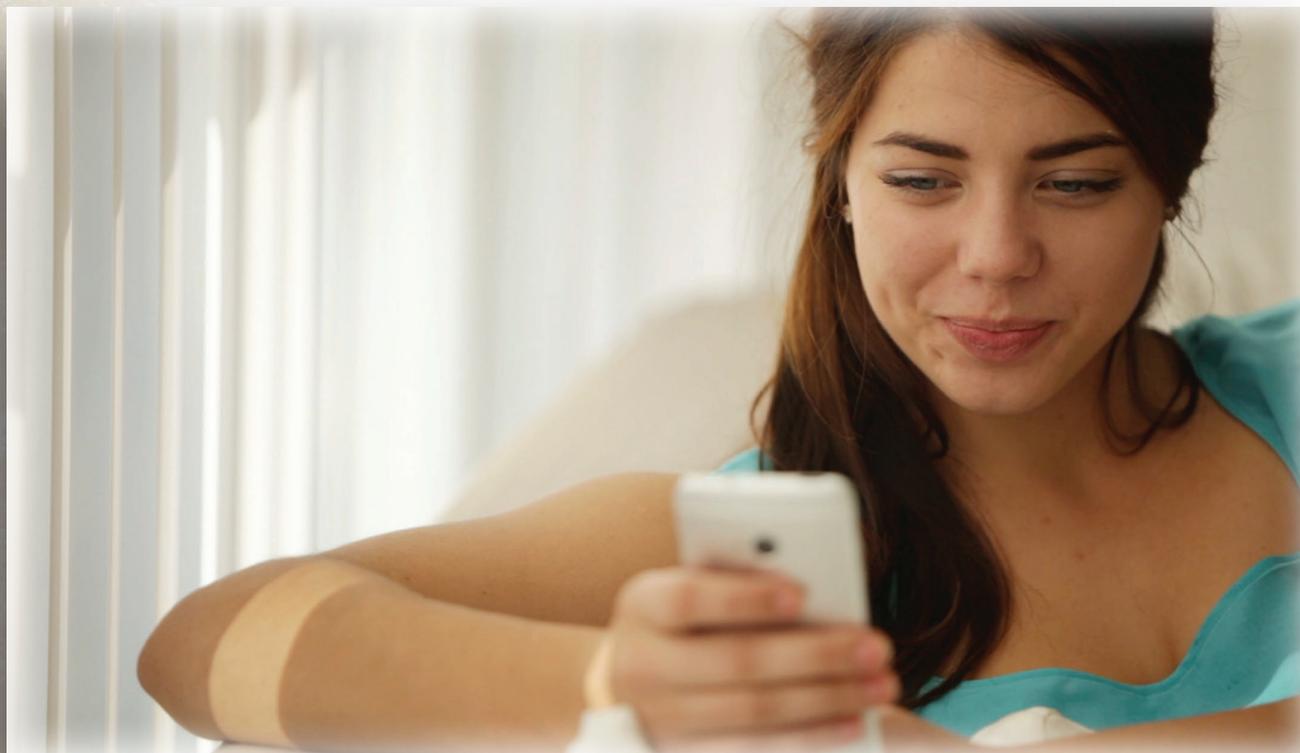


Portable Electronics: The Periodic Table in the Palm of Your Hand



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REFLECTION

What's in Your Cell Phone?

As you will see in this chapter, chemistry plays a central role in controlling the properties of electronic devices.

- List some desirable attributes of a cell phone, and some that you would like to see in the future.
- The majority of materials that comprise your cell phone may be classified as metals, plastics, or glass. Using the Web as a resource, describe where these materials come from (both the region(s) of the world where they are produced, and the raw materials used in their fabrication).
- Cite two elements that combine to form a substance important to your cell phone.
- What is the expected lifespan of your cell phone?

The Big Picture

In this chapter, you will explore the following questions:

- What are the different components in your portable electronic device made from?
- How does the periodic table of elements guide us in the design of your device?
- How does the touchscreen on your portable electronic device work?
- What role do metals play in electronic devices?
- What are rocks, and how do we isolate and purify metals from these natural sources?
- How is ordinary sand converted into silicon—the fundamental component of processor chips?
- How is sand converted into glass, and how can its structure be modified for crack-resistant screens?
- What are the environmental implications of fabricating and recycling your portable electronic devices?

Introduction

Email, phone calls, texts, tweets, and, of course, Facebook. Our modern society demands constant contact during busy days filled with meetings, classes, travel, and social activities. The tablet or cell phone you hold in your hand is a combination of a variety of materials that have been carefully crafted to give you special capabilities you can't live without.

In order to satisfy the ever-rigorous demands of today's consumer, the latest portable electronics must be lightweight, thin, durable, multifunctional, and easily synced with computers and next-generation wearable devices. Such complex designs are only possible by putting together the elements of the periodic table in many different ways to form materials with the above physical properties that we need or desire.

In this chapter, you will learn about the various components that make up your cell phone, tablet, or other portable electronic device. Perhaps most importantly, you will discover where these components came from and what happens to them after their lifetime is finished. Throughout this book, you will see that the world around us may be described by various length scales. Let's now begin our discovery into the sub-microscopic depths of your electronic device. You will never look at your cell phone the same way again ...

Your Turn 1.1 Scientific Practices How Small?!

The smallest building blocks inside your cell phone are about *1000 times* smaller than the diameter of a human hair fiber!

- a. What is a typical diameter of an individual hair fiber?
- b. Using the answer found in question **a**, how many hair-fiber widths would it take to span the length your cell phone?