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Unit 5 - Week 4 : Chemical Equilubrium and Kinetics

Week 4 Assessment 4

The due date for submitting this assignment has passed. **Due on 2018-03-07, 11:59 IST.**

Submitted assignment

1.[1)] When the system $A + B \Leftrightarrow C + D$ is at equilibrium, ***1 point***

- The sum of the concentrations of A and B must equal the sum of the concentrations of C and D.
- Both the forward and the reverse reactions have stopped.
- Either the forward reaction has stopped or the reverse reaction h
- Neither the forward nor the reverse reaction has stopped.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Neither the forward nor the reverse reaction has stopped.

2) For the reaction, ***3 points***

$2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3(g)$ ΔH^0 = -197.8 kJ/mol and ΔS^0 = -187.9 J/mol

Assume that ΔH^0 and ΔS^0 are independent of temperature, calculate the equilibrium constant for this reaction at 262 K

- 4.2×10^{25}
- 4.2×10^{29}
- 4.2×10^{34}
- 4.2×10^{39}

No, the answer is incorrect.
Score: 0

Accepted Answers:
4.2×10^{29}

3) Determine the mole fraction of H_2, O_2, H_2O at the equilibrium at 3000 K and 5 atm for the chemical reaction $H_2 + 0.5O_2 \rightarrow H_2O$ when the ratio of the number of hydrogen to elemental oxygen is unity. Consider g^o_f = 77326 kJ/kmol ***5 points***

- 0.02,0.34,0.64
- 0.09,0.64,0.27
- 0.19,0.17,0.64
- 0.04,0.68,0.28

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.02,0.34,0.64

4) For the reaction, ***3 points***

$$CO_2 \Leftrightarrow CO + 0.5O_2$$

at 5 atm and 1200 K, the mole fractions at an instant is given to be 0.67,0.21 and 0.12 for CO_2, CO and O_2 respectively. Evaluate K_p

- 0.243
- 0.143
- 0.147
- 0.297

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.243

5) For the reaction ***1 point***

$$CO_2 \Leftrightarrow CO + 0.5O_2$$

at 5 atm and 1200 K, the mole fractions at an instant is given to be 0.67,0.21 and 0.12 for CO_2, CO and O_2 respectively. Evaluate K_c

- 0.00443
- 0.00314
- 0.00243
- 0.00175

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.00243

6) Consider the equilibrium reaction $H_2 \Leftrightarrow 2H$ in a reactor vessel. Calculate the mole fractions of H_2 and H for T= 3000 K, P =1 atm using following data: ***2 points***

$$g^0_{f,H}(2300K) = 46007\,\text{kJ/kmol}\quad g^0_{f,H}(3000K) = 88664\,\text{kJ/kmol}.$$

- 0.91,0.09
- 0.71,0.29
- 0.65,0.35
- 0.83,0.17

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.83,0.17

7) Consider the equilibrium reaction $H_2 \Leftrightarrow 2H$ in a reactor vessel. Calculate the mole fractions of H_2 and H for T= 3000 K, P =5 atm using following data: ***1 point***

$$g^0_{f,H}(2300K) = 46007\,\text{kJ/kmol}\quad g^0_{f,H}(3000K) = 88664\,\text{kJ/kmol}.$$

- 0.65,0.35
- 0.71,0.29
- 0.93,0.07
- 0.83,0.17

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.93,0.07

8) Consider the equilibrium reaction $H_2 \Longleftrightarrow 2H$ in a reactor vessel. Calculate the mole fractions of H_2 and H for T= 2300 K, P =5 atm using following data: ***1 point***

$$g^0_{f,H}(2300K) = 46007\,\text{kJ/kmol}\quad g^0_{f,H}(3000K) = 88664\,\text{kJ/kmol}.$$

- 0.996,0.004
- 0.912,0.088
- 0.934,0.066
- 0.954,0.046

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.996,0.004

9) A flame exhaust has the composition (by volume) of 14% CO_2, 2% O_2, 12% H_2O, the rest is N_2. The flame temperature is 1900K operated at a pressure of 31 atm. Calculate the equilibrium mole fraction of H from the dissociation reaction ***3 points***

$$H_2O \Longleftrightarrow 2H + 0.5O_2$$

Assume that the effect on the mole fractions of the major species negligible.

$$g^0_{f,H}(1900K) = 112859\,\text{kJ/kmol}.\quad g^0_{f,H2O}(1900K) = -141435\,\text{kJ/kmol}.$$

- 0.069
- 0.075
- 0.047
- 0.084

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.069

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