Assignment 1

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

Due on 2020-09-30, 23:59 IST.

INSTRUCTIONS:

(A) The marks that each question carries is marked against the question. 
(B) There is only one correct answer for a question. 
(C) Take the E° values from appropriate sources, when not mentioned. 
(D) Take F = 96500 C mol⁻¹

1) Calculate the standard free energy change for the electrochemical equilibrium Cu²⁺ / Cu and Zn²⁺ / Zn. If their standard potentials respectively are +0.337 V and -0.763 V

• -60.6kJ mol⁻¹, +147.3kJ mol⁻¹
• -70.5kJ mol⁻¹, +100.3kJ mol⁻¹
• +60.6kJ mol⁻¹, -147.3kJ mol⁻¹
• +70.5kJ mol⁻¹, -100.3kJ mol⁻¹

No. the answer is incorrect
Score: 0
Accepted Answers:
-60.6kJ mol⁻¹, +147.3kJ mol⁻¹

2) What would be the equilibrium potentials of the following systems with respect to (i) SHE and (ii) SCE? (Standard potentials for Cu²⁺ / Cu and Zn²⁺ / Zn are +0.3419 V (SHE) and -0.7618 V (SHE) respectively)

a. Cu in 10⁻² mol l⁻¹ of Cu²⁺

• 0.3219 V (SHE) & 0.0532 V (SCE) for Cu²⁺ / Cu & -0.8229 V (SHE) & -1.2441 V (SCE) for Zn

• 0.4909 V (SHE) & 0.0222 V (SCE) for Cu²⁺ / Cu & -0.8799 V (SHE) & -0.8921 V (SCE) for Zn

• 0.2620 V (SHE) & 0.0416 V (SCE) for Cu²⁺ / Cu & -0.8205 V (SHE) & -1.2421 V (SCE) for Zn

• 0.5320 V (SHE) & 0.0342 V (SCE) for Cu²⁺ / Cu & -0.7409 V (SHE) & -1.1111 V (SCE) for Zn

No. the answer is incorrect
Score: 0
Accepted Answers:
0.2620 V (SHE) & 0.0416 V (SCE) for Cu²⁺ / Cu & -0.8205 V (SHE) & -1.2421 V (SCE) for Zn

3) What should be the equilibrium concentration of Fe³⁺ species for an iron rod dipped in HCl solution of pH 4 at 25 °C to stop its corrosion? (Given E° Fe³⁺ / Fe = -0.440 V)

• 7.535 x 10⁶ mol l⁻¹

• 7.932 x 10⁶ mol l⁻¹

• 6.254 x 10⁶ mol l⁻¹

• 7.367 x 10⁶ mol l⁻¹

No. the answer is incorrect
Score: 0
Accepted Answers:
7.367 x 10⁶ mol l⁻¹

4) If in 1 M sulfuric acid solution is immersed under two conditions: (a) 1 atm hydrogen and (b) 1 atm hydrogen. Which of the two will have a larger tendency to corrode? Assume the concentration of H⁺²⁺ ion to be 10⁻¹⁰ mol l⁻¹. (Standard potential for nickel is -0.2579 V (SHE))

• 1 atm
• 0.1 atm
• same tendency
• Hydrogen partial pressure has no effect.

No. the answer is incorrect
Score: 0
Accepted Answers:
0.1 atm

5) Zn in 1 N ZnSO₄ and Zn in 0.01 N ZnSO₄ are coupled. Which of these two Zn pieces will corrode? (Standard potential for Zn²⁺ is -0.7618 V (SHE))

• Zn in 1 N ZnSO₄

• Zn in 0.01 N ZnSO₄

No. the answer is incorrect
Score: 0
Accepted Answers:
Zn in 0.01 N ZnSO₄

6) Condition (a) Three metal namely, iron, copper and silver immersed in 0.5 M sulfuric acid solution having unit activity of Fe³⁺, Cu²⁺ and Ag⁺ and 1 atm atmosphere pressure of hydrogen. Condition (b) the above solution was added with formic acid at 0.6 M concentration and condition (c) air is continuously bubbled with partial pressure of oxygen in air is 0.33 atmosphere. Which of the following are true? (Standard potentials for iron, copper and silver are -0.440 V(SHE), -0.3419 V(SHE) and -0.7995 V(SHE) respectively)

(1) Condition 1 only Fe corrodes
(2) Condition 1 both Fe and Cu corrode
(3) Condition 2 both Cu and Ag corrode
(4) Condition 2 both Fe and Ag corrode
(5) Condition 2 both Fe and Cu corrode
(6) Condition 2 only Fe corrodes
(7) Condition 3 all the metals corrode
(8) Condition 3 only Fe and Cu corrode

• 1.2,4,6,7
• 1.2,5,8
• 1.3,5,7
• 1.5,7

No. the answer is incorrect
Score: 0
Accepted Answers:
1.5,7