

Changing Matter in Colonial Days

Summary

In the following activities, the students will experience making some of the products used in Colonial life. They will also see whether the product was produced by a physical or chemical change.

Group Size

Small Groups

Materials

Activity One Station--Making Soap, Chemical Change

- Pictures of process
- Ash hopper picture
- Student journal

- [Notes on Making](#)

- Store soap
- Hand-made soap
- Extension cord
- Heating unit
- Measurement Cup
- Stainless steel pan
- Steel pot
- Wooden spoon
- Soap mold pan
- Rubber gloves
- Safety glasses
- Lye
- Lard
- Cold water
- Digital scale

Activity Two Station--Making Sundried Bricks, Physical Change (baked in sun); Chemical Change (baked in oven)

- Pictures of process
- Student journal

- [Notes on Making](#)

- Store brick
- Hand-made clay brick
- Brick mold
- Measurement cup
- Deep bowls
- Sand
- Clay dirt
- Straw, cut up
- Water
- Digital scale

Activity Three Station--Making Candles, Physical Change (making), Chemical Change (burning)

- Pictures of process
- Student journal

- [Notes on Making](#)

Store candle
Hand-made candle
3 - V8 cans
Hot plate
Sauce pan
Paraffin wax
Wick
Hot water
Cold water
Digital scale

Activity Four Station--Making Yarn for Weaving, Physical Change

Pictures of a loom, a spindle, sheep sheers, sheering sheep, spinning wheel
Student journal with reading notes about yarn

- [Notes on Making](#)

Store bought yarn and home spun yarn
Large scissors
2 Wool carders
Drop spindle/wire hook
Cardboard
Skeen of yarn
Wool, unprocessed
Paper towels
Digital scale

Additional Resources

Books

Colonial Living, by Edwin Tunis; ISBN 9780801862274 (Paperback)

If You Lived in Colonial Times, by Ann McGovern; ISBN 059045160X (Paperback)

If You Lived In Williamsburg in Colonial Days, by Barbara Brenner; 0590929224 (Paperback)

Background for Teachers

In the early colonial times of the 17th Century, everyone was mostly responsible for growing, making, and constructing their own things for survival. This included building cabins and digging wells. They made furniture, doors, latches, toys and tools. They grew their own crops, learned how to cook food, and learned how to store the food and crops to make them last through the winter. They needed bricks for their chimneys, walkways, fireplaces, and roads. Soap and candles were necessary for their cleanliness and for light at night. They also had to learn the great art of making cloth from plants and wool to make clothes. It was truly ingenious how the colonists and their predecessors discovered how to make some of these products. Certain tools were also discovered for the need of making the products.

As we think about the things they made, we can see that they all started from raw matter. This raw matter was changed into a useful product. Some of the "raw matter" went through a physical change and some of the "raw matter" went through a chemical change. The hard part was producing the items by hand with their hand tools. Even today, each finished product starts from raw matter and is changed into a useful product through physical and chemical change. However, today we have other forms of energy and more sophisticated tools.

In the student readings, the students were able to see what "raw matter" was used to make some useful products in colonial days. The students read about the tools that were needed to make these products. They saw that in most cases it was hard, long work.

In the following activities, the students will experience making some of these products. They will rotate through four stations and make the products or observe the products being made. They will experience how colonial people made candles, soap, adobe bricks, and yarn to make cloth in these rotations. Students will personally make some of these products from raw matter, and some will be made by a teacher demonstration for the purpose of safety. Each student will keep a record in a journal of how the product was made and what they discovered. They will also see whether the product was produced by a physical or chemical change.

Intended Learning Outcomes

1. Use science process and thinking skills.
2. Manifest science attitudes and interests.

Instructional Procedures

Invitation to Learn

Explain to the students that when a colonial town was established, some colonists wanted to earn money by having a business instead of farming all day. They had shops making products that colonists needed on a regular basis. From the back of the book *If You Lived in Colonial Times* read out loud some of the stories of what the workers made. Ask questions as to where they got the raw matter to make these products. Ask questions of how the raw matter changed into new products. Students might be able to speculate how the products were made from beginning to the end. Ask questions if the products are a result physical or chemical change.

There is one story about the blacksmith in the book. The blacksmith was the most popular citizen in the town because he knew how to make iron which was strong. The making of iron is a chemical reaction ($\text{Fe}_2\text{O}_3 + 3\text{CO} = 3\text{CO}_2 + 2\text{Fe}$). He could make it into any shape by request with hot coals. Below is some background information that will help them understand how iron was made.

"The basic materials to make iron are iron ore, coke (made by breaking down coal by heating it), and lime (from limestone). The iron ore, coke and lime are put into a furnace. The main purpose of the coke is to use it as a fuel to heat the furnace. As the iron ore melts and the coke burns, the oxygen in the iron ore and the carbon from the coke combine to form carbon dioxide gas. This gas escapes from the furnace leaving a metallic product called pig iron. This pig iron still has impurities which makes weak iron. The purpose of the lime is to aid in the removal of any unwanted impurities in the pig iron such as silicon and phosphorus. The lime produces more carbon monoxide and combines with these unwanted impurities and produces "slag". This slag is in the form of a solid. Even though the slag is a solid, it is lighter than the liquid iron and forms on the surface of the liquid iron. The slag is then lifted off the top of the liquid iron. What is left in the furnace is almost pure iron."

Instructional Procedures

Activity One Station--Making Soap, Chemical Change

Pre-activity

Have students take out their journals for the review.

Review what the students learned about how colonists made soap.

Discuss how colonists found the materials and tools for making soap.

Show a picture of the "soap making" setup and the ash hopper and have a discussion about their uses.

Show the container of lye. Discuss why lye was put in the soap. (For disinfecting.)

Show the box of lard. Discuss why lard was put in the soap. (For cleaning.)

Show a sample of the real lye soap with today's soap. Pass them around and have them discuss what they observe as differences between the two students.

Pass out the activity sheet *Notes on Making* _____. (Have students put Soap on the line.)

Have the students write the tools needed to make soap. Explain why each is needed and have

them write the reasons.

- a. Heating unit (for heat)
- b. Measuring cup (for measuring the ingredients)
- c. Stainless steel pan (for making the lye water)
- d. Steel pot (for making the soap)
- e. Wooden spoon (for stirring the ingredients while it cooks)
- f. Soap mold (for shaping the soap)

Have the students write down the ingredients needed to make soap. Explain why each is needed and have them write the reasons. Weigh out each ingredient and record the weight.

- a. 1/2 pound lard (for cleaning)
- b. 2/5 cup lye (for disinfectant)
- c. 1 cold cup water (making lye water)

Have the students put on their safety glasses.

Making the Soap (This needs to be done outdoors.)

As the soap is being made, have the students write the procedure on their activity sheet.

Put 1/2-pound of lard in the steel pot.

Put the steel pot on a heating unit on high heat to melt the lard. Ask students, "What type of change is this when the lard melts? Explain." (Physical--it is just changing form but is not a new product.)

While it is melting make the lye water. Put the water into the stainless steel pan. Let them feel that the water is cold. Pour the lye into the cold water. Stir it until the lye is dissolved. It will begin to show steam coming from the pan. Ask them, "What type of change is happening in the pan? Explain." (Chemical--it is giving off heat.)

When the lard is melted and it's not too hot, slowly pour in the lye water.

Stir the mixture constantly over medium-high heat for about twenty minutes until the soap is bubbly and creamy like that of a thin milkshake.

During the twenty minutes it is cooking, talk about the importance of soap during colonial times. (It kills germs, cleans off dirt, keeps us from smelling bad, makes people look clean, keeps things sanitary, etc.)

Also during this twenty minutes, have the students list at the bottom of the activity sheet what the colonists used the soap for. (Wash hair, hands, body, dishes, clothes, tools, animals, cabin, etc.)

