

# Rice Krispie Rocks

**Estimated Time: 30-60 minutes of prep, 20-30 minutes of identification**

## SUMMARY

Rock identification in geology involves examining rocks and following flow charts or detail. Does this rock have more of mineral A or more of mineral B? What shape are those pieces and how did they come together? Once you have a name, it can tell you a lot about how the rock came to be there, but identification can take practice and patience. Luckily in this activity you can identify rocks and get a sweet snack too!

## WHAT YOU'LL LEARN

- Different types of sedimentary rocks and their characteristics.
- How to identify rocks based on their composition.
- How to make marshmallow cereal treats.

Materials Used (per rock)	Resources Used
<ul style="list-style-type: none"> <li>● 8" x 8" or 9" x 13" baking pan</li> <li>● 1.5 Tb butter (margarine not recommended)</li> <li>● 5 oz (about 20) marshmallows or 2 cups mini-marshmallows</li> <li>● 3 cups of cereal, combinations of...               <ul style="list-style-type: none"> <li>○ Rice Krispies</li> <li>○ Cocoa Krispies</li> <li>○ Kix</li> <li>○ Cocoa Puffs</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>● Video for younger students: <a href="https://www.youtube.com/watch?v=Smn0aChFuXM">https://www.youtube.com/watch?v=Smn0aChFuXM</a></li> <li>● Video for older students: <a href="https://www.youtube.com/watch?v=Etu9BWbuDIY">https://www.youtube.com/watch?v=Etu9BWbuDIY</a></li> </ul>

## WHAT TO DO

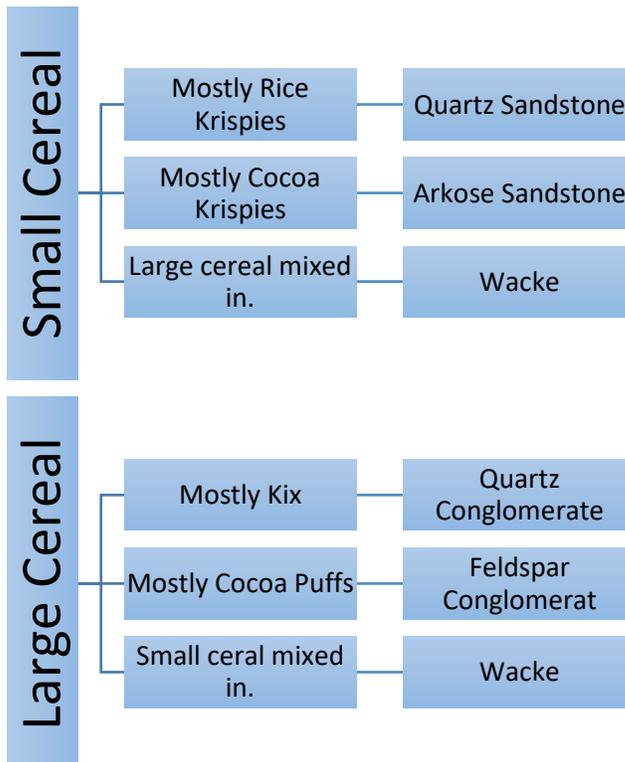
### Sedimentary Rocks

1. We'll start by making sedimentary rocks out of our ingredients. Here is the recipe, straight from the Rice Krispies website! Note that "cereal" can be a few different items, as described below.
  - a. Melt the butter in a large saucepan over low heat. Add marshmallows and stir until completely melted, then remove from the saucepan.
    - i. Alternatively, you can put the butter and marshmallows together in a microwave safe bowl and heat on High for 3 minutes. Stop and stir after 2 minutes, then finish. Continue on as normal.
  - b. Add cereal and stir well until coated.
  - c. Using a buttered spatula or wax paper, evenly press mixture into an 8"x8" baking pan coated with cooking spray. If you're making a few rocks at a time, you can instead press them each into half of a 9"x13" baking pan.
2. For the "cereal" in the recipe, choose one or two of the cereals listed under "Materials." What you choose will decide what kind of rock you are making! Geologists describe

sedimentary rocks based on the **size** and **composition** of the grains in them. The two most common types of grains are feldspar and quartz, represented here by the chocolate and “plain rice” options.

