

# The Corroding Can

## *Teacher Information*

### **Summary:**

In this lesson, students work together in teams to determine who is at fault for a corrosive substance found in a soft drink can. Students will use role cards and gather data on all the evidence to arrive at an explanation for when or how the corrosive agent was added to the drink.

### **Objective:**

- Students will work as a team and use data to establish a relationship between evidence and explanation.

### **Materials Needed:**

1. Role cards
2. Paper and writing utensil

### **Procedure:**

1. Read the background information to your students and then have them read “The Crime”.
2. Put students in groups of seven. Copy a set of role cards for each group, and give each student one of the role cards. Explain to them that when they read their cards for the first time, they should think about the character they are playing and try to assume some of his or her characteristics. If possible, supply simple costumes or props for students as they play their roles.

### **Background Information:**

Before foods can be placed on the market, they must be approved by scientists at the department of Food and Drug Administration (FDA). When a foreign substance is found in food, FDA scientists perform experiments to find out its identity.

On rare occasions, corrosive agents have been found in foods. Corrosive agents have the ability to break down or destroy some substances. Bases, which are basic on the pH scale, can be corrosive.

Some mild corrosive agents are found in window cleaner and laundry detergent. A very strong corrosive agent, lye, is found in drain opener. Lye is the common name for a strong chemical, sodium hydroxide. Lye is very dangerous to living things and can cause serious burns to the skin.

Name \_\_\_\_\_

Date \_\_\_\_\_

## Role Cards

### John

I was visiting Mike for a few days, and he asked me to go to Nick's party with him. I didn't know Nick or anyone else at his party.

Mike left me in the dining room next to the table of food and drinks. I pulled a can of DiggIt Soda off the plastic six-pack ring like I normally would. As soon as I took the first sip, I felt an instant burning pain. The pain kept getting worse. In fact, it still hurts.

DiggIt Soda should be more careful and make sure there are no dangerous chemicals in their drinks. It was carelessness that caused my burns. They should pay for my hospital bills and give me extra money for all of my pain and suffering. I am going to sue them for five million dollars!

### Mike

John is an old friend of mine who lives out of town. He came to visit and I asked him to go to the party with me at Nick's house.

When we got to the party, I introduced him to some people, showed him where the food was, and wandered off to talk. Suddenly I heard him screaming and turned to see John crying out that something was burning him. Man, he was in a lot of pain. Someone called an ambulance, and we got him to the hospital.

I think he's going to be okay, but he's really mad about the whole thing. I sure don't blame him. I'd be mad too.

Name \_\_\_\_\_

Date \_\_\_\_\_

### **Cheryl Sunrise, Ambulance Paramedic**

When we arrived at 9:51 p.m., the people at the party were trying to help John rinse his face and mouth with water. John was lying on the floor, screaming.

We put him on a stretcher, and rushed him to the emergency room. A guy at the party told us that John was drinking from a DiggIt can when he started screaming.

Once we got on the road, I called the fire department and asked them to go to Nick's house and pick up that can. I also called the police department so they could find out if some kind of foul play was involved.

### **Paul Schiffer, Firefighter**

A call came in at 10:02 p.m. that there was a hazardous substance in a DiggIt pop can at 301 Marshall Street. We put on our protective clothing and drove a small truck to the scene. There was a party in progress. We collected an open can of DiggIt and five unopened cans. They were all placed in a glass container, the five unopened cans on the bottom and the opened can on top. We took the glass container and cans to the fire station.

We didn't know what to do with the cans so we left them at the station Saturday night. I noticed on Sunday morning that something had eaten through the bottom of the can. It was stacked on the top and it had damaged the other cans. All cans were empty of cola which had collected in the bottom of the glass container. Someone from the State Crime Lab picked up the whole mess on Monday morning.

Name \_\_\_\_\_

Date \_\_\_\_\_

### **Dr. I. Feelbetter, Emergency Room Doctor**

John arrived at the hospital at 10:09 p.m. on Saturday night. He was in obvious pain, and large burns were developing on his lips, face, and tongue. I cannot be certain, but they looked like burns caused by a strong acid or base. I gave him something for pain and swelling, and admitted him to the hospital.