When the soap gets to be quite thick and bubbly, pour the soap into the soap mold (bread pan). Get as much out as your can.

Ask students, "What type of change is this? Explain." (Chemical--a new product is made.)

Explain to them that the lye is no longer lye and the lard is no longer lard. They have mixed as a chemical change where a new product is made for cleaning.

Have the students write down their special observations and thoughts about making soap.

Have the students write down on the activity sheet what kind of a change it is and explain why.

The next day take the soap out as a whole piece. Weigh it. Ask them, "Does it weigh the same as the sum of the three ingredients put in?" Have them write their conclusion. (No, but it is close. Some of the water evaporated and not all of the soap was taken out of the pan.)

Cut the soap into eight squares.

The squares need to be set aside for about a month. (There is a residue of a weak lye solution on the cubes. It is not harmful, but can sting the skin. Setting the lye aside for the month lets the lye solution evaporate. It does work like soap.)

Activity Two Station--Making Sundried Bricks, Physical Change (baked in sun); Chemical Change (baked in oven)

Pre-activity

Have students take out their journals for the review.

Review what the students learned about how colonists made sundried bricks.

Discuss how colonists found the materials and tools for making sundried bricks.

Show pictures of colonists making sundried bricks and discuss the pictures.

Pass out the activity sheet *Notes on Making _____*. (Have students put *Sundried Bricks* on the line.)

Have the students write the tools needed to make bricks. Explain why each is needed and have them write the reasons.

- a. Bowls (mixing in)
- b. Brick mold (shaping the brick)
- c. Measuring cup (for measuring the ingredients)

Have the students write down the ingredients needed to make bricks. Explain why each is needed and have them write the reasons. Weigh out each ingredient and record the weight.

- a. 1 cup clay dirt (main ingredient)
- b. 1/3 cup water (for making mud)
- c. Handful of straw (for strengthening the brick)
- d. Sand (to use as a lubricant)

Have the students put on their safety glasses.

Making the Sundried Bricks

Put the 1 cup of clay dirt in the bowl.

Put 1/3 cup of water in the bowl. Mix it together until it has the consistency of bread dough. (If more water or more dirt is needed, weigh it out first then add it.) Ask students, "What type of change happened? Explain." (Physical--it is just changing form but not a new product.)

Once the water is mixed with the clay dirt, add a small handful of cut up straw. Ask, "What type of change is happening in the bowl? Explain." (Physical--it is just changing in looks but not a new product.)

Wet the mold with water and sprinkle sand on it.

Put the brick dough into the mold. Press as hard as you can with your hand to compact the brick dough.

Shake out the brick while it is still wet. It should come out easy because of the sand.

After the students make their bricks, have them write the step- by-step procedure.

Have the students write down the colonists' uses of the bricks.

Have them write down any special observations and thoughts they had while they were making the bricks.

Let them bake in the sun for two days--one day on one side and one day on the other side.

After two days, weigh the bricks. Ask them, "Does it weigh the same as the ingredients added together? Explain." (No. The water has evaporated.)

Ask them, "What type of change is this? Why? (Physical change--the ingredients are still the same--clay and straw)

Have the students write down on the activity sheet what kind of a change it is, and explain why.

Ask, "What type of a change is it if the brick was put in an oven? Explain." (Chemical change--the clay melts and combines together with the other clay particles and becomes a new product.

It is much more solid and stronger.)

Activity Three Station--Making Candles, Physical Change (making), Chemical Change (burning)

Pre-activity

Have students take out their journals for the review.

Review what the students learned about how colonists made candles.

Discuss how colonists found the materials and tools for making candles.

Show pictures of colonists making candles and discuss these pictures.

Pass out the activity sheet *Notes on Making _____*. Fill in the blank with *Candles*. Have the students write the tools needed to make candles. Explain why each is needed and have them write the reasons.