Ingredients	Represents	Sedimentary Rock	Notes
Cocoa Krispies	Small feldspar grains	Arkose Sandstone	Really arkose just has at least 25% feldspar.
Rice Krispies	Small quartz grains	Quartz Sandstone	Contain more than 90% quartz and chert.
Cocoa Puffs	Large feldspar gravel	Arkose Conglomerate	Typical of glacier deposits.
Kix	Large quartz gravel	Quartz Conglomerate	Often formed by river deltas.
Cocoa Puffs/Kix and Rice/Cocoa Krispies	Mix of different grains	Wacke	Pronounced like “wacky.”

- In other words, you could mix up a pan of marshmallow mixture and Kix cereal to make a “quartz conglomerate.” Next you can make a batch of “arkose sandstone” using the marshmallow mixture and Cocoa Krispies. A “wacke” rock is made of large and small grains jumbled together so just mix it up.
  - Anything that’s not a feldspar grain or a quartz grain is a “lithic grain.” If you want to get more complicated, add Fruity Pebbles as a third grain type for lithic grains. These can make “lithic sandstone” rocks to add to the mix or be part of the small-grain portion of a wacke.
  - There are hardly any rocks that are all one type of grain. Consider making a batch of 1 cup Rice Krispies and 2 cups Cocoa Krispies; would you call this an arkose sandstone or a quartz sandstone?
  - “Conglomerate” refers to big-grained rocks that have rounded gravel (from being bounced along a river). There are also rocks called “breccias” (sharp gravel that hasn’t been in a river much) that you can create by splitting your large cereals with a knife beforehand.
- Once the treats are cooled and cut into squares, students can use the chart to the right to identify their rocks! If you’re using “lithic grains” or “sharp gravel pieces” as discussed above, you can add branches for those as well.
  - Once you’ve identified them you can eat your rocks! **Note:** Do not eat actual rocks you find outside. They are much harder and might not taste as good!



## TIPS

- While the focus in this activity is on composition and identification, the videos in the “Resources” section at the beginning describe *how* sedimentary rocks are formed. Grains (or “clasts”) are broken off of larger rocks (removed from the cereal box) and moved to a new location (mixed into the marshmallow and butter). Then they “lithify” into a rock, represented by the cooling of the mixture into a solid treat.
- The preparation time for this activity can be fairly long, but it’s also an opportunity to teach other topics to students. The melting of the butter is a phase change, the mixing of the sugary marshmallow is dissolving, and using butter or cooking spray to avoid sticking takes advantage of the non-polar nature of oils. See some of our food science activities for resources and make this a two-for-one lesson!
- When doing this activity for multiple students, consider working with each of them to make a rock type and then trading. Student A can help to make a few batches (or two rocks to fill a single 9x13 pan) and then they get the treats that Student B made.
- While this activity only covers sedimentary rocks, it can easily be extended to metamorphic and igneous rocks as well.
  - To make a **metamorphic rock**, take the sedimentary rocks you made and press them slightly. You will see the cereal pieces start to “smoosh” and deform, representing how minerals are remade in the metamorphic process. Press even more and they will smoosh further and further, just like increased heat and pressure makes progressively more altered metamorphic rocks. You will likely be able to tell what the smooshed cereals were, though it might get more difficult and you might have to guess whether they started big or small. Try smooshing a treat in secret and seeing if students can tell what it once was.
  - To make an **igneous rock**, take the smooshed metamorphic rocks and really flatten them. Break all the cereal pieces up as much as you can. Place the flattened treats into a saucepan over medium heat and cook until the butter and marshmallow mixture melts again. Stir and pour onto wax paper or a sprayed baking pan. When it’s cooled take a look at your new igneous rock, melted into liquid and then reformed. You might be able to see that it’s a little more chocolate or a little more yellow but all parts of the older rocks have been obliterated.
  - Continue the cycle into **another sedimentary rock** by breaking pieces off of the metamorphic and igneous rocks (and any leftover sedimentary rocks). Put all of these pieces into the palm of your hand and squeeze gently until they’re all stuck together. You’ve formed these new grains into a brand new sedimentary rock!