Code No: R05211802 **R05** **Set No. 2**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

THERMODYNAMICS AND KINETICS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Derive an expression for Boyle temperature in terms of Vander wall's constants.
   (b) Explain the term 'Internal Energy' of a system.
   (c) Calculate the increase in internal energy of a gaseous system at a constant pressure of one atmosphere when 10 calories of heat (or energy) are added and the volume of the system increases by 100^0 C. [6+4+6]

2. (a) Explain the following
      i. Phase equilibrium
      ii. Chemical equilibrium
      iii. Thermal equilibrium
   (b) Define and explain the standard free energy change, ΔG^O for a reaction, and the Standard free energy of formation ΔG_f^O ,of a substance.

3. (a) From the classiusclapeyron equation, derive the following.
   Expression for the vapor pressure of liquid metal
   Log P=A/T+B where A and B are constants.
   (b) The vapor pressure P of liquid A is given by Log P (mm) = -2450/T +6.69 abd that of a solid A by log P(mm)=6947+10.8. Calculate the temperature at which liquid and solid will have the same vapor pressure. [16]

4. Explain the application of a thermodynamic equation of state to the equation of state to the elastic compression or Expansion of a solid. [16]

5. Define the following :
   (a) Extensive property
   (b) Charle's law
   (c) State property
   (d) Critical temperature. [16]

6. (a) Draw a potential energy diagram for an uncatalyzed reaction. Compare it with a potential energy diagram for a catalyzed reaction. In each case indicate ΔH for the activated complex.
   (b) Discuss the various methods available for determining the order of reaction. [16]

7. Explain the following [16]

   (a) Tabular method of regarding thermodynamic data.

   (b) Application of third law of thermodynamics.

   (c) Various methods to obtain ΔS^O for reaction

8. (a) In the graphical integration of binary Gibb's-Duhem equation why is it preferable to use the activity coefficients instead of the activities of the component.

   (b) Explain what you mean by sigma function.

   (c) Explain the terms, Activated complex and activation energy. [16]

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Code No: R05211802 **R05** **Set No. 4**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

THERMODYNAMICS AND KINETICS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Draw a potential energy diagram for an uncatalyzed reaction. Compare it with a potential energy diagram for a catalyzed reaction. In each case indicate ΔH for the activated complex.
   (b) Discuss the various methods available for determining the order of reaction. [16]

2. Explain the application of a thermodynamic equation of state to the equation of state to the elastic compression or Expansion of a solid. [16]

3. (a) From the classiusclapeyron equation, derive the following.
   Expression for the vapor pressure of liquid metal
   Log P=A/T+B where A and B are constants.
   (b) The vapor pressure P of liquid A is given by Log P (mm) = -2450/T +6.69 abd that of a solid A by log P(mm)=6947+10.8. Calculate the temperature at which liquid and solid will have the same vapor pressure. [16]

4. Explain the following [16]
   (a) Tabular method of regarding thermodynamic data.
   (b) Application of third law of thermodynamics.
   (c) Various methods to obtain ΔS^O for reaction

5. (a) In the graphical integration of binary Gibb's-Duhem equation why is it preferable to use the activity coefficients instead of the activities of the component.
   (b) Explain what you mean by sigma function.
   (c) Explain the terms, Activated complex and activation energy. [16]

6. (a) Derive an expression for Boyle temperature in terms of Vander wall's constants.
   (b) Explain the term 'Internal Energy' of a system.
   (c) Calculate the increase in internal energy of a gaseous system at a constant pressure of one atmosphere when 10 calories of heat (or energy) are added and the volume of the system increases by 100^0 C. [6+4+6]

7. (a) Explain the following
      i. Phase equilibrium
      ii. Chemical equilibrium

iii. Thermal equilibrium

(b) Define and explain the standard free energy change, ΔG^O for a reaction, and the Standard free energy of formation ΔG_f^O ,of a substance.

8. Define the following :

(a) Extensive property

(b) Charle's law

(c) State property

(d) Critical temperature. [16]

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Code No: R05211802 **R05** **Set No. 1**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

THERMODYNAMICS AND KINETICS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Derive an expression for Boyle temperature in terms of Vander wall's constants.
   (b) Explain the term 'Internal Energy' of a system.
   (c) Calculate the increase in internal energy of a gaseous system at a constant pressure of one atmosphere when 10 calories of heat (or energy) are added and the volume of the system increases by 100^0 C. [6+4+6]

2. Explain the following [16]
   (a) Tabular method of regarding thermodynamic data.
   (b) Application of third law of thermodynamics.
   (c) Various methods to obtain ΔS^O for reaction

3. (a) From the classiusclapeyron equation, derive the following.
   Expression for the vapor pressure of liquid metal
   Log P=A/T+B where A and B are constants.
   (b) The vapor pressure P of liquid A is given by Log P (mm) = -2450/T +6.69 abd that of a solid A by log P(mm)=6947+10.8. Calculate the temperature at which liquid and solid will have the same vapor pressure. [16]

4. Define the following :
   (a) Extensive property
   (b) Charle's law
   (c) State property
   (d) Critical temperature. [16]

5. Explain the application of a thermodynamic equation of state to the equation of state to the elastic compression or Expansion of a solid. [16]

6. (a) Draw a potential energy diagram for an uncatalyzed reaction. Compare it with a potential energy diagram for a catalyzed reaction. In each case indicate ΔH for the activated complex.
   (b) Discuss the various methods available for determining the order of reaction. [16]

7. (a) Explain the following

i. Phase equilibrium
ii. Chemical equilibrium
iii. Thermal equilibrium

(b) Define and explain the standard free energy change, ΔG^O for a reaction, and the Standard free energy of formation ΔG_f^O ,of a substance.

8. (a) In the graphical integration of binary Gibb's-Duhem equation why is it preferable to use the activity coefficients instead of the activities of the component.

(b) Explain what you mean by sigma function.

(c) Explain the terms, Activated complex and activation energy. [16]

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Code No: R05211802 **R05** **Set No. 3**

II B.TECH – I SEM EXAMINATIONS, NOVEMBER - 2010

THERMODYNAMICS AND KINETICS
Metallurgy And Material Technology

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Draw a potential energy diagram for an uncatalyzed reaction. Compare it with a potential energy diagram for a catalyzed reaction. In each case indicate ΔH for the activated complex.
   (b) Discuss the various methods available for determining the order of reaction. [16]

2. Define the following :
   (a) Extensive property
   (b) Charle's law
   (c) State property
   (d) Critical temperature. [16]

3. (a) From the classiusclapeyron equation, derive the following.
   Expression for the vapor pressure of liquid metal
   Log P=A/T+B where A and B are constants.
   (b) The vapor pressure P of liquid A is given by Log P (mm) = -2450/T +6.69 abd that of a solid A by log P(mm)=6947+10.8. Calculate the temperature at which liquid and solid will have the same vapor pressure. [16]

4. Explain the following [16]
   (a) Tabular method of regarding thermodynamic data.
   (b) Application of third law of thermodynamics.
   (c) Various methods to obtain ΔS^O for reaction

5. Explain the application of a thermodynamic equation of state to the equation of state to the elastic compression or Expansion of a solid. [16]

6. (a) Explain the following
      i. Phase equilibrium
      ii. Chemical equilibrium
      iii. Thermal equilibrium
   (b) Define and explain the standard free energy change, ΔG^O for a reaction, and the Standard free energy of formation ΔG_f^O ,of a substance.

7. (a) Derive an expression for Boyle temperature in terms of Vander wall's constants.
   (b) Explain the term 'Internal Energy' of a system.
   (c) Calculate the increase in internal energy of a gaseous system at a constant pressure of one atmosphere when 10 calories of heat (or energy) are added and the volume of the system increases by 100^0 C. [6+4+6]

8. (a) In the graphical integration of binary Gibb's-Duhem equation why is it preferable to use the activity coefficients instead of the activities of the component.
   (b) Explain what you mean by sigma function.
   (c) Explain the terms, Activated complex and activation energy. [16]

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