

Unit 3 - Week 1

Course outline

How does an NPTEL online course work?

Week 0

Week 1

- Introduction to corrosion-1
- Introduction to Corrosion-II
- Types and forms of Corrosion
- Uniform and Galvanic Corrosion
- Crevice and Pitting Corrosion
- Quiz : Assignment 1

Corrosion - Part I: Week 1 Feedback

Assignment 1 - Solution

Week 2

Week 3

Week 4

Week 5

Week 6

Week 7

Week 8

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Assignment 1

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

Due on 2020-02-12, 23:59 IST.

1) Consider that a piece of iron is immersed in an aerated 0.6M NaCl solution containing FeCl_3 as an impurity. Which of the following shows the correct anodic and cathodic half-cell reactions occurring on the surface of iron? 1 point

- Anodic: $\text{Fe} \rightarrow \text{Fe}^{2+} + 2\text{e}^-$, Cathodic: $\text{H}^+ + \text{e}^- \rightarrow \frac{1}{2} \text{H}_2$
- Anodic: $\text{Fe} \rightarrow \text{Fe}^{2+} + 2\text{e}^-$, Cathodic: $\text{H}^+ + \text{e}^- \rightarrow \frac{1}{2} \text{H}_2$ and $\text{Fe}^{3+} + \text{e}^- \rightarrow \text{Fe}^{2+}$
- Anodic: $\text{Fe} \rightarrow \text{Fe}^{2+} + 2\text{e}^-$, Cathodic: $\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^- \rightarrow 4\text{OH}^-$
- Anodic: $\text{Fe} \rightarrow \text{Fe}^{2+} + 2\text{e}^-$, Cathodic: $\text{H}^+ + \text{e}^- \rightarrow \frac{1}{2} \text{H}_2$; $\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^- \rightarrow 4\text{OH}^-$ and $\text{Fe}^{3+} + \text{e}^- \rightarrow \text{Fe}^{2+}$

No, the answer is incorrect.
Score: 0

Accepted Answers:
Anodic: $\text{Fe} \rightarrow \text{Fe}^{2+} + 2\text{e}^-$, Cathodic: $\text{H}^+ + \text{e}^- \rightarrow \frac{1}{2} \text{H}_2$; $\text{O}_2 + 2\text{H}_2\text{O} + 4\text{e}^- \rightarrow 4\text{OH}^-$ and $\text{Fe}^{3+} + \text{e}^- \rightarrow \text{Fe}^{2+}$

2) Which of the following riveted joints is not suitable to be used in a marine environment? 1 point

- brass rivet on mild steel plates
- mild steel rivet on aluminium plates
- mild steel rivet on copper plates
- copper rivet on brass plates

No, the answer is incorrect.
Score: 0

Accepted Answers:
mild steel rivet on copper plates

3) Galvanized steel shows inferior corrosion resistance at an elevated temperature of 100°C and it is observed that iron corrodes heavily without much of the corrosion of Zn. Which of the following is the possible reason for the increase in corrosion rate of iron? 1 point

- zinc coating delaminates from the surface of iron
- iron becomes active to zinc
- due to formation of ZnO , which acts as cathode
- due to formation of Fe-Zn alloy on the surface

No, the answer is incorrect.
Score: 0

Accepted Answers:
due to formation of ZnO , which acts as cathode

4) Consider that a copper plate (surface area: 100 cm^2) is galvanically coupled to (A) iron of surface area 100 cm^2 and (B) iron of surface area 10 cm^2 , in a deaerated 0.6M NaCl solution. Which of the following shows the correct statement for the corrosion behaviour of iron? 1 point

- iron will corrode more in case of (A)
- iron will corrode more in case of (B)
- iron will passivate
- no change in corrosion rates of iron in both the cases

No, the answer is incorrect.
Score: 0

Accepted Answers:
iron will corrode more in case of (B)

5) Which of the following applications results severe erosion corrosion? 1 point

- flow of clean dust-free water in a storage tank
- heat exchangers carrying water to cool hot air
- iron sheet roof
- reinforced bar in concrete

No, the answer is incorrect.
Score: 0

Accepted Answers:
heat exchangers carrying water to cool hot air

6) Which of the following helps to inhibit intergranular corrosion of 18:8 stainless steel? 1 point

- low carbon content
- avoid staying longer in the temperature range $450-650^\circ\text{C}$
- addition of Nb
- all of these

No, the answer is incorrect.
Score: 0

Accepted Answers:
all of these

7) A bare mild steel pipe and a stainless steel pipe transporting water and crude oil, respectively, were laid down in the moist air. At some locations, both the pipes touch each other (metal-to-metal contact). After few months, the mild steel pipe started leaking at few locations. The probable cause of the above failure could be; 1 point

- uniform corrosion in the mild steel pipe
- due to impure water supply
- due to galvanic cell formed between stainless steel and mild steel pipes
- due to the high pressure of the water, mild steel pipe failed

No, the answer is incorrect.
Score: 0

Accepted Answers:
due to galvanic cell formed between stainless steel and mild steel pipes

8) Which of the following results in occurrence of crevice corrosion? 1 point

- presence of sharp edges inside of a container holding aqueous solution
- wide crevice gap to avoid stagnant solution
- smooth and dirt free surface
- supply of oxygen to crevice

No, the answer is incorrect.
Score: 0

Accepted Answers:
presence of sharp edges inside of a container holding aqueous solution

9) Consider that two different metals A and B of equal area are galvanically coupled and immersed in an aerated 0.6M NaCl solution such that the current flows from metal A to B through the solution. Which of the following statements is true about the couple? 1 point

- metal B is more active as compared to metal A
- metal A is more active as compared to metal B
- both metals will corrode at the same rate
- Negligible corrosion in both metals

No, the answer is incorrect.
Score: 0

Accepted Answers:
metal A is more active as compared to metal B

10) Consider that two metals A and B are welded together and exposed to the marine environment. Metal B is more active as compared to metal A. Which of the following schematics correctly illustrates the degradation of the couple? 1 point



No, the answer is incorrect.
Score: 0

Accepted Answers:

