

RESEARCH

Galvanizing

Galvanizing is the process of applying a coating of zinc onto metals such as iron or steel. Using books or electronic resources, prepare a brief report about the advantages and disadvantages of galvanizing. Begin your search at www.pearsoned.ca/scienceinaction.

Other Electrochemical Applications

Anodizing and electrorefining are two more examples of electrochemical processes used in Canada. Anodizing is a process to coat aluminum parts with a layer of aluminum oxide. This oxide coating is much harder than pure aluminum. Anodizing is used on a wide range of products including aluminum screen doors, airplane or car parts, kitchenware, and jewellery.

Electrorefining can be used to remove impurities from metal. For example, impure gold can be formed into bars that serve as an electrode in an electrolytic cell. The impure bars are put into a strong acid solution (the electrolyte), along with a thin strip of pure gold. When current is applied, it moves from one electrode to the other. At the same time, pure gold dissolves from the impure electrode into the acid electrolyte. The dissolved pure gold moves to the electrode made out of pure gold and is deposited there. The other impurities and unwanted metals are left behind in the electrolyte. This process produces very pure gold.

In another application of electrochemistry, some automobile companies use an electrochemical process to bond special paints onto car parts.

CHECK AND REFLECT

Key Concept Review

1. What is electrolysis? Give one example of an application of electrolysis.
2. What is an electrolyte?
3. What was Alessandro Volta's contribution to battery technology?
4. How does a rechargeable cell work?

Connect Your Understanding

5. Which would be a more practical source of electricity for a car: a wet cell or a dry cell? Why?
6. Describe the components of a wet cell and explain how the cell produces electricity. Use a diagram in your answer.
7. Dry cells are designed to keep electrons flowing. Why do they eventually "die" (stop working)?
8. Draw a diagram of an electroplating apparatus that would coat copper with gold. Be sure to label all parts of your apparatus.

Extend Your Understanding

9. Figure 1.30 shows an older design for a dry cell, which is still widely used. How does this design differ from the alkaline cell shown in Figure 1.20 on page 288?
10. A car designer has proposed a new car battery. She is planning to test the following different electrode combinations:

a) both zinc	c) both copper	e) both carbon
b) zinc and copper	d) zinc and carbon	

Will all of these combinations work? Explain why or why not.

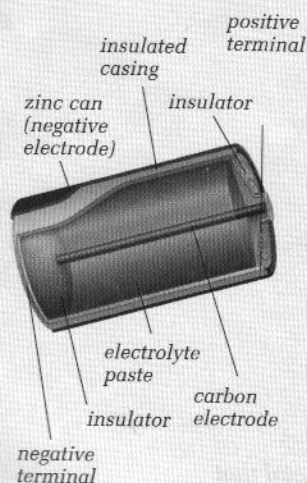


Figure 1.30 Question 9—older design for dry cell

Assess Your Learning

Key Concept Review

1. Describe the charged particles in an atom.
2. What are electrodes? Explain their role in a dry cell.
3. What is the difference between a cell and a battery?
4. State three guidelines for electrical safety.

Connect Your Understanding

5. Describe how a static charge might build up on you as you walk across a carpet.
6. Some cells are rechargeable. Others must be discarded when they run out of energy. Explain the difference between these two cell types.
7. Fuses are designed to interrupt the flow of current. Why are they included in a circuit?
8. Lightning is a dangerous discharge of electrons built up by friction between air and water molecules in a cloud. Is this discharge current electricity or static electricity? Explain the reason for your choice.
9. Static discharges are classified as electricity, but cannot provide the energy to operate your household devices. Why?

Extend Your Understanding

10. Computer circuits can be damaged by static discharges. To prevent this, technicians usually wear an anti-static strap that is connected to the metal case of the computer. Explain how wearing such a strap protects computer circuits.
11. A tall tree stands in a yard, towering over a one-storey house. There are no other trees in the area. A car is parked on the street. Which object is most likely to be struck by lightning: the tree, the house, or the car? Explain your answer.

Focus On

SCIENCE AND TECHNOLOGY

Scientific knowledge may lead to the development of new technologies. And new technologies may lead to scientific discovery. Think about what you learned and the activities you did in this section.

1. Describe one example from this section of how scientific knowledge led to a new technology, which then led to scientific discoveries.
2. What would someone who wanted to invent a new type of electrical cell need to know about electricity?
3. Describe one example of an electrical technology that is used in scientific research today.