LESSON 14 | What is a suspension?

Before you pour orange juice, you shake it. Before you spoon out vegetable soup, you stir it.

Orange juice and vegetable soup are mixtures. But they are not like solutions. The parts of solutions dissolve and do not settle. Mixtures like orange juice and vegetable soup do not dissolve. The parts do settle out.

Mixtures that do not dissolve and that do settle are called **suspensions** [suh-SPEN-shunz].

You have many suspensions in your home. Salad dressing and fruit juices are suspensions. So is liquid shoe polish.

Have you ever read the label on a salad dressing bottle? Some labels may say "Shake well before using." These bottles contain suspensions. In fact, any mixture that you see settling or that needs mixing is a suspension.

Many common suspensions are made of solids and liquids. A suspension can be made of solids and gases, too. A suspension may even be made up of two or more liquids. Suspensions made up of only liquids are called **emulsions** [i-MUL-shunz]. Mayonnaise is an example of an emulsion. The oil and water in mayonnaise are able to stay together because egg is added as an emulsifying agent. Emulsions are special kinds of **colloids** [KAHL-oyd]. In a colloid, particles are permanently suspended.

The particles of most suspensions settle by weight. The heavy parts settle first. Then the lighter parts settle.

The parts of a suspension are large. You can see them easily.

Most suspensions are cloudy. The suspended particles stop light. Light that hits the particles is reflected. This is why suspensions are cloudy.

Now you know several important properties of suspensions:

- The particles in suspensions do not dissolve.
- The particles in suspensions settle out. They separate into layers by weight.
- Suspensions are cloudy and uneven.
- The solid particles of a suspension are large. You can see them.
- Suspended solids reflect light.

WHICH SETTLES FIRST?

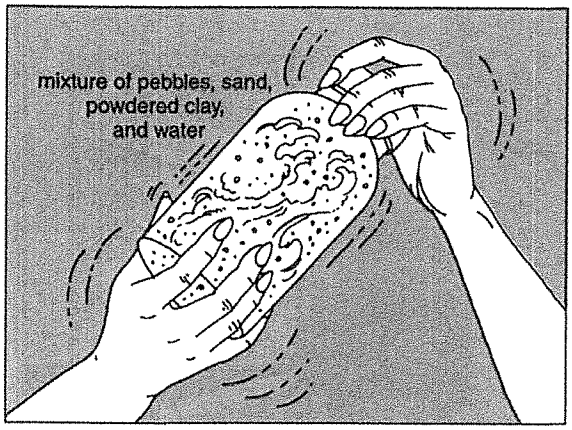

Figure A

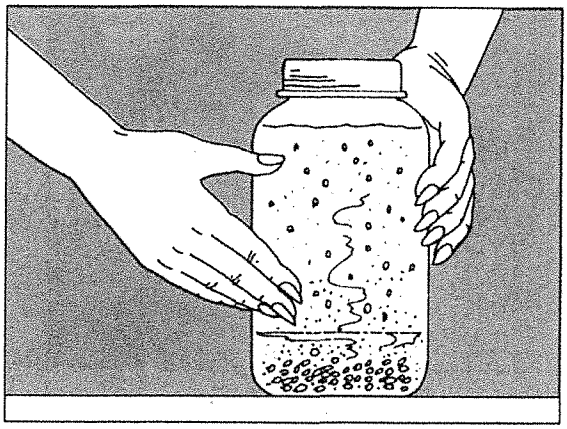

Figure B

Place some pebbles, sand, and powdered clay into a jar.

Add water nearly to the top. Cover the jar tightly and shake.

Let it stand for five minutes. Observe what happens.

1. Which pieces settled first? _____

2. They are the _____ pieces.
   largest, smallest

3. They also are the _____ pieces.
   lightest, heaviest

4. Which settled last? _____

5. They are the _____.
   largest, smallest

6. They also are the _____.
   lightest, heaviest

7. This shows that when a suspension settles, the _____ pieces settle
   heaviest, lightest
   first and the _____ pieces settle last.
   heaviest, lightest

