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NPTEL

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Courses » Phase Diagrams in Materials Science and Engineering

Announcements Course Ask a Question Progress Mentor

Unit 3 - Week 2

Course outline

How to access the portal

Week 1

Week 2

- Lecture 06: Single Component Phase Diagram
- Lecture 07 : Binary Phase Diagram - Isomorphous Diagram
- Lecture 08 : Binary Isomorphous System
- Lecture 09 : Solidification of Isomorphous Alloys
- Quiz : Week 2 Assignment 2

Week 3

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Week 11

Week 12

Week 2 Assignment 2

The due date for submitting this assignment has passed. **Due on 2016-02-09, 23:55 IST.**

Submitted assignment

1) The equation

1 point

$$\frac{dp}{dT} = \frac{\Delta_{fus}H}{T\Delta_{fus}V}$$

describes which of the following?

- The change in pressure with respect to temperature as a solid is converted into liquid
- The change in pressure with respect to temperature as a liquid is converted into solid
- The change in pressure with respect to temperature as a liquid and solid stay at equilibrium
- The change in pressure with respect to temperature as a solid is heated

No, the answer is incorrect.

Score: 0

Accepted Answers:

The change in pressure with respect to temperature as a liquid and solid stay at equilibrium

2) Based on fundamental equation for a change in internal energy for a closed system of constant composition, $dU = TdS - pdV$, which of the following represents a valid Maxwell relations? 1 point

$$\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial p}{\partial S}\right)_V$$

$$\left(\frac{\partial S}{\partial V}\right)_T = -\left(\frac{\partial V}{\partial S}\right)_p$$

$$\left(\frac{\partial T}{\partial p}\right)_V = -\left(\frac{\partial S}{\partial V}\right)_T$$

$$\left(\frac{\partial U}{\partial T}\right)_V = -\left(\frac{\partial V}{\partial S}\right)_p$$

No, the answer is incorrect.

Score: 0

Accepted Answers:

Week 13

Assignment
Solutions

$$\left(\frac{\partial T}{\partial V}\right)_S = -\left(\frac{\partial p}{\partial S}\right)_V$$

3) Identify the incorrect thermodynamic relation?

1 point

- H = U + pV
- G = H-ST
- U = q + w
- dS = dq/T

No, the answer is incorrect.

Score: 0

Accepted Answers:

U = q + w

4) What are the assumptions made by the clausius-clapeyron equation in 1850?

1 point

- molar volume of liquid is negligible compared to that of the gas
- the vapor is an ideal gas the liquid is also in equilibrium with the solid
- above both
- none

No, the answer is incorrect.

Score: 0

Accepted Answers:

above both

5) The clapeyron equation can be used to..

1 point

- drive the Maxwell equations
- compute the entropy change in a chemical reaction
- determine the enthalpy change associated with phase transitions
- compute the relation between specific heat Cp, Cv

No, the answer is incorrect.

Score: 0

Accepted Answers:

determine the enthalpy change associated with phase transitions

6) The standard enthalpy of vaporization of water, H₂O, Δ_{vap}H = 40.7 kJ mol⁻¹ at 373 K.

1 point

Assuming this value to remain constant at temperatures close to 373 K, use the Clausius-Clapeyron equation to estimate the vapour pressure of liquid water at 80°C.

- 95.8 kPa
- 48.2 kPa
- 100 kPa
- 4.82 kPa

No, the answer is incorrect.

Score: 0

Accepted Answers:

48.2 kPa

7) What is the composition, in atom percent, of an alloy that contains 33 g copper and 47 g zinc?

1 point

- 51 and 49
- 33 and 47
- 47 and 33
- 41.9 and 58.1

No, the answer is incorrect.

Score: 0

Accepted Answers:

41.9 and 58.1

8) What is the composition, in weight percent, of an alloy that consists of 5 at% Cu and 95 at% Pt? **1 point**

- 5% and 95 %
 95 % and 5 %
 1.68 % and 98.32 %
 2 % and 98 %

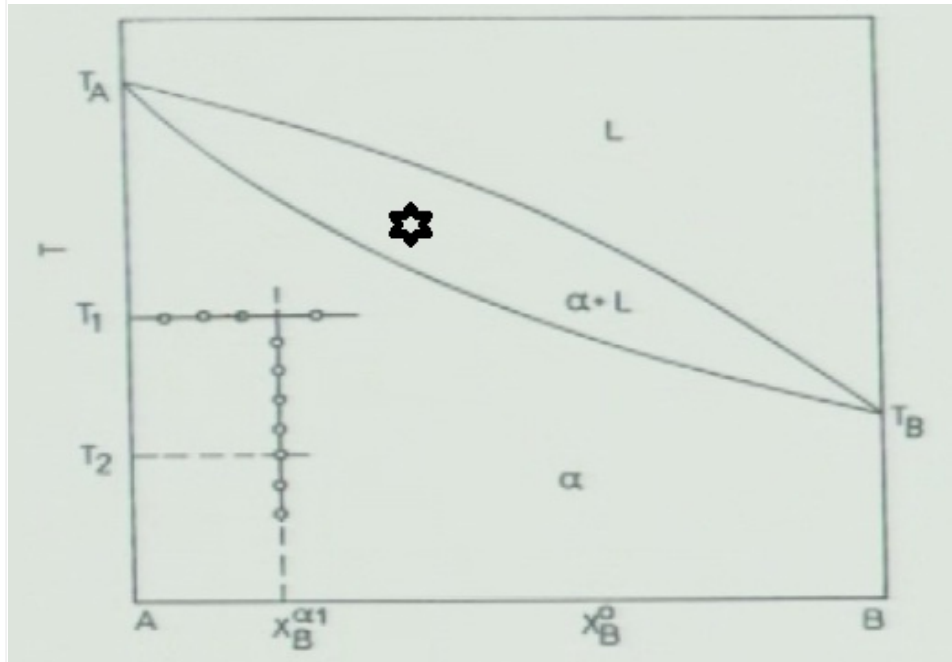
No, the answer is incorrect.

