Corrosion and Protective Coatings

New Regents original practice • Name: _____ Date: _____
Show your work for written answers.

Rusting involves oxidation of iron. A barrier coating can limit contact with water and oxygen. In a sacrificial coating model, a more readily oxidized metal can protect exposed iron.

1 Which change describes iron oxidation in a corrosion model?

(1) Iron loses electrons.

(2) Iron gains electrons.

(3) Iron nuclei gain neutrons.

(4) Water molecules stop moving.

2 Explain how an intact barrier coating can slow rusting of steel. [1]

Answer and work

3 What can a scratch do to a coating that protects only by acting as a barrier?

(1) Expose underlying iron to water and oxygen

(2) Turn iron into zinc

(3) Stop all oxidation permanently

(4) Change the iron’s atomic number

4 In a model where zinc oxidizes more readily than iron, explain what it means for zinc to act sacrificially. [1]

Answer and work

Comparing Coated Steel Models

Use the information below to answer the questions.

A simulation exposes four equal steel pieces to the same moist air for the same time. The values report loss of underlying iron. In the zinc model, zinc stays electrically connected to the steel around the scratch.

Sample	Surface condition	Iron lost (mg)
P	Uncoated	18
Q	Intact barrier coating	2
R	Scratched barrier coating	13
S	Scratched zinc coating	4

5 Which sample loses the least iron?

(1) P

(2) Q

(3) R

(4) S

6 Calculate the difference in iron loss between the two scratched samples. [1]

Answer and work

7 Which comparison directly shows the effect of scratching the barrier coating in the model?

(1) P and S

(2) Q and R

(3) P and Q

(4) R and S

8 Use the model to explain how S can lose less iron than R even though both coatings are scratched. [1]

Answer and work