Assignment 8

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

Due on 2019-03-27, 23:59 IST.

1) If the activation energy for diffusion is 80 kJ/mol, at what temperature will the depth of diffusion be 5 times that at 25°C for the same diffusion time?

- 58°C
- 331°C
- 68°C
- 302°C

No, the answer is incorrect.
Score: 0
Accepted Answers:
58°C

2) Which of the following plain carbon steels does not have any proeutectoid microconstituent in its microstructure at room temperature?

- hypoeutectoid steel
- hypereutectoid steel
- eutectoid steel
- eutectic steel

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

3) “In a plain carbon steel in equilibrium at room temperature, the proeutectoid ferrite has the same chemical composition as the ferrite lamellae that constitute pearlite.” True/False?
4) Find the diffusivity (in m²s⁻¹) of a material with \( D_0 = 2.5 \times 10^{-3} \text{ m}^2\text{s}^{-1} \) and activation energy. \( Q = 24.942 \text{ kJ/mol at 78}^\circ\text{C}. \) (Take gas constant \( R = 8.314 \text{ J K}^{-1}\text{mol}^{-1} \))

- \( 8.42 \times 10^{-6} \)
- \( 2.43 \times 10^{-7} \)
- \( 4.85 \times 10^{-7} \)
- \( 3.48 \times 10^{-7} \)

No, the answer is incorrect.

Score: 0

Accepted Answers:
- \( 4.85 \times 10^{-7} \)

5) Determine the composition (in wt.% C) of proeutectoid ferrite in a steel with 0.5 wt.% carbon at the eutectoid temperature.

- 0.8
- 0.5
- 0.02
- 0.1

No, the answer is incorrect.

Score: 0

Accepted Answers:
- 0.02

6) Find the composition of steel in which the amount of proeutectoid ferrite is half the amount of total ferrite. Use eutectoid composition=0.8 wt% C for calculations.

- 0.25
- 0.43
- 0.67
- 0.8

No, the answer is incorrect.

Score: 0

Accepted Answers:
- 0.43

7) In plain carbon steel samples P (wt.% C= 0.9) and Q (wt.% C= 1.1). At any given temperature below the eutectoid temperature, the amount of total cementite is greater in sample ___ and the amount of proeutectoid cementite is greater in sample ___.

- P, Q
- Q, P
- P, P
- Q, Q

No, the answer is incorrect.

Score: 0

Accepted Answers:
- Q, Q

8) At 912°C, what is the time required to carburize a steel with an initial composition of 0.29 wt% C to a carbon concentration of 1.11 wt% C at a depth of 0.1 mm? A carburizing atmosphere provides a constant surface concentration of 2% C. The diffusivity of C in gamma Fe is given by 

\[
D = D_0 \exp\left(\frac{-Q}{RT}\right)
\]
Fracture
Interactive Session

with \( D_0 = 7 \times 10^{-9} \text{ m}^2 \text{ s}^{-1} \) and \( Q = 150 \text{ kJ mol}^{-1} \). The Error function table is given below:

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<thead>
<tr>
<th>( z )</th>
<th>0.25</th>
<th>0.3</th>
<th>0.35</th>
<th>0.4</th>
<th>0.45</th>
<th>0.5</th>
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<tbody>
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<td>0.329</td>
<td>0.379</td>
<td>0.428</td>
<td>0.475</td>
<td>0.520</td>
</tr>
</tbody>
</table>

10 A plain carbon steel has 1.6 wt.% carbon. Find the percentage of vacant octahedral sites in austenite in equilibrium at 1150°C.  

- 90.6
- 8.7
- 9.4
- 91.3

No, the answer is incorrect.
Score: 0
Accepted Answers:
91.3