Unit 6 - Week 4

Course outline

How to access the portal?

Week 0

Week 1

Week 2

Week 3

Week 4

- Theory of Sacrificial Anode for the Protection of Steel Objects
- Effect of two Active Metals on Fe-corrosion when they are Galvanically Coupled
- Corrosion of Metals when Cathodic Protection is Concentration Controlled
- Effect of Velocity on the Corrosion Rate of an Active Metal
- Concentration Polarization and Activation Polarization: Numerical Analysis
- **Quiz : Assignment 4**
- Assignment 4 - Solution
- Feedback for Week-4

Week 5

Week 6

Week 7

Week 8

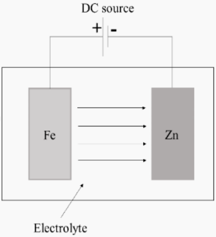
Live Session

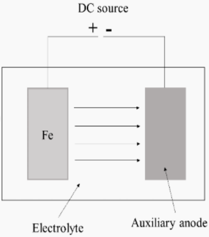
Assignment 4

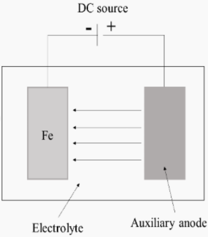
The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

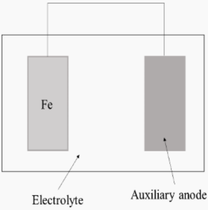
Due on 2019-09-25, 23:59 IST.

1) Which of the following correctly illustrates the schematic for impressed current cathodic protection? *1 point*

○ 
DC source
+
-
Fe
Zn
Electrolyte

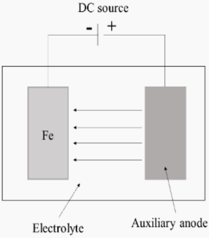
○ 
DC source
+
-
Fe
Electrolyte
Auxiliary anode

○ 
DC source
-
+
Fe
Electrolyte
Auxiliary anode

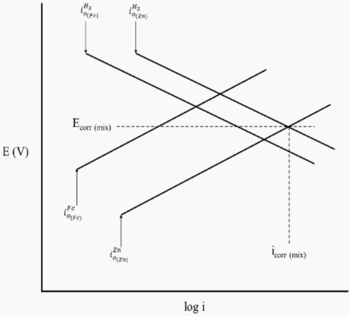
○ 
Fe
Electrolyte
Auxiliary anode

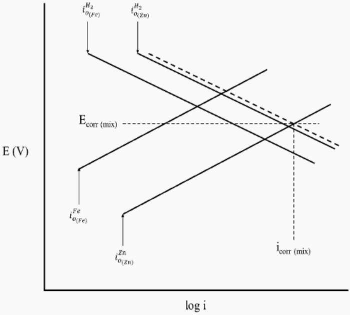
No, the answer is incorrect.
Score: 0

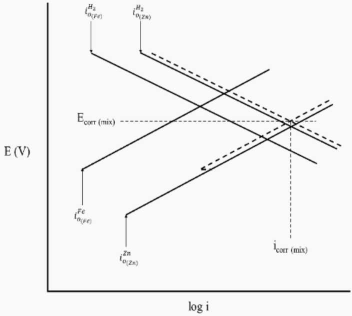
Accepted Answers:

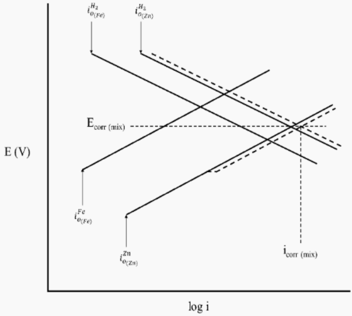

DC source
-
+
Fe
Electrolyte
Auxiliary anode

2) Consider that iron is cathodically protected with the help of zinc sacrificial anode. Which of the following schematics correctly illustrates the E vs log i plot? *1 point*

○ 

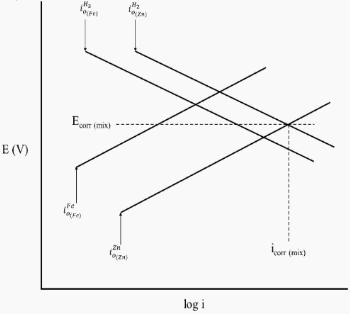
○ 

○ 
$i_{o(Fe)}^{H_2}$
$i_{o(Zn)}^{H_2}$
$E_{corr\ (mix)}$
E (V)
$i_{o(Fe)}^{Fe}$
$i_{o(Zn)}^{Zn}$
$i_{corr\ (mix)}$
log i