Score: 0

Accepted Answers:

1.68 % and 98.32 %

9) See the isomorphous diagram freedom at starred position in the following image **1 point**



- 1
 2
 0
 3

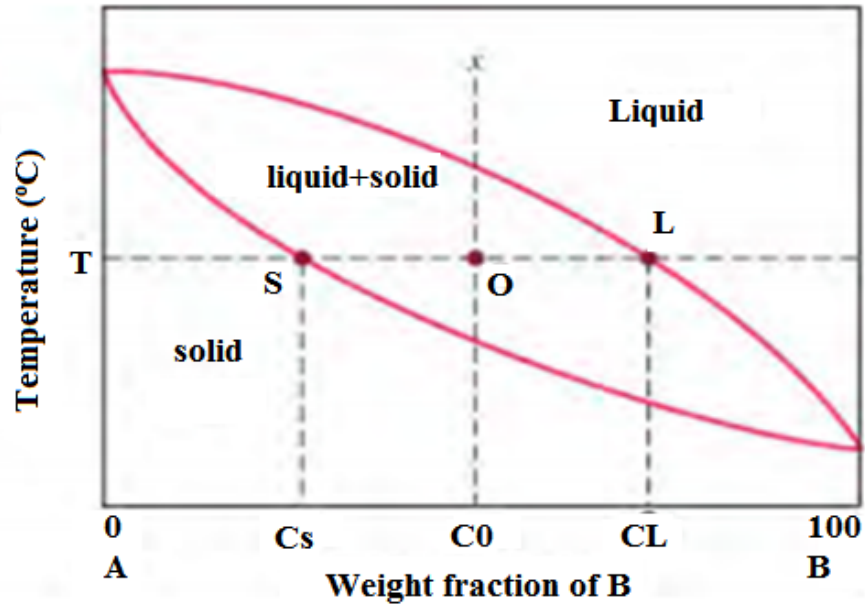
No, the answer is incorrect.

Score: 0

Accepted Answers:

1

10) As shown in the binary phase diagram, an alloy with composition $C_0 = 48\%$ is cooled down from liquid to form solid. At the temperature T , $C_S = 26\%$, $C_L = 72\%$, the fraction of solid phase is **1 point**



- 48
 52
 67
 13

No, the answer is incorrect.

Score: 0

Accepted Answers:

52

11) Select the composite from following-

1 point

- Nylon
 Wood
 Steel
 Mica

No, the answer is incorrect.

Score: 0

Accepted Answers:

Wood

12) Steel is strong because of Carbon ----

1 point

- resist motion of dislocation
 makes covalent bond
 substitute Fe
 none

No, the answer is incorrect.

Score: 0

Accepted Answers:

resist motion of dislocation

13) Carbon steel is the _____ alloy of Fe and C

1 point

- Substitutional
 Interstitial
 above both
 none

No, the answer is incorrect.

Score: 0

Accepted Answers:*Interstitial*

14) Mild steel belong to the following category.

1 point

- Low carbon steel
- Medium carbon steel
- High carbon steel
- alloy steel

No, the answer is incorrect.**Score: 0****Accepted Answers:***Low carbon steel*

15) Gibbs energy change of mixing for an ideal solution is ?

1 point

- Greater than zero
- 0
- less than zero
- 0 or greater than 0

No, the answer is incorrect.**Score: 0****Accepted Answers:***less than zero*

16) The temperature of mixture of ice and liquid water decrease by adding salt to the mixture because....

1 point

- it stabilize the water phase
- it destabilize the water phase
- it stabilize the ice phase
- it destabilize the ice phase

No, the answer is incorrect.**Score: 0****Accepted Answers:***it stabilize the water phase*

17) At constant pressure, when NaOH dissolves in water, beaker becomes warm to touch. The enthalpy change for dissolving NaOH in water is ?

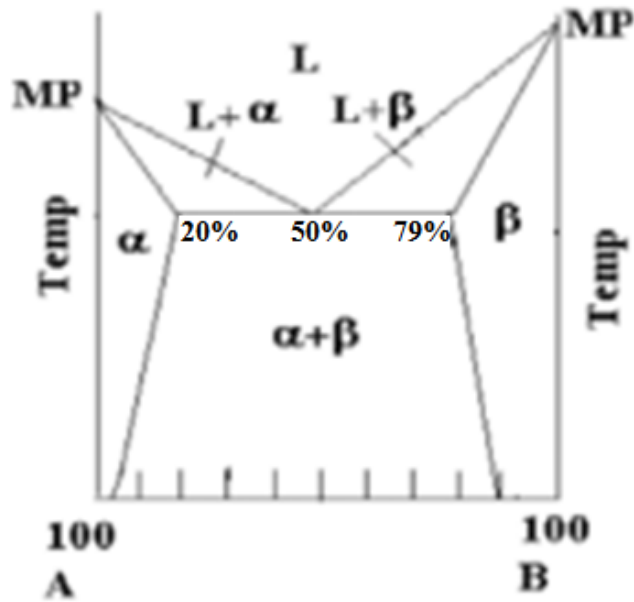
1 point

- positive
- 0
- negative
- impossible to tell

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

18) In the Phase diagram below, eutectic point is ?

1 point



- 20%
- 50%
- 79%
- all

No, the answer is incorrect.

Score: 0

Accepted Answers:

50%

19) A phase is defined as a matter with

1 point

- distinct composition
- distinct structure
- distinct structure and composition
- all of above

No, the answer is incorrect.

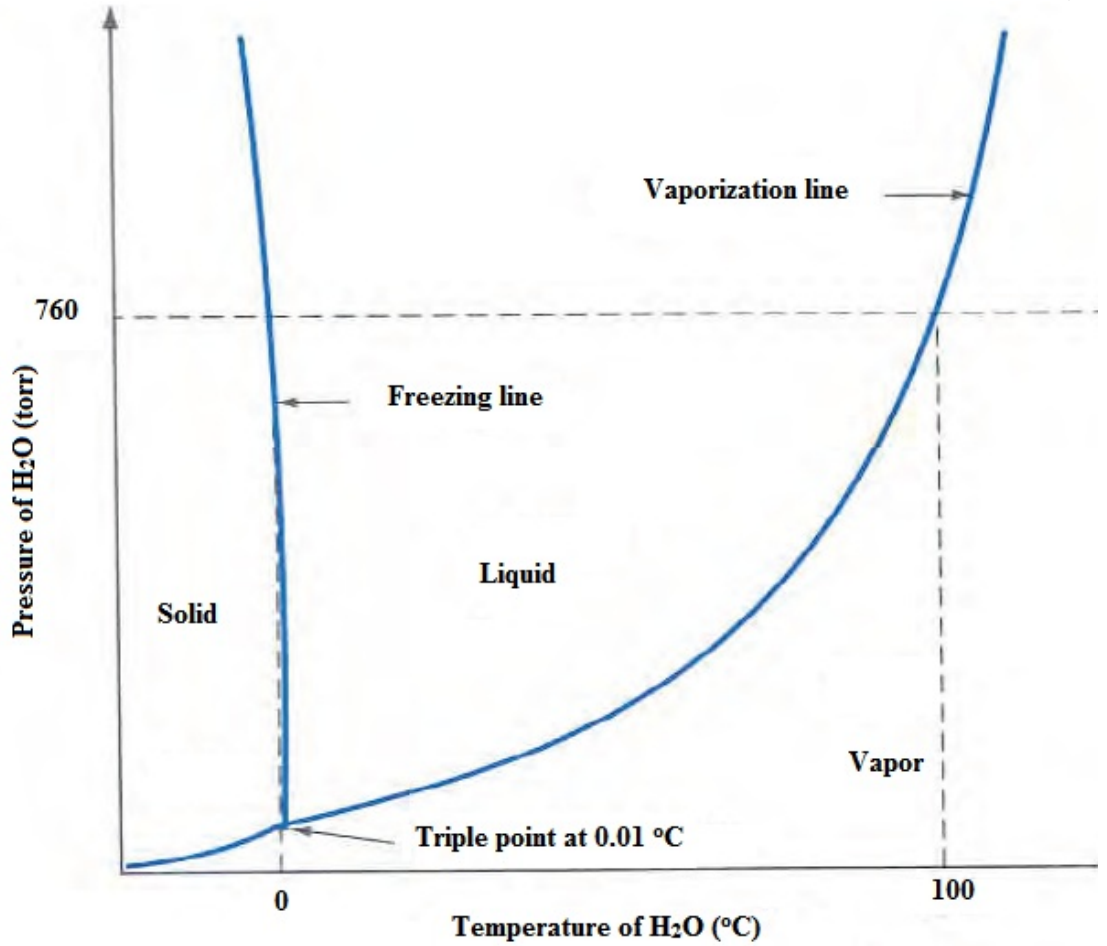
Score: 0

Accepted Answers:

distinct structure

See the phase diagram of water. On the liquid/solid boundary line, the freedom is

1 point



- 1
- 2
- 3
- 0

No, the answer is incorrect.

Score: 0

Accepted Answers:

1

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