- a. Three tall V8 cans (one to heat the hot wax; one to hold hot wax; one to hold cold water)
- b. Hot plate (used to melt the wax)
- c. Sauce pan (used to hold hot water to heat the hot wax can)

Have the students write down the ingredients needed to make candles. Explain why each is needed and have them write the reasons. Weigh out each ingredient and record the weight.

- a. Paraffin wax (main substance of the candle)
- b. Wick (string, for the wax to build on and to light)
- c. Hot water (to create a double broiler to melt the wax)

Have the students put on their safety glasses.

Making the Candles

Plug in hot plate and set the hot plate on high.

Fill a saucepan half filled with water.

Fill a V-8 can with broken pieces of cold wax. Place it in the saucepan.

Set the saucepan (with the V-8 can filled with cold wax in it) on the hot plate.

When the water begins to boil, turn the heat down a bit so it isn't boiling as hard, but still boiling.

At this point the wax will begin to melt and continue to melt.

Add more hard wax to the can until the wax almost fills the can. (Weight each one.)

Give it about 30 to 45 minutes to get a can full of hot wax.

At this point put it on simmer until ready to use.

Give a wick to each student, the length being a little longer than the length of the V8 can.

Fill the second V8 can with cold water and put it on a table with paper on it for easy clean up.

When ready to dip candles, take the hot wax can out of the simmering water and place it on a table next to the cold water.

Heat up some more wax in the third V8 can. (Weigh out each piece.) (As the hot wax can on the table gets low, put some more hot wax in it from the hot wax can on the hot plate.)

Dip the wick into the hot wax can. Pull it out of the wax and dip it into the cold water can. This hardens the wax on the wick.

Repeat this procedure many times until you attain the desired size of the candle.

If the candle becomes crooked, it can be rolled across a smooth surface.

Have the students weigh their candles. Add the weight of each candle. See if the total matches the weight of the wax used.

After the students make their candles, have them write the step- by-step procedure.

Ask the students, "What type of change is this? Explain" (Physical change. The wax only changed form.)

Have the students write down the uses of the candles by the colonists.

Have them write down any special observations and thoughts they had while they were making the candles.

Have the students write down on the activity sheet what kind of a change it is, and tell why.

Activity Four Station--Making Yarn for Weaving, Physical Change

This will make enough yarn samples for every student.

Pre-activity

Have students take out their journals for the review.

Review what the students learned about how colonists made yarn.

Discuss how colonists found the tools and materials for making yarn.

Show the process of how colonists made yarn by showing the pictures in order of the production. Have a discussion about this process.

Pass out the activity sheet *Notes on Making _____*. Fill in the blank with "Yarn".

Have the students write the tools needed to make yarn. Explain why each is needed and have them write the reasons. Weigh out the ingredients and record the weight.

- a. Sheep shears/big scissors (to cut the wool off the sheep)
- b. Bowl (to wash the yarn)
- c. Soap (to wash the yarn)
- d. Wool carders (to make the wool fluffy)
- e. Spinning wheel/spindle (to spin the fluffy wool into yarn)
- f. Loom (to make clothing)

Have the students write down the ingredients needed to make wool. Explain why each is needed and have them write the reasons. Weigh out each ingredient and record it.

- a. Wool from the sheep (main substance)

Making the Yarn

Cut a piece of wool from the large piece of wool. Weigh it and record it.

With the warm water and soap, gently wash the wool so it is clean.

Gently dry the wool with a paper towel. Be sure to remove all the moisture.

Put the piece of wool on the carders. With the carders on top of each other and opposite each other, pull out and away. Put them on top of each other and pull away again. Repeat many times. Every once in a while, fix the wool on top of the carders. Keep repeating this until the wool is fluffy. Weigh it to see if the weight is the same.

Pull out a small tuft of wool. Hook it onto the wire hook.

With the help of another person, have the other person spin the wire hook. As the wire hook is being spun, gradually let out small bits of wool. Try not to get it too thick or too thin. Keep doing it until the wool is gone. Wool yarn has just been made.