8. Usually, the heavy pieces are _____; the light pieces are
   smaller, larger
   _____.
   smaller, larger

CLAY AND WATER

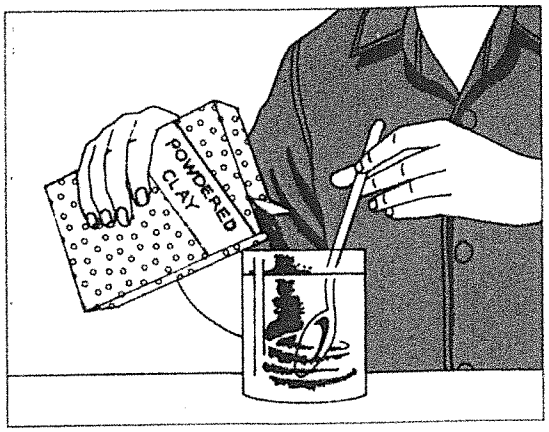

Figure C

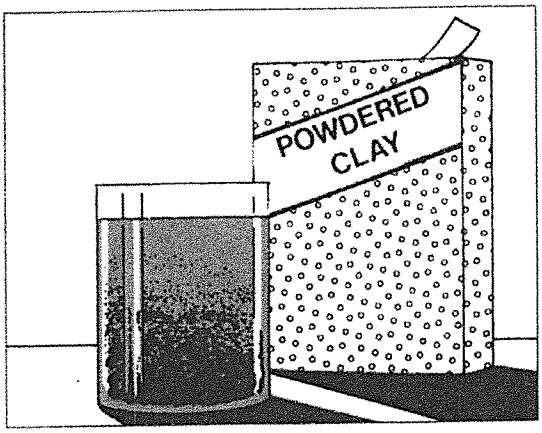

Figure D

Stir some powdered clay into a jar of water. Let it stand. Notice what happens.

1. Powdered clay in water _____ a mixture.
   is, is not
2. The clay _____ dissolve.
   does, does not
3. The clay pieces _____ settle.
   do, do not
4. Clay in water makes a mixture called a _____.
   liquid solution, suspension
5. The parts of a suspension _____ dissolve.
   do, do not
6. The parts of a suspension _____ settle out.
   do, do not

MATCHING

Match each term in Column A with its description in Column B. Write the correct letter in the space provided.

	Column A	Column B
_____	1. mixture	a) reflect light
_____	2. suspension	b) settle last
_____	3. heavy pieces	c) cloudy mixture of two or more substances that settle on standing
_____	4. light pieces	d) liquid suspension
_____	5. emulsion	e) settle first

WHAT IS THE TYNDALL EFFECT?

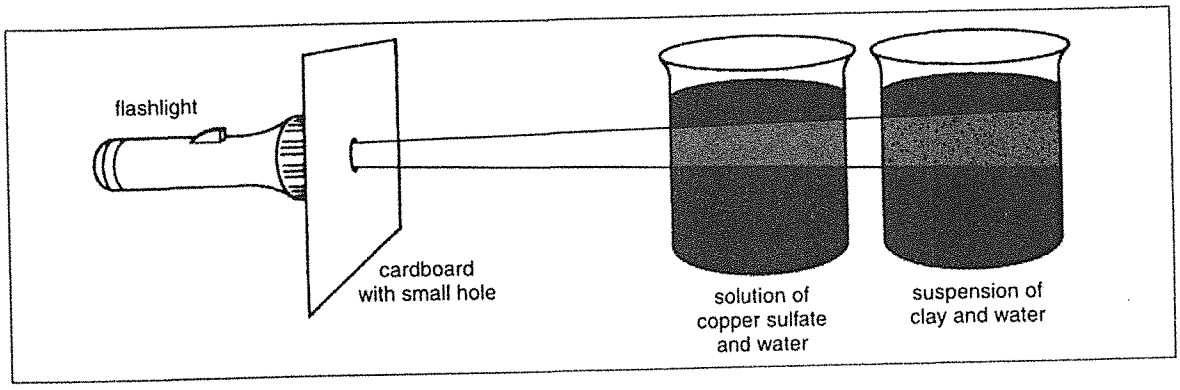

Figure E

What You Need (Materials)

2 beakers
copper sulfate
water
powdered clay
flashlight
cardboard with a hole

What to Do (Procedure)

1. Fill a beaker with a solution of copper sulfate and water.
2. Fill another beaker with a suspension of clay and water. Mix both mixtures well.
3. Place the beakers on the table next to one another.
4. Let the clay water settle for about two minutes.
5. Shine a flashlight through both beakers as in Figure E.

What You Saw and Learned (Observations)

1. You _____ (can, cannot) see particles in the solution.
2. You _____ (can, cannot) see particles in the suspension.

The reflection of light by suspended particles is called the **Tyndall effect**.

3. You can see suspended particles because they _____ (do, do not) stop light.

Something to Think About (Conclusions)

1. The Tyndall effect _____ (does, does not) help us identify a suspension.
2. The Tyndall effect also helps us identify the _____ (size, kind) of suspended particles.
3. Which kind of mixture shows the Tyndall effect? _____ (solution, suspension)
4. Which kind of mixture does not show the Tyndall effect? _____ (solution, suspension)

WHO WAS THE TYNDALL EFFECT NAMED FOR?