○ 
$i_{o(Fe)}^{H_2}$
$i_{o(Zn)}^{H_2}$
$E_{corr\ (mix)}$
E (V)
$i_{o(Fe)}^{Fe}$
$i_{o(Zn)}^{Zn}$
$i_{corr\ (mix)}$
log i

No, the answer is incorrect.
Score: 0

Accepted Answers:


$i_{o(Fe)}^{H_2}$
$i_{o(Zn)}^{H_2}$
$E_{corr\ (mix)}$
E (V)
$i_{o(Fe)}^{Fe}$
$i_{o(Zn)}^{Zn}$
$i_{corr\ (mix)}$
log i

3) The concentration over-potential of – 0.050 V is applied to deposit gold from an electrolyte at 298 K with limiting current density of 400 A/cm^2. The value of current density (A/cm^2) at which gold is deposited is: (Given: n = 2 and F = 96500 C) ***1 point***

○ (110 to 119)
○ (389 to 396)
○ (196 to 203)
○ (53 to 60)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(389 to 396)

4) Consider that the corrosion of copper is diffusion controlled in an acidic solution. The value of the thickness of diffuse layer (cm) is: (Given: i_L=0.15 A/cm^2; C_0 = 1 mol/litre; D = 10^{-10} /cm^2/s; n = 2) ***1 point***

○ (1.0 to 1.5) x 10^{-4}
○ (5.5 to 6.0) x 10^{-4}
○ (8.7 to 9.5) x 10^{-4}
○ (15.5 to 16.3) x 10^{-4}

No, the answer is incorrect.
Score: 0

Accepted Answers:
(1.0 to 1.5) x 10^{-4}

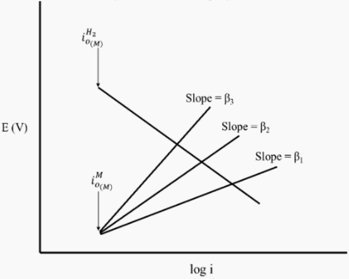
5) Consider that silver is depositing at a rate of 0.8 g/m^2/min in an electrolyte and the limiting current density is 500 A/cm^2. The value of concentration over-potential (mV) at 298K with respect to standard hydrogen electrode is: (Given: n = 1, atomic weight of silver = 107.87 and F = 96500 C) ***1 point***

○ (0.59 to 0.66)
○ (0.23 to 0.31)
○ (0.05 to 0.10)
○ (1.23 to 1.30)

No, the answer is incorrect.
Score: 0

Accepted Answers:
(0.59 to 0.66)

6) Consider that a metal M exhibits activation controlled cathodic reaction. Which of the following plots show the correct sequence of corrosion current density (i_{corr}) vs anodic slope (β)? ***1 point***



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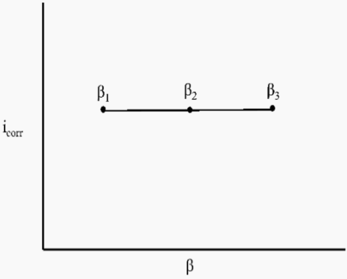

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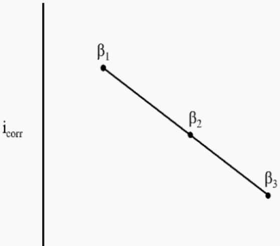

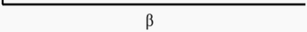

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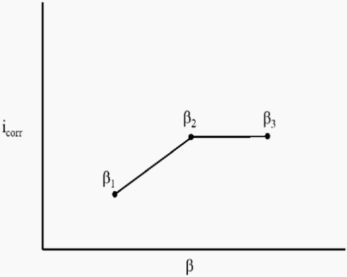

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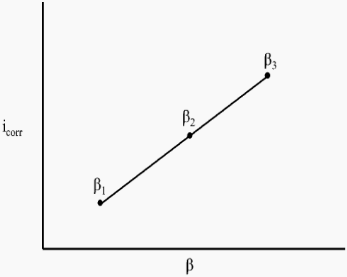
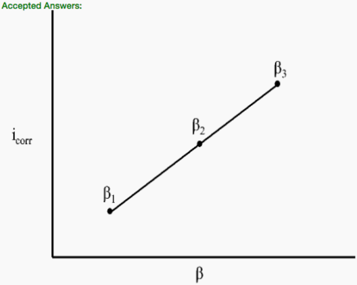


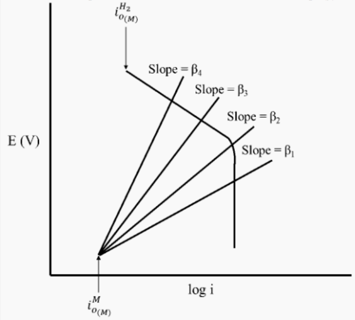
No, the answer is incorrect.
Score: 0

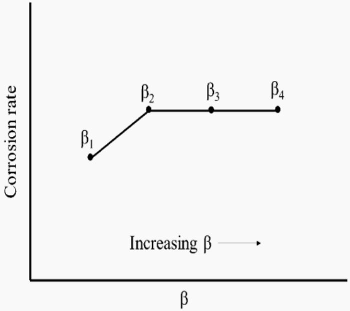
Accepted Answers:

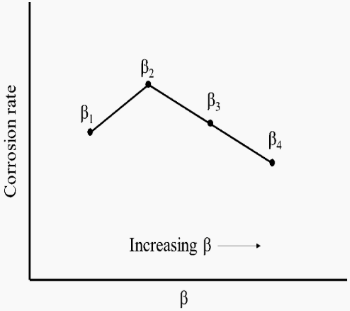


7) Consider that a metal M exhibits combined activation and concentration controlled cathodic reaction. Which of the following plots ***1 point***

show the correct sequence of corrosion rate vs increase in anodic slope (β)?


$i_{o(M)}^{H_2}$
Slope = β_4
Slope = β_3
Slope = β_2
Slope = β_1
E (V)
log i
$i_{o(M)}^{M}$

○ 

○ 

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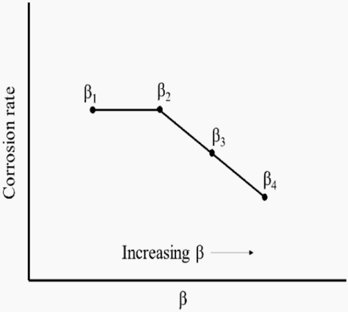

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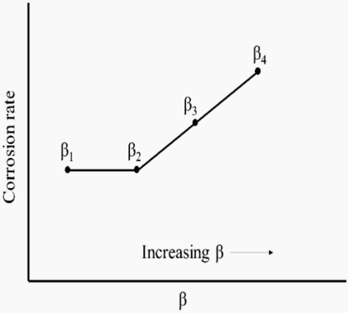
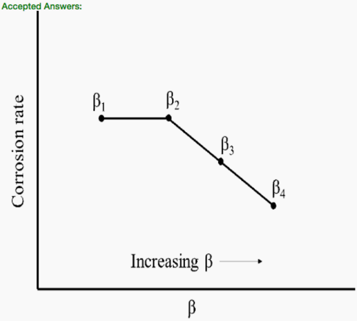


No, the answer is incorrect.
Score: 0

Accepted Answers:



8) Consider that a metal M, immersed in an electrolyte, exhibits active behaviour along with activation controlled cathodic reaction. Which of the following statements shows the correct behaviour of increase in velocity of the electrolyte on the corrosion rate of metal M? ***1 point***

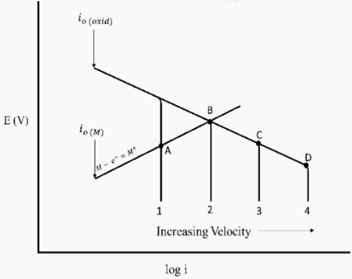
○ corrosion rate increases with increase in velocity
○ corrosion rate decreases with increase in velocity
○ corrosion rate remains same with increase in velocity
○ corrosion rate initially increases and then remains same with increase in velocity

No, the answer is incorrect.
Score: 0

Accepted Answers:
corrosion rate remains same with increase in velocity

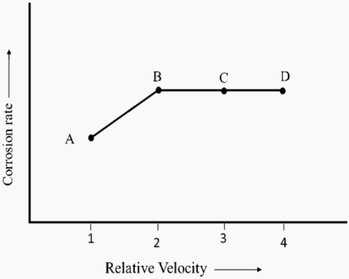
9) Figure below shows the E vs log i plot for the effect of velocity on a metal M exhibiting active behaviour with a diffusion controlled cathodic process. Which of the following plots shows the correct sequence of corrosion rate vs relative velocity?

