

## Salt Activity #1

Name \_\_\_\_\_

Research **one** of the following questions. Your answer will be in the form of a paragraph with a topic sentence, supporting details, and a conclusion. Be prepared to share your paragraph with the class tomorrow. You should **cite at least two sources** of information in proper format.

1. Why is salt important?
2. What are some uses for salt?
3. What products in your home contain salt (may also be labeled as sodium chloride or sodium)? Can you think of any other products made from salt or a by-product of salt?

## Answer Sheet for Salt Activity #1

The following are possible answers. Others may also be acceptable.

1. Salt is important because without salt we cannot live. The human body contains about eight ounces of salt. Salt is involved in muscle contraction, including the heartbeat, nerve impulses, and in the digestion of protein. It regulates the exchange of water between our cells and their surrounding fluid which carries food in and waste out. If blood cells are put in a salt-free fluid, they burst. Without salt, the body goes into convulsions, paralysis, and death.
2. There are an estimated 14,000 uses for salt. Some of the primary uses are:
  - Human and animal nutrition
  - Water conditioning
  - Winter roadway safety
  - Chemical feedstock
  - Paper production
  - Metal processing
  - Rubber manufacturing
  - Grinding agent
  - Soap making
  - Hide processing and leather tanning
  - Food preservative
  - Food flavoring
  - Food processing
3. Some products in the home that contain salt are:
  - Cheetos
  - Baked beans
  - Peanut butter
  - Spam
  - Tuna
  - Chicken noodle soup
  - Canned vegetables
  - Cranberry sauce
  - Butter
  - Velveeta cheese
  - Hidden Valley dressing
  - Tomato sauce
  - Mayonnaise
  - Salsa
  - Ketchup
  - Maple syrup
  - Soy sauce
  - Ramen noodles
  - Cheerios
  - Poptarts
  - Brownie mix

## Salt Activity #2

The human need for salt has shaped history. Civilizations rose in Africa, China, India, and the Middle East around rich salt deposits. Map each of the developments listed below on the world map provided. Use an atlas to help you. Label the name of the place and the corresponding clue number. Then color as indicated.

1. In earliest times, man, the hunter, got his salt from raw meat, as does the Eskimo hunter. When man began to farm, cereals did not give him enough salt, so the great salt hunt began. Label Alaska and leave it white to symbolize early man and the Eskimo hunter.
2. In China, about 2,700 B.C., the Peng-tzao-kan-mu, the earliest known writing on pharmacology was published. A major portion of this writing discussed more than 40 kinds of salt and included descriptions of two methods of extracting salt. Chinese folklore recounts the discovery of salt. In 2200 B.C.E. the Chinese emperor, Yu, made salt taxes a major source of revenue. Color China red.
3. Salt was very important economically. Ancient Greeks exchanged their slaves for salt. That is where the expression "not worth his salt" originated. Color Greece yellow.
4. Salt was used as money in many places throughout history. In Ancient Roman times, Roman soldiers were paid partially in salt, a salarium, from which the English word salary is derived. King Ancus Martius (640 - 616 B.C.) founded the first Roman colony at Ostia because of the salt marshes there and the Via Salaria (Salt Road) was built to carry salt to the city. Locate and label Rome, Italy.
5. Twentieth century Ethiopia used salt disks as money. Stacks of them were kept in the treasury. A bride price of salt is customary in Ethiopia. Color Ethiopia green.
6. In the past, in Sudan, where salt was scarce, it was traded for gold. Color Sudan orange.
7. Salt has played a crucial role in religion. There are more than thirty references to salt in the Bible. The Israelites were required to include salt with all offerings. Ancient Jewish temples included a salt chamber. For hundreds of years Roman Catholic priests would place a pinch of salt on a baby's tongue during baptism and say, "Receive the salt of wisdom." When Lot's wife disobeyed God and looked back at the destruction of Sodom, she turned into a pillar of salt. Locate Israel as representative of salt's religious importance. Color Israel purple.
8. Salt has had military importance. For example, it is recorded that thousands of Napoleon's troops died during his retreat from Moscow because their wounds would not heal due to a lack of salt. Locate and label Moscow, Russia.
9. During the Civil War, Northern generals targeted the South's salt-production facilities because they knew that armies and civilians needed salt to maintain health, preserve food, and tan leather. Color the southeastern United States brown.

10. Settlement patterns were influenced by salt. People have made their home for thousands of years near Hallein, Austria. In 600 B.C. underground mining began. There are relics from Roman times into the Middle Ages that have been found there. For several hundred years this town was the center of the European salt trade from which the name of the state, Salzburg and its capital originated. Locate and label Salzburg, Austria on your map.

11. Salt taxes have led to angry riots. In the late 1700's hogs and cattle began dying in Britain for lack of salt. Farmers couldn't afford the high salt taxes. Angry mobs rioted. Finally, the Parliament abolished the tax. Color Great Britain (The United Kingdom) black.

12. France's long-disputed tax on salt was partially responsible for the French Revolution. The new Assembly ended the tax in 1790, making salt affordable. Color France red.

13. In 1930, Mahatma Gandhi undertook a 200 mile march to the sea to protest Britain's salt tax and the prohibition against gathering one's own sea salt. This started India on its path to independence. Color India green.

14. The Erie Canal, opened in 1825, was known as the "ditch that salt built" because salt was its principal cargo. The salt taxes also helped pay for the canal. Color the Erie Canal, near Syracuse, New York blue.

15. Powerful monopolies in salt have grown through the ages. One example is the first patent issued by the British Crown to an American settler gave Samuel Winslow of the Massachusetts Bay Colony the exclusive right for ten years to make salt by his particular method. Color Massachusetts yellow.

16. In Central Africa until the early 1900's salt could be used to buy a bride. Color the region of Central Africa purple.

17. Salt has been mined for 1000 years at Poland's Wieliczka mine. Generations of salt miners in Poland have carved a national treasure of salt sculptures in the Wieliczka salt mine near Krakow, Poland. Label Krakow, Poland.

18. Salt has been used for preserving food throughout the ages. In medieval society, with relatively poor transportation systems, villages had to be close to self-sufficient for food. In Medieval Sweden good quality arable land was scarce, and had to be used for crops. That meant grazing and foraging animals, mainly cattle and pigs, were turned out into the woodlands to graze. Most meat was butchered in the fall due to a lack of winter fodder. This meat was preserved with salt. Color Sweden orange.

### Salt Activity #3

Geologists believe that all salt deposits were formed by the oceans or from enclosed bodies of salt water. Evaporating water left beds of salt, which often were buried by rock strata. Beds of salt can be from a few feet to over 100 feet in thickness. Layers of salt deeply buried by rock strata may become mobilized by great pressure and flow upward to form salt domes. Salt domes are a source of salt for many salt mining operations.

There are three methods for mining salt. In conventional underground mining, a shaft is sunk deep into the salt deposit, usually 600 to 2,000 feet below the surface. Miners then drill into a wall so that explosives can be placed to loosen the rock salt. Trucks or shuttle cars then carry the broken salt to a preparation station where it is crushed and screened. It is then taken to an elevator and hoisted up to the surface. The largest known U.S. salt beds occur in Louisiana, Texas, New York, Ohio, Michigan and Kansas. Locate and color these states blue on your U. S. map.

A brine well operation involves a small pipe to introduce water into a salt deposit, and a larger pipe to remove the brine formed when the water dissolves the salt. The water from the brine will be removed by heat processing that leaves granular salt. Occasionally natural brine deposits are found underground. In these cases, the brine is pumped to the surface where it is processed. Huge underground brine deposits have been found in Michigan. Locate and color this state yellow.

The third method is solar evaporation of sea water or natural brine. This process requires certain climatic conditions: abundant sunshine, little rainfall, and ample wind. The system has one series of ponds, called concentrating ponds, where brine is increased in concentration to the point where salt is about to crystallize. The brine is then transferred to crystallizing ponds where further evaporation causes salt to crystallize and form a salt bed. The remaining seawater is drained away and the salt is removed with special equipment called harvesters, then washed and screened. This method is used in several areas of the U.S. including the Great Salt Lake in Utah, San Francisco and San Diego Bay areas in California and Syracuse, New York. Locate and label these areas on your map.

## Salt Activity #4

Name \_\_\_\_\_

### Overview

You are going to set up and observe a solar evaporation mining experiment. Each day for a week you will make and record observations in the space provided below. Be detailed in what you observe. On the final day, you will be asked to draw conclusions concerning solar evaporation mining of salt based on this experiment.

### Procedures

1. Mix 3 1/2 level teaspoons of salt with 1/4 cup of water to make brine.
2. Place the brine in a shallow container. Make sure the water is no more than 1/8 of an inch deep.
3. Place the container in a sunny or warm place.
4. You will make observations on what you see in your container on the first day, third day, fourth day, fifth day, and sixth day.
5. On the seventh day, the water should be evaporated. Using a magnifying glass, examine the salt crystals that have formed. Draw and describe their characteristics. Then answer the conclusions questions.

### Observations

Day 1:

Day 3:

Day 4:

Day 5:

Day 6:

Day 7:

### **Conclusions:**

Were you able to extract salt from brine using this method? Why or why not?

Do you think large amounts of salt could be obtained using this method? Why or why not?

What conditions would need to exist to obtain large amounts of salt using this method?

Do you think this is an economical way to obtain large amounts of salt? Why or why not?

**Salt Activity #5**

Name \_\_\_\_\_

World salt production totaled 280 million tons in 2017. Below are listed the top ten salt producing countries in the world. Create a bar graph to show this data. Use the scoring guide provided to check your work.

Country	Salt Produced in Millions of Tons
United States	43
Mexico	9
India	26
Germany	13
France	6
China	68
Chile	12
Canada	13
Brazil	7.5
Australia	11

**Graph Scoring Guide**

My name is on my graph (1 pt) \_\_\_\_\_

My graph has a title (1 pt) \_\_\_\_\_

The x-axis has a title (1pt) \_\_\_\_\_

The x-axis has the appropriate intervals (1 pt) \_\_\_\_\_

The y-axis has a title (1 pt) \_\_\_\_\_

The y-axis has the country names (1 pt) \_\_\_\_\_

The data from the chart is correctly graphed (4 pts) \_\_\_\_\_

Total \_\_\_\_\_/10 pts



**Answer Key**

Salt Production in Millions of Tons

