)
- Phase Diagrams (Type III Alloys with Partial Solubility in Solid State)
- Quiz : Assignment 9
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Assignment 9

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-11-18, 23:59 IST.

1) Refer to the table below and identify the correct combination. *2 points*

Column I	Column II
(I) Homogeneous System	(1) System
(II) A homogeneous portion of a system that has uniform physical and chemical characteristics	(2) Multiple Phases
(III) Guest component in a solution	(3) Solvent
(IV) Series of possible alloys consisting of same components	(4) Single Phase
(V) A component in the large fraction in an alloy	(5) Phase
(VI) Heterogeneous System	(6) Solute

- (I)-(5); (II)-(6); (III)-(5); (IV)-(1); (V)-(3);(VI)-(2)
- (I)-(4); (II)-(5); (III)-(6); (IV)-(1); (V)-(3);(VI)-(2)
- (I)-(2); (II)-(3); (III)-(5); (IV)-(4); (V)-(6);(VI)-(1)
- (I)-(6); (II)-(5); (III)-(4); (IV)-(3); (V)-(1);(VI)-(2)

No, the answer is incorrect.
Score: 0
Accepted Answers:
(I)-(4); (II)-(5); (III)-(6); (IV)-(1); (V)-(3);(VI)-(2)

2) The isomorphous alloys are characterized by the complete solubility of their components in solid-state and liquid-state. *1 point*

- True
- False

No, the answer is incorrect.
Score: 0
Accepted Answers:
True

3) Identify the correct option(s) from the list given below. *1 point*

- Solidification of a pure metal is congruent.
- Solidification of a binary alloy at Eutectic composition is incongruent.
- Solidification of a pure metal is incongruent.
- Solidification of a binary alloy at Eutectic composition is congruent.

No, the answer is incorrect.
Score: 0
Accepted Answers:
Solidification of a pure metal is congruent.
Solidification of a binary alloy at Eutectic composition is incongruent.

4) A binary phase diagram can be drawn as *2 points*

- Temperature versus Composition diagram at a given Pressure
- Pressure versus Composition diagram at a given Temperature
- Only as a Temperature versus Composition diagram
- Temperature versus Pressure diagram at a given Composition

No, the answer is incorrect.
Score: 0
Accepted Answers:
Temperature versus Composition diagram at a given Pressure
Pressure versus Composition diagram at a given Temperature
Temperature versus Pressure diagram at a given Composition

5) The degree of freedom for a point on the boundary of the liquid and vapor phase of the unary phase diagram of water is (enter an integer) _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 1

1 point

The following questions (a-f) should be answered based on Figure 1.

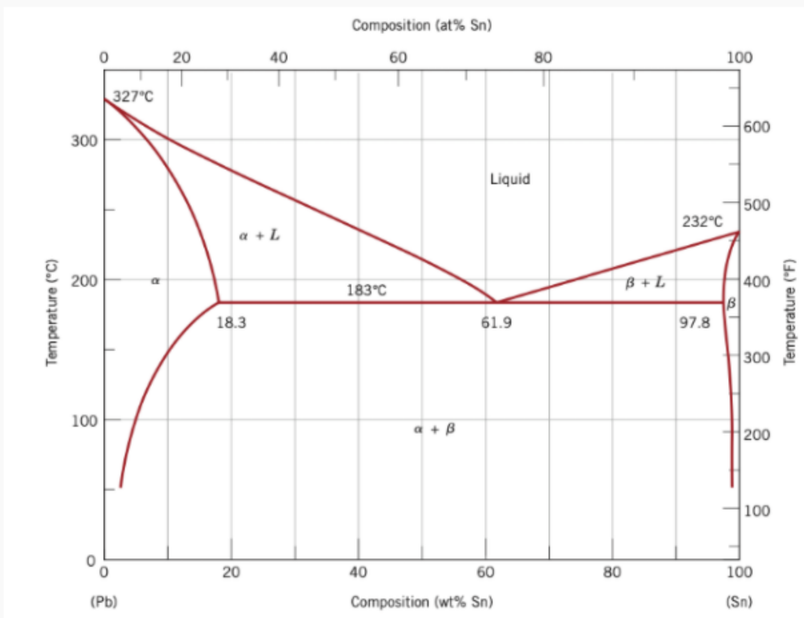

Figure 1: Phase diagram of Pb-Sn

6) A lead-tin alloy of composition 30 wt% Sn–70 wt% Pb is slowly heated from a temperature of 150° C. The composition of the last solid remaining prior to complete melting in weight percentage of Sn (if the answer is 5.5%, enter 5.5 as your answer) computed from the Pb-Sn phase diagram shown in Figure 1 is _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 12,15

2 points

7) A lead-tin alloy of composition 30 wt% Sn–70 wt% Pb is slowly heated from a temperature of 150 ◦ C. The temperature (in degree Celsius) at which there is approximately 33.33% weight fraction of liquid solution present is _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 190,210

2 points

8) The microstructure of a Pb-Sn alloy with 40 wt% Pb when cooled from 300° C to room temperature will have *1 point*

- Eutectic mixture of α and β
- A large fraction of proeutectic α and small fraction of eutectic mixture of α and β.
- A small fraction of proeutectic α and a large fraction of eutectic mixture of α and β.
- Equal fractions of proeutectic α and eutectic mixture of α and β.

No, the answer is incorrect.
Score: 0
Accepted Answers:
A small fraction of proeutectic α and a large fraction of eutectic mixture of α and β.

9) The maximum solubility of Pb in Sn (in wt%) is _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 2.2

1 point

10) The eutectic composition of Pb-Sn alloy in wt% of Pb is _____

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) 38.1

1 point

11) A Pb-Sn alloy with an alloy composition of 80 wt% of Sn at a temperature of 100°C is _____ *1 point*

- an eutectic alloy
- a hypereutectic alloy
- a hypoeutectic alloy
- a single phase α solid solution

No, the answer is incorrect.
Score: 0
Accepted Answers:
a hypereutectic alloy