Name _____ Per___ Date _____ Mailbox_____

Science 8/7 Unit: Chemistry

15-3 What are mixtures?

Objective ► Describe the physical properties of a mixture.

TechTerm

► **mixture:** two or more substances that have been mixed together but not chemically combined

Mixtures The earth's oceans are made up of salt water. Salt water contains particles of salt and other substances mixed in water. The substances in salt water are not chemically combined. The salt and the water keep their own properties. Salt water is an example of a **mixture.** A mixture contains two or more substances that have been mixed together but not chemically combined. The molecules in a mixture are not all alike. Salt water contains particles of salt and molecules of water.

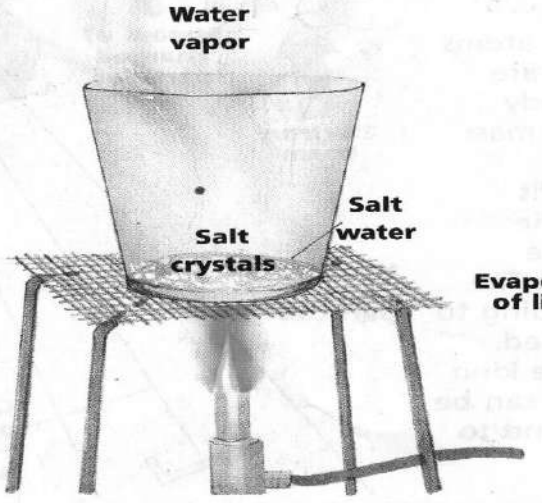
Define: What is a mixture?

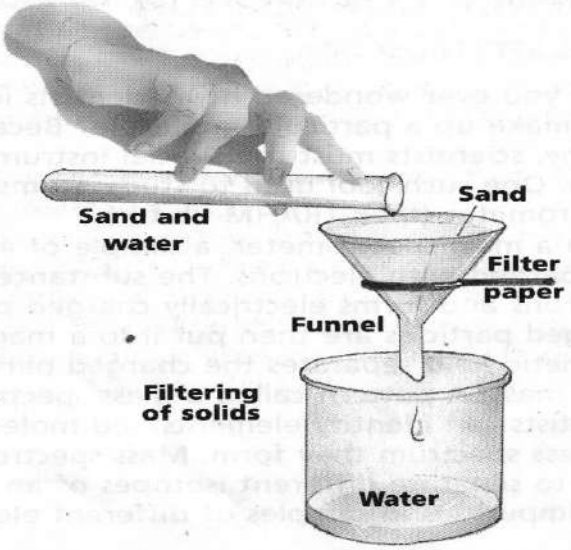
Making a Mixture The substances in a mixture can be present in any amount. A mixture of salt water may contain equal numbers of salt particles and water molecules. It also may have twice as many water molecules as salt particles. The amount of each type of substance present in a mixture can change. However, the substances always keep their own properties. All salt-water mixtures have the properties of both salt and water.

Infer: Why do the substances in a mixture keep their own properties?

Separating a Mixture The properties of the substances in a mixture can be used to separate the mixture. The substances in a mixture are not chemically combined. Therefore, they can be separated by physical means. Water evaporates when it is heated. If salt water is heated, the water will evaporate out of the mixture. Salt and other impurities will be left behind. Another way of separating a mixture is by filtering the mixture. Suppose you wanted to separate a mixture of sand and water. You could pour the mixture through a piece of filter paper. The water would pass through the paper. The sand would not pass through the paper. It would collect on the paper.

Name: What are two possible ways of separating a mixture?





15-3 WHAT ARE MIXTURES?

READING SUMMARY

- The substances in a mixture keep their own properties
- Heating a mixture of iron and sulfur will produce the compound iron sulfide.
- A compound has a definitive chemical composition, while a mixture does not.
- A mixture can be separated by physical means, while a compound can be separated only by chemical means.

15-3 PRACTISE

DIRECTIONS: Write true if the statement is true. If the statement is false, change the underlined term to make the statement true.

1. **Salt water is an example of a compound.**

2. **The substances in salt water are not chemically combined.**

3. **All the molecules in a mixture are alike.**

4. **The substances in a mixture keep their original properties.**

5. **A mixture can be separated by chemical means.**

6. **Salt water can be separated by filtering.**

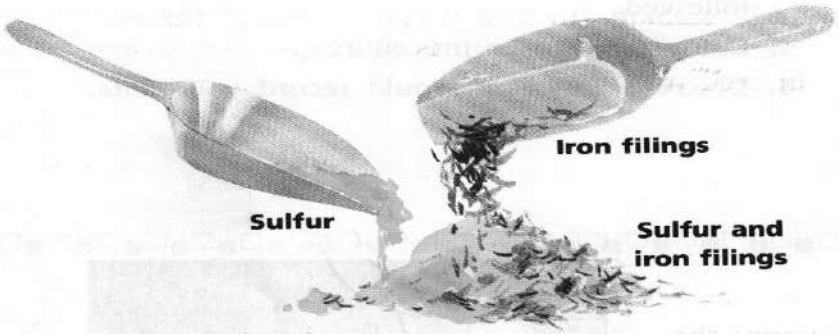
7. PREDICT: How could a mixture of iron and sulfur be separated?

8. Classify: A teaspoon of instant coffee is place in a cup of water. Is this a mixture or a compound? Explain your answer.

15-4 How are compounds and mixtures different?

Objective ▸ Contrast the properties of compounds with the properties of mixtures.

Making a Mixture The substances in a mixture are not chemically combined. You can make a mixture of iron filings and sulfur simply by mixing the substances together. Each substance in the mixture will keep its own properties after being mixed. Iron filings are magnetic slivers of grey metal. Sulfur is a nonmetallic yellow powder. You can see the grains of yellow powder and slivers of grey metal in a mixture of these substances.



Infer: How could a mixture of iron filings and sulfur be separated?

Making a Compound A compound is made up of more than one element. The elements in a compound have been chemically combined. Iron sulfide is a compound. It contains the elements iron and sulfur. If you heat a mixture of iron filings and sulfur, you will produce the compound iron sulfide. Heating the mixture causes the iron filings and sulfur to combine chemically.

Explain: What happens when a mixture of iron filings and sulfur is heated?

Comparing Mixtures and Compounds Mixtures and compounds are different in several ways. A mixture of iron and sulfur does not have a definite chemical composition. The mixture might contain equal parts of each element. It also might have twice as much iron as sulfur. Each substance in a mixture of iron and sulfur keeps its own properties. A mixture of iron and sulfur can be separated by simple physical means.

The compound iron sulfide always has a definite chemical composition. A molecule of iron sulfide always contains one part iron and one part sulfur. This is because the elements in the compound have been joined chemically. When elements are combined chemically, each element loses its properties. The iron and sulfur in iron sulfide cannot be separated by physical means.

Table 1 **Comparing Mixtures and Compounds**

MIXTURES	COMPOUNDS
Made of two or more substances mixed together	Made of two or more substances chemically combined
Substances keep their own properties	Substances lose their own properties
Can be separated by physical means	Can be separated only by chemical means
Have no definite chemical composition	Have a definite chemical composition

Contrast: How are mixtures and compounds different?

https://youtu.be/A5H6DVe5FAI <- watch

What is the chemical composition of fool's gold? _____

_____

15-4 HOW ARE COMPOUNDS AND MIXTURES DIFFERENT?

READING SUMMARY

- The substances in a mixture keep their own properties
- Heating a mixture of iron and sulfur will produce the compound iron sulfide.
- A compound has a definitive chemical composition, while a mixture does not.
- A mixture can be separated by physical means, while a compound can be separated only by chemical means.

15-4 PRACTISE

COMPLETE ALL OF THE FOLLOWING

1. **The elements in a _____ are combined chemically.**

2. **Each substance in a _____ keeps its own properties.**

3. **A _____ does not have a definite chemical composition.**

4. **A _____ can only be separated by chemical means.**

5. **A _____ always has the same chemical composition.**

6. **A_____ can be separated by simple physical means.**

7. INFER: When a certain poisonous gas is combined with flammable metal, a fine white powder results. The powder is neither flammable nor poisonous. Is the powder a mixture or a compound? How do you know this?

8. HYPOTHESIS: Would all samples of salt water taste the same? Explain?

MIXTURE MIX-UP LAB

In class, you will be given a mixture of the materials and tools listed below. How can we take advantage the various individual physical properties of these substances to separate them all back out again in to their individual materials prior to being all mixed up? Take a look at the materials and consider the hints below.

Materials in the Mixture:

- Barley
- Sand
- Salt
- Packing Peanuts
- Iron Filings

Materials Available to Separate the Mixture:

- Magnet
- Paper (for individual piles)
- Balloon
- Water
- Filter and funnel
- Spoon

SEPARATION OF MIXTURES – HINTS

As we have learned, mixtures can be separated into their parts by physical means. This has broad reaching implications from the extraction of mineral resources in mines to the sorting of recyclables in recycling plant to the formation of river deltas and sandy beaches. Here are some things to consider:

- **Filter paper** – if one substance is a liquid and the other a solid, liquid will pass through the filter pores and the solid will be retained. (like coffee does)
- **Sifting** – if you "sift" substances on say a piece of paper back and forth repeatedly particles will begin to arrange themselves by size. (just like pan handling gold) try it!
- **Evaporation** – if one substance dissolves into liquid water and another does not, you can remove the solution formed from non-dissolvable materials.
- **Magnets** – If a substance is magnetic (like iron filings) you can pull it out of mixture as long as materials aren't all stuck together by say, water.
- **Static electricity** – In some instance a static electro charge can be used to from oppositely charged materials from mixtures.

NOTE: For this lab write-up you must use complete sentences and proper grammar. Points will be deducted for spelling errors of science content words. If you do not have *great hand writing skills*, you need to put in extra effort, or simply type the report!

State the Problem/ & your hypothesis:	

PRE-LAB: In this particular experiment, you will be tasked with coming up with a procedure to separate all the substances out of mixture. You will require a minimum of six steps. Each step should address all of the listed materials and include water. You'll need to mention the material substances and the tools you intend to use for each step.

1._____

_____

_____

2._____

_____

_____

3._____

_____

_____

4._____

_____

_____

5._____

_____

_____

6._____

_____

_____

Place checks in boxes of tools you used or considered for each substance.

DATA CHECK:	Magnet	Spoon	Balloon	Water	Filter paper & Funnel
Barley					
Packing Peanuts					
Iron Filings					
Sand					
Salt					

POST-LAB: Answer the following conclusion questions with complete sentences.

1. Which material did you find most difficult to separate and why?

_____

_____

_____

2. Why may have it been important to follow the procedure and why to separate everything? Discuss water: _____

_____

_____

3. Which step had to be completed last and why explain why? _____

_____

_____

_____

4. If sugar was used instead of salt, would you have to change your procedure? Explain why?

_____

_____

_____

5. Explain how the balloon may have helped you in sorting materials? Did it work? Explain.

_____

_____

_____

6. Did you have any errors? Did anything not separate? Regardless, even if it all went fine explain where it could have gone wrong? _____

_____

_____