He'll be okay, but there may be some scarring. Thankfully, John didn't actually swallow the soda. That would have damaged his throat, caused it to close, and perhaps killed him.

### **Dr. Smartypants, State Crime Lab**

The police called us and said they were sending us some evidence to examine. Monday afternoon, a firefighter brought in a glass container holding six soft drink cans and a lot of brown liquid. The firefighter gave me the history behind these cans. I think that a liquid had eaten through the open can, burned holes in the cans below it, and caused them all to leak their contents.

We analyzed the soft drink in the glass containers and found it to be pretty basic. Its pH was 10. Soft drinks are usually acidic, with a pH of 5 or 6.

Name \_\_\_\_\_

Date \_\_\_\_\_

### **Dr. Tommy Testit, FDA Lab**

First of all, I wanted to know how long it would take a very strong acid or base to eat through a soft drink can. Therefore, I put drain cleaner, which contains sodium hydroxide, into an aluminum can in my office and recorded the time. Sodium hydroxide is a very strong base, and it has a pH of 14. In only five hours, the sodium hydroxide had eaten through the bottom of the aluminum can.

The pH of the liquid in the glass container delivered from the fire station was 10. I took some of this liquid and put it in a soft drink can, recorded the time, and set it on my desk. It has been there for four days now, and nothing has happened to the can yet.

# Cans

## *Student Information Sheet*

### **The Crime**

Mike invites his out-of-town friend, John, to a party at Nick's house. John is only in town visiting for a few days, and Mike doesn't want to go to the party without him, so John agrees to go along.

John and Mike enter Nick's house, which is overrun with loud and happy people. They make their way to the table where all kinds of food and drinks are arranged. DiggIt soft drinks are stacked in six-packs at one end of the table. Mike introduces John to some of his other friends, and then wanders away to say hello to another. Suddenly, Mike hears a loud scream. When he turns to look, he sees John rubbing his mouth and face, obviously in pain.

An ambulance is called to take John to the hospital. Later, the fire department picks up the soft drink can from which John was drinking along with the rest of the cans in that six-pack.

Two weeks after this traumatic event, John calls the president of DiggIt Soft Drink Company to tell them what happened. He explains that his burns are DiggIt's fault, and he plans to sue them. The DiggIt president apologizes, and then asks his scientists to investigate this case. The president wants to find out when and how the corrosive agent was added to John's soft drink.

### **Procedure**

1. In your group of seven, take one role card. Don't show it to the other students in your group.
2. Read your role card to yourself, and think about the character you are playing. If costumes or props are available, be sure to dress your part.
3. Take turns with other students in your group to read and act your role cards aloud.
4. When everyone has read his or her card, work as a group to determine whether or not John's claim is correct. John claims that DiggIt was at fault because the corrosive agent was added to the soft drinks during the manufacturing phase.

Name \_\_\_\_\_

Date \_\_\_\_\_

## Questions

1. What agency is responsible for testing the safety of food and drinks that are for sale?
2. What is sodium hydroxide?
3. How does sodium hydroxide affect the skin?
4. Do you think that the corrosive substance was added to the can during the manufacturing phase or after the can was opened? Explain your answer.
5. How many of the cans in the six-pack do you think held the corrosive chemical? Why? Explain your answer.
6. If Dr. Smartyants of the State Crime Lab had found the pH of the cola in the firefighter's glass container to be 14, how would that have changed your thinking about the number of cans that contained the chemical? Explain your answer.
7. Based on your findings in the lab, pretend you are Velma from the Scooby-Doo gang and write at least one paragraph that explains how you think the sodium hydroxide got into the soft drink can.

Name \_\_\_\_\_

Date \_\_\_\_\_

## **Answers**

1. Food and Drug Administration (FDA).
2. A strong base and an ingredient in drain cleaner.
3. Causes burns.
4. Answers will vary. The corrosive agent could not have been placed in the can at the time of manufacturing because it burns through cans in about five hours.
5. Answers will vary. Only one can could have held the caustic chemical. The spilled soft drink in the glass container was not caustic enough to have burned the can. Therefore, one can must have held a caustic liquid that was diluted by cola from the other five cans.
6. Answers will vary. The finding would have indicated that all of the cans contained a strong concentration of caustic liquid.
7. Answers will vary.