1.1 What Is Matter?

Key Question: What is matter made of and how does it behave?

Think about the things you see and touch every day. You may see trees and cars. You may touch paper, wood, and stone. What are these things made of?

All the objects around you are made of matter. Your body is made of matter. Even air is made of matter! **Matter** is anything that has mass and takes up space. Look at Figure 1 to find more kinds of matter.

matter
anything that takes up space and has mass

Figure 1 What kinds of matter can you see?

The Science of Matter

The study of matter and its changes is called **chemistry**. Scientists who work in chemistry are called chemists.

chemistry
the study of matter and its changes

Chemists study matter. Chemists can often imitate, or copy, the matter found in nature using artificial chemicals.

Artificial chemicals can be good for people. For example, some medicines are made from matter in plants. Chemists can also use artificial chemicals to make medicines that cost less. The medicines with artificial chemicals are often purer than the medicines made from plants.

TURN

Not all artificial chemicals are better, though. For example, lemonade made with real lemons has a lot of vitamin C. Vitamin C is very good for people. Lemonade made with artificial flavour does not usually have as much vitamin C.

The Makeup of Matter

All matter is made of very tiny particles. You can see the particles only with a very strong microscope. These particles do not always look like the matter they make up.

Look at Figure 2. Aluminum foil looks smooth and shiny. It is made of aluminum particles. Now look at Figure 3. With a very strong microscope, you would see tiny bumps in the foil. These bumps show aluminum particles.

Figure 2 Aluminum is made of just one kind of matter.

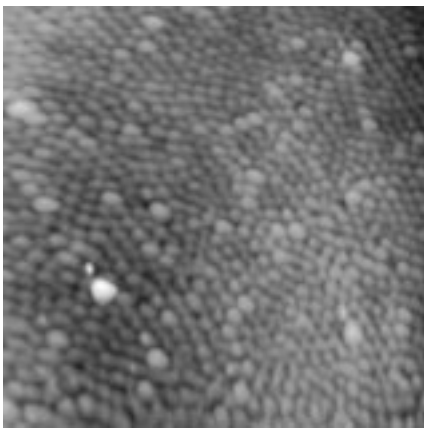


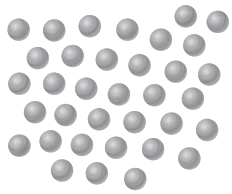
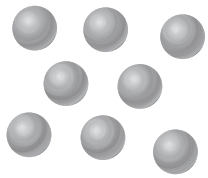
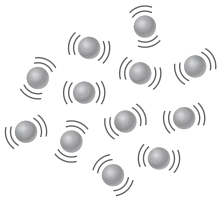
Figure 3 A powerful microscope shows the particles in aluminum.

particle theory of matter
an explanation of what matter is made of and how it behaves; the particle theory states that all matter is made up of tiny particles that are always moving, that attract each other, and that have space between them

The Particle Theory of Matter

Scientists use the **particle theory of matter** (also known as the "particle theory") to explain what they know about matter. Table 1 lists the main ideas of the particle theory.

Table 1 The Particle Theory

Main idea	Illustration
1. All matter is made up of tiny particles.	
2. Particles have empty spaces between them.	
3. Even though you cannot see them, particles are moving randomly all the time.	
4. Particles move faster and spread farther apart when they are heated.	
5. Particles attract each other, so they tend to stay together rather than fly apart.	

You can use the particle theory to explain many things you see. Think about what happens in the following example.

You place a drop of food colouring in a cup of water without stirring. The food colouring and particles of water mix together. Why?

Solution: The particle theory states that particles are moving all the time. The particles of food colouring and the particles of water move around. This causes the particles to mix together, even without stirring (Figure 4).

Figure 4 Particles move and bump into each other all the time.

Name: _____ Date: _____

CHECK YOUR UNDERSTANDING

1. What is matter made of?

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2. How do chemists use artificial chemicals? Give one example.

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3. Why is the particle theory important?

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4. Think back to the Key Question at the beginning of the section. What have you learned about matter? How do particles of matter behave?

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END