Name _____ **Date** _____

Mixtures and Solutions

Key Words		
combine	dissolve	ingredient
mixture	physical property	separate
solution	substance	

We often mix, or **combine**, different kinds of matter in our daily lives. A salad is a combination of vegetables or fruit. Iced tea is a combination of water, tea, sugar and ice. Concrete is a combination of sand, gravel, and water. These combinations are called mixtures. Even our backpacks contain a combination of books, notebooks, pens, pencils, and paper.

A **mixture** is a combination of two or more objects or **substances**. The substances that mix together are called **ingredients.** Mixtures can be made up of solids, liquids, or gases. The ingredients in a mixture do not join together to form any new substances.

Mixtures are physically combined. Each ingredient retains, or keeps, some or all of its own physical properties. The ingredients in a mixture can also be physically **separated.** Some mixtures such as trail mix (raisins, peanuts, chocolate chips, and coconut) can be easily separated by just using your fingers. You might pick out all of the raisins and eat the rest. Other mixtures might require using tools to get them separated.

When you eat a mixture like trail mix, the ingredients taste the same as they do when they are not mixed together. The raisins are sweet; the peanuts are salty, and the chocolate chips are crunchy. The ingredients stay the same color. Mixing the raisins, peanuts, chocolate chips and coconut does not change their **physical properties**.

Lemonade is another mixture that has the properties of its ingredients. It is sweet like sugar, sour like lemons, and a liquid like water. But, can you take lemonade apart? It would be more difficult to achieve, but you can take the ingredients in

lemonade apart. Letting the water evaporate would leave behind the lemonade powder and the sugar.

Mixtures are separated by using the different physical properties of their ingredients. Some mixtures contain items made of iron. A magnet will separate the iron from the other ingredients. You could pick nails out of sand by using a magnet. Mixtures with small particles can be separated by sifting or filtering. You might use a sieve or strainer to separate sand from water. As you pour in the mixture, the sand will be trapped as the water passes through the sieve. Filters trap particles even smaller than the grains of sand. Air conditioning filters trap tiny particles of dust and separate them from the gases in the air.

Some mixtures have particles or ingredients so small that you can't see them. You can't see the particles of salt when it is mixed with water. This is because the salt **dissolves** in the water. When one or more substances dissolve in another substance, the result is a special kind of mixture called a **solution.** The particles of salt spread out evenly in the water so that the solution looks the same throughout. Although you can't see the salt in the water, you can still separate the salt-water mixture. If you boil the salty water until the water evaporates, all of the salt will remain in the pan.

In a solution some properties of the ingredients stay the same while others change. For example, if you mix sugar and water, the dissolved sugar is still sweet. Other properties of the sugar change. Dissolved sugar is no longer a white powder. The water is still a clear liquid, but a sugar-water solution has a higher boiling point and a lower freezing point than pure water.

The ingredients in a mixture like Italian salad dressing can also be separated. When you use this type of salad dressing, you have to shake it up before you can pour it on your salad. The oil, the vinegar and the spices in the dressing don't dissolve. The ingredients only stay mixed for a short period of time. After sitting for a while, the spices will sink below the vinegar and the oil will rise to float on top of the vinegar. By allowing time for the ingredients to sink or float, you can easily separate the oil from the vinegar by using a spoon to skim off the oil. You can separate the spices by pouring the remaining mixture through a sieve or a filter.

1. Why is it possible to separate the ingredients in a mixture? The ingredients in a mixture—

A retain their own physical properties

B change color when they are mixed together

C look exactly the same as before being mixed

D are not able to be separated by hand.

2. What is the main idea of paragraph six?

A The ingredients in most mixtures are different states of matter.

B Air is a mixture made up of gases and small particles of dust.

C Some mixtures contain ingredients made of iron.

D Mixtures are separated by the physical properties of their ingredients.

3. A **mixture** is a combination of—

A two or more solids

B two or more ingredients

C a solid and a liquid

D a liquid and a gas

4. Which of the following is NOT a solution?

A Powdered drink mix and water

B Salt and water

C Italian salad dressing

D Chocolate syrup and milk

5. Which word in paragraph three is a synonym for retains?

A keeps

B ingredients

C mixtures

D separated

6. A worker in a hardware store accidentally poured some steel nails into a container of aluminum nails. All of the nails look exactly alike. What would be the best way to separate the mixture of nails?

A Heat the container until the aluminum nails melt.

B Use a hand lens to see the difference between the nails.

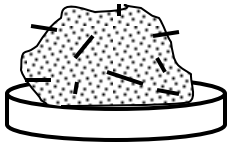
C Pour water into the container to see which nails float.

D Drag a magnet through the container to remove the iron nails.

7. Which of the following substances would **dissolve** in water?

A Powdered drink mix
B Milk
C Flour
D Cooking oil

Use the illustrations below to answer questions 8-10.



1. Sand and iron filings

2. Ocean water

3. Salad Dressing

4. Mixed Nuts

8. Which of the mixtures shown above could you separate using only your hands?

A Sand and iron filings
B Ocean Water
C Salad Dressing
D Mixed nuts

9. What is the best way to separate the ingredients in the first mixture?

A Allow the water to evaporate
B Allow one ingredient to float on top of the other
C Use a magnet to pull out the iron filings
D Use a sieve to strain the solids from the liquids

10. Which mixture could you separate by allowing one substance to float on top of another?

A Mixture 1
B Mixture 2
C Mixture 3
D Mixture 4

Combine	To mix different ingredients together
Dissolve	To mix evenly and separate into particles too small to be seen
Ingredients	The substances that mix together in a mixture
Mixture	A collection of ingredients in which the substances do not join together
Physical property	A characteristic of matter that can be observed using the senses
Separate	To split or divide a mixture into its parts or ingredients
Solution	A type of mixture in which one or more ingredients dissolve in another
Substance	A kind of matter that can mix with other matter