1 point



$i_{o\,(oxid)}$
E (V)
$i_{o\,(M)}$
$M - e^- = M^+$
B
C
A
D
1
2
3
4
Increasing Velocity
log i

○



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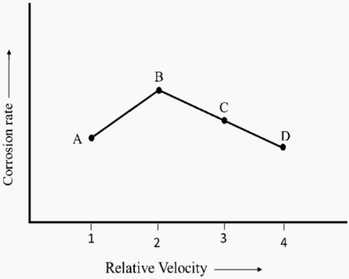

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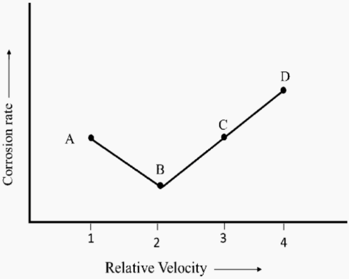
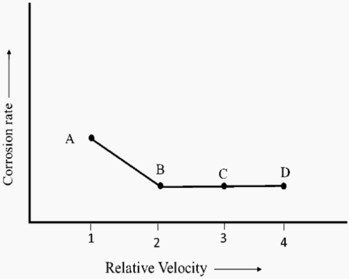
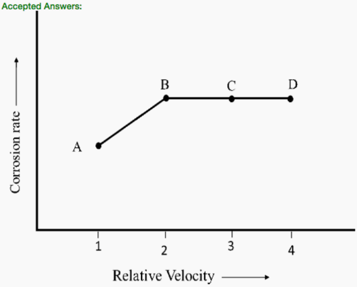


○ 

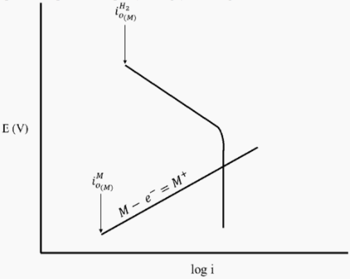
No, the answer is incorrect.
Score: 0

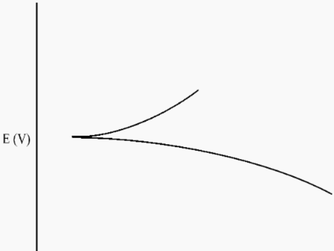
Accepted Answers:

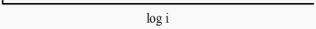


10) Consider that a metal M exhibits concentration controlled cathodic reaction. Which of the following shows the correct experimental polarization plot (E vs log i) for the figure as shown below?

1 point



○ 



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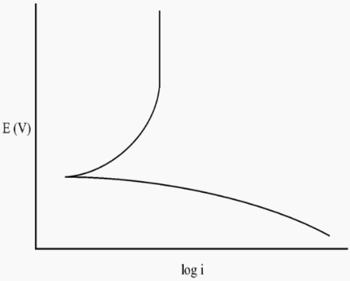

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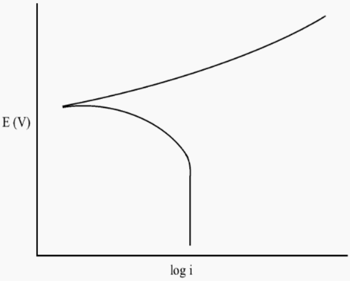

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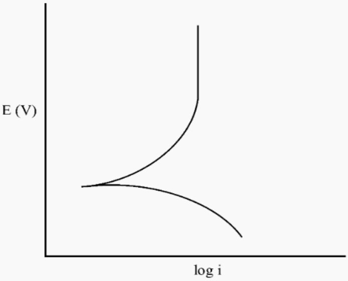
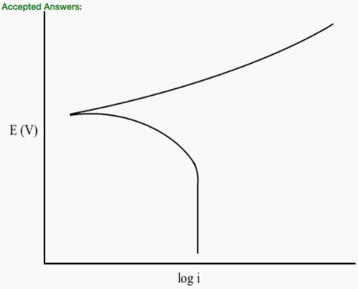


No, the answer is incorrect.
Score: 0

Accepted Answers: