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NPTEL

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Courses » Phase field modelling: the materials science, mathematics and computational aspects

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Unit 2 - Week-1

Course outline

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Assignment 1

The due date for submitting this assignment has passed.

As per our records you have not submitted this **Due on 2018-08-15, 23:59 IST.**
assignment.

1) Consider a binary alloy system A-B where 20 g of A and 30 g of B are mixed to form an ideal solid solution. The atomic weight of element A is 63.546 g/mol and element B is 26.98 g/mol. Calculate the mole fraction of A and B : **1 point**

- 0.220 and 0.779.
- 0.112 and 0.888.
- 0.212 and 0.788.
- 0.434 and 0.566

No, the answer is incorrect.

Score: 0

Accepted Answers:

0.220 and 0.779.

2) For the same A-B alloy(ideal solid solution) calculate the configurational entropy at 500°C : **1 point**

- 6.256 J/K
- 3.342 J/K
- 3.342 J/K
- 6.256 J/K

No, the answer is incorrect.

Score: 0

Accepted Answers:

6.256 J/K

3) For the same A-B alloy (ideal solid solution) calculate the free energy of mixing per **1 point**

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-3.166 kJ/mol

No, the answer is incorrect.

Score: 0

Accepted Answers:

-3.39 kJ/mol

4) For the same A-B alloy (ideal solid solution) calculate the chemical potential of A and B at 500⁰ C (assume free energies of pure A and B zero) :

0 points

-9.73 kJ/mol and -2.07 kJ/mol.

-14.52 kJ/mol and -3.12 kJ/mol.

9.73 kJ/mol and 2.07 kJ/mol.

14.52 kJ/mol and 3.12 kJ/mol.

No, the answer is incorrect.

Score: 0

Accepted Answers:

-9.73 kJ/mol and -2.07 kJ/mol.

5) Consider a system consisting of A and B atoms. Let the total number of atoms be equal to 100. Consider two cases when a. $N_A = 60$, $N_B = 40$ and b. $N_A = 40$, $N_B = 60$. Would the configurational entropy be different in the two cases?

1 point

Yes

No

Can't say

No, the answer is incorrect.

Score: 0

Accepted Answers:

No

6) Phase separating systems are those in which interaction parameter (Ω) is:

1 point

$\Omega < 0$

$\Omega > 0$

$\Omega = 0$

equal to number of phases

No, the answer is incorrect.

Score: 0

Accepted Answers:

$\Omega > 0$

7) Phase separation can't be expected when a change in enthalpy of mixing is _____ (positive or negative)

No, the answer is incorrect.

Score: 0

Accepted Answers:

(Type: String) negative

1 point

8) A tangent is drawn to the G versus X curve of a binary alloy system at some composition X_0 . The points of intersection of this tangent with the G-axis (at compositions $X=0$ and $X=1$) gives:

1 point

- Free energy of mixing of the components at that composition.
- Enthalpy of Mixing of the components at that composition.
- Chemical Potential of the components of that composition.
- Enthalpy of formation of the components at that composition.

No, the answer is incorrect.

Score: 0

Accepted Answers:

Chemical Potential of the components of that composition.

9) Which of the following expressions give the enthalpy of a pure, single phase material?

1 point

- $\int C_p dT$
- $\int \frac{C_p}{T} dT$
- $\frac{dC_p}{dT}$
- $C_p \ln(C_p) - 1$

No, the answer is incorrect.

Score: 0

Accepted Answers:

$\int C_p dT$

10) Interaction parameter $\Omega > 0$, means that:

1 point

- A-A, B-B bonds are preferred over A-B bonds.
- A-B bonds are preferred over A-A, B-B bonds.
- There is no preference.

No, the answer is incorrect.

Score: 0

Accepted Answers:

A-A, B-B bonds are preferred over A-B bonds.

11) In Sterling's approximation, the error at $N = 50$ is nearly:

1 point

- 0.2%
- 2%
- 10%
- 50%

No, the answer is incorrect.

Score: 0

Accepted Answers:

2%

12) Fe - Fe₃C phase diagram is a/an :

1 point

- equilibrium phase diagram.
- metastable phase diagram.
- Unstable phase diagram.
- None of the above.

No, the answer is incorrect.

Score: 0

Accepted Answers:

metastable phase diagram.

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