Assignment 2

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 IP values from appropriate sources, when not mentioned.

1) Hg, Zn and Pt immersed in 0.1 N HCl have been subjected to a potential of -0.4 V (SHE). What current do these electrodes show if A = 1 cm² and B = 1 cm²?

A) 6.25 x 10⁻⁶ A cm⁻², 6.25 x 10⁻⁵ A cm⁻², 6.25 A cm⁻²
B) 6.93 x 10⁻⁶ A cm⁻², 6.93 x 10⁻⁶ A cm⁻², 6.93 x 10⁻⁶ A cm⁻²
C) 7.28 x 10⁻⁶ A cm⁻², 7.28 x 10⁻⁴ A cm⁻², 7.28 A cm⁻²
D) 6.10 x 10⁻⁴ A cm⁻², 6.10 x 10⁻⁴ A cm⁻², 6.10 A cm⁻²

No, the answer is incorrect.
Score: 0

Accepted Answer:
6.10 x 10⁻⁴ A cm⁻², 6.10 x 10⁻⁴ A cm⁻², 6.10 A cm⁻²

2) A zinc electrode of 5 cm² area has been immersed in zinc ions of 1 x 10⁻⁴ mol l⁻¹. If zinc has to (a) corrode and (b) deposit on its surface with a current of 10⁻⁴ A cm⁻², what does the required applied potential in each of the two cases? Given: E° of /Zn⁺ /Zn = -0.76 V, E° of /H₂ /H⁺ = 0.0 V, and /pH = 6.10, and pAg = 0.0, 125 mV decade⁻¹ and 50 mV decade⁻¹

A) -0.552 V, -1.2345 V
B) -0.5512 V, -1.4012 V
C) -0.5512 V, -1.6453 V
D) -0.3367 V, -1.2397 V

No, the answer is incorrect.
Score: 0

Accepted Answer:
-0.5512 V, -1.4512 V

3) Distinguish between the total and partial contribution of the oxygen reduction reaction to the cathodic reaction at 2 x 10⁻⁴ cm², 25°C. The solubility of O₂ in water is 6 ppm; the diffusion layer thickness in solution 30 µm. For O₂ reduction reaction is 50 µm² s⁻¹, what will be the limiting current density for the cathodic reaction?

A) 30.19 µA cm⁻²
B) 32.33 µA cm⁻²
C) 25.62 µA cm⁻²
D) 28.56 µA cm⁻²

No, the answer is incorrect.
Score: 0

Accepted Answer:
28.56 µA cm⁻²

4) A metal with standard potential of -0.7 V (SHE) immersed in 1 N acid solution undergoes corrosion. If the cathodic reaction is assumed to be completely non-dissociative, what would be the corrosion potential of this in this solution? (Assume pH = 1 atm and the concentration of metal ions to be 3 x 10⁻⁴ M)

A) 0.25 V (SHE)
B) 0.50 V (SHE)
C) 0.00 V (SHE)
D) 0.30 V (SHE)

No, the answer is incorrect.
Score: 0

Accepted Answer:
0.00 V (SHE)

5) Determine E°corr and E°O₂ for iron in 1 N H₂SO₄ solution. Given: Exchange current densities for hydrogen evolution on iron and for the equilibrium PCl₅ → PCl₃ + Cl₂, Ar = 1.0 atm, and Cl₂, Ar = 0.0 atm respectively. The corrosion potential is 0.4470 V (SHE).

A) -0.12 V (SHE), 1.40 A m⁻²
B) -0.12 V (SHE), 0.123 A m⁻²
C) -0.24 V (SHE), 1.40 A m⁻²
D) -0.24 V (SHE), 5.564 A m⁻²

No, the answer is incorrect.
Score: 0

Accepted Answer:
-0.12 V (SHE), 1.40 A m⁻²

6) The corrosion rate of a metal increases by 200 times. What is the change in corrosion potential at a given pH? Assume 2a = 50 mV decade⁻¹.

A) 6.562 V
B) 0.234 V
C) 0.130 V
D) 0.436 V

No, the answer is incorrect.
Score: 0

Accepted Answer:
0.130 V