The Tyndall effect was named for John Tyndall. He was a 19th century British scientist.

He studied many things. One was how light passes through the air in different places.

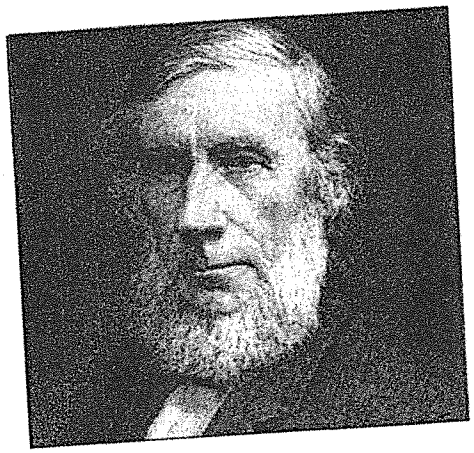

Figure F

Complete the chart below.

	Solutions	Suspensions
1. Do the parts dissolve?		
2. Do the particles settle?		
3. Is the mixture clear?		
4. Is the mixture cloudy?		
5. Do the particles reflect light?		
6. Can you see the particles?		

TRUE OR FALSE

In the space provided, write "true" if the sentence is true. Write "false" if the sentence is false.

_____ 1. Suspensions are mixtures.

_____ 2. The particles in suspensions settle out.

_____ 3. Suspensions are transparent.

_____ 4. Suspensions are cloudy.

_____ 5. Suspended pieces settle by weight.

_____ 6. In a suspension, heavy pieces settle last.

_____ 7. Suspension particles are the size of molecules.

_____ 8. The particles in suspensions stop light.

COLLOIDS

You have learned that the solid parts of a regular suspension settle out. A colloid is a special kind of suspension. The solid particles in a colloid do not settle out.

The particles in a colloid are larger than molecules. But they are much smaller than the particles in a regular suspension. The particles are so small and so light that they stay in suspension. They do not settle by themselves.

Most colloids look like solutions—transparent and evenly mixed. You cannot see the suspended particles easily. But with the beam of light, the tiny particles show up in the Tyndall test. Some colloid particles are so small that you need a microscope to see them.

Colloids cannot be separated with filter paper. Special porcelain [POR-suh-lan] filters are needed.

COLLOID OR SOLUTION?

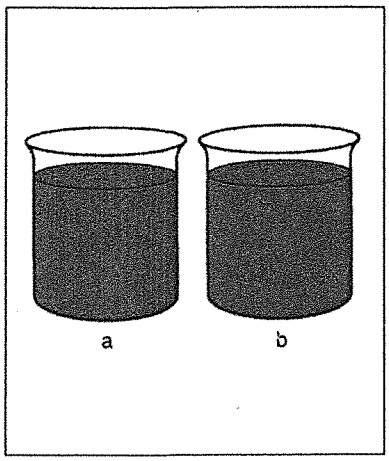

Figure G

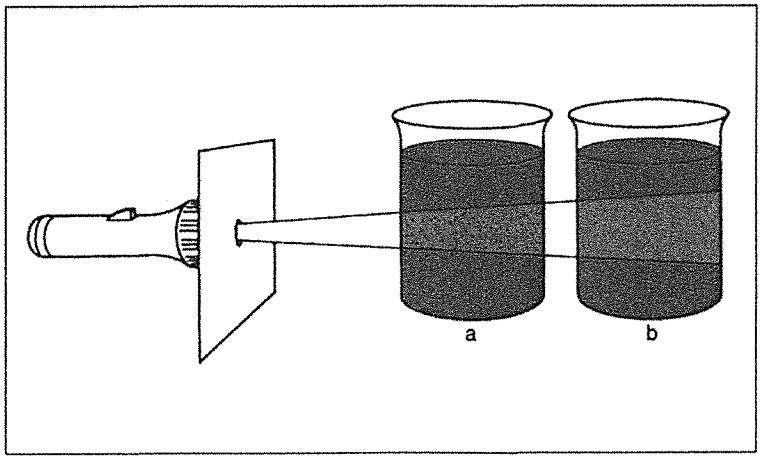

Figure H

One of these mixtures is a solution. The other is a colloid.

They both look the same until we shine a beam of light through them.

1. Beaker _____ shows the Tyndall effect.
   a, b
2. Beaker _____ does not show the Tyndall effect.
   a, b
3. The solution is in beaker _____.
   a, b
4. The colloid is in beaker _____.
   a, b
5. _____ particles are the size of molecules.
   Colloid, Solution
6. _____ particles are larger than molecules.
   Colloid, Solution