Have the students weigh their wool yarn pieces. Add them up. See if the total matches the weight of the wool used.

Ask them, "What kind of change is this? Explain." (Physical change--It is still the same type of material.)

After the students make their yarn, have them write the step-by- step procedure.

Have the students write down the uses of the yarn by the colonists.

Have them write down any special observations and thoughts they had while they were making the yarn.

Have the students write down on the activity sheet what kind of a change it is, and tell why.

If time allows, follow the instructions below to make a mat out of yarn.

Making the Mat (optional)

Take an 8" X 4" piece of cardboard and make half-inch slits about half inches apart on both of the long ends. Fold the cardboard in half so the two slitted ends are across from each other.

Keep the slitted ends about three inches apart.

Cut off about three yards of regular yarn. Weigh it.

With the regular yarn, connect the top slits with the bottom slits by going up and down until all the slits have yarn through them keeping the opening about three inches apart. Cut the yarn off and tie both ends to the ends of the cardboard.

Take the rest of the yarn and tie it to the eraser end of a sharpened pencil. Tie the other end to the one of the end strings on the loom.

With a pencil, weave the pencil in and out of the yarn strings on the loom. Then, pull the yarn through. The first weave has just been made. Take the pencil back the other way, weaving it through the yarn strings on the loom. It is back where it started.

Keep doing this over and over until the loom is filled with woven yarn.

Ask them, "What kind of change is this? Why? (Physical change--It is still the same type of

material.)

Have the students write the step-by-step procedure.

Have the students write down any special observations and thoughts they had while they were making the yarn mat.

Have the students write down on the activity sheet what kind of a change it is, and explain why.

Extensions

Curriculum Extensions/Adaptations/ Integration

The advanced learners can learn more about how iron was made. Have them read more about the blacksmith and how he was able to make iron. They can also read how he was able to bend iron to make different products.

The advanced learners can learn more about the tools used in the activities and about how they were made.

The advanced learners can learn more about the physical and chemical reactions of each of the activities.

The advanced learners can learn about other products that were made by colonists--how they were made and if the product is a result of physical or chemical change.

For learners with special needs, there are many easy reader books in the library that tell about colonial living. After they read them, have them write if the product is a physical or chemical change.

Family Connections

Have the students take home their product from each station. Have them tell about each one by describing how it was made. Have them tell if each was the product of a physical or chemical change.

As a family visit Pioneer Heritage Park and see how these products and others were made.

Watch carefully if they were made by physical or chemical changes.

Assessment Plan

Review the activity sheets that students did. Check for accuracy and completeness.

Take pictures of the students at each of the activities. As the pictures are shown, have the students relate what is happening at each station. Have them relate whether it was a physical change or a chemical change.

Make an assessment with each of the products of the four stations with pictures. Have the students tell if each product is a result of a physical change or a chemical change. Have them explain why.

Bibliography

Research Basis

Myhill, D. (2006). Talk, talk, talk: teaching and learning in whole class discourse. *Research Papers in Education*, Vol. 21, No. 1, pp. 19-41

It is important that teachers don't take up too much of student learning time by talking that limits opportunities for pupil learning. Teachers are encouraged to only take up about 15 minutes of whole class time. Teachers are encouraged to use questions for student interaction with each other for discussion and discovery. The teacher only acts as a facilitator during the student learning time. Teachers are also encouraged to have students work in groups to learn from each other.

Bransford, J.D., Brown, A.L., & Cocking, R. R. (Eds). (1999). *How people learn: brain, mind, experience, and school*. Washington, DC: National Academy Press

Hands-on learning provides the students with kinesthetic, auditory, and visual learning. As students perform hands-on tasks, they make learning happen for themselves. They learn quickly from their

experiences. They begin to make a connection to their world. As this approach is being taught the students learn through the process of inquiry. The teachers should ask many questions during science lessons to make students' thinking process complete.

Authors

[Utah LessonPlans](#)