Making Detrital Sedimentary Rocks

Background:

Sedimentary rocks are made of sediments, eroded pieces of other rocks that are either compacted, cemented or crystallize after the water has evaporated from a solution. Compaction happens when water is squeezed out of porous sediments like sand and clay by layers of sediments that have piled up on top of them. Cementation occurs when minerals in solution like calcite, quartz or iron oxide seep in spaces between pieces of rock and precipitate to form natural glue.

Objective:

To distinguish between detrital sedimentary rocks that are formed by compaction from ones formed by cementation.

Materials:

1. Lab Apron
2. Salt
3. Plaster of Paris
4. Safety goggles
5. Sand
6. Pebbles
7. Scissors
8. Water
9. Three 6 oz paper cups
10. Hand lens
11. Teaspoon
12. Disposable stirring sticks

Procedure:

1. For safety wear your goggles over your eyes and keep on your lab apron.
2. Cut 3 paper cups so that each is only 3 cm deep. Do Not cut the bottom out of the cups.
3. Label each cup A, B And C
4. Fill each cup half full with water
   Part A
5. Add two heaping teaspoons of salt to the water in cup A
6. Stir the until most of the salt has dissolved
7. Add sand slowly to cup A until it almost fills the cup
8. Stir the sand and salt water together
9. Carefully pour out any excess water. Try not to spill out any sand
10. Set cup A in a place where it will not be disturbed for 24 hours
11. Make a hypothesis.

What do you think you will observe when you look at Cup A in 24 hours?

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1. Record your initial data for cup A
   Part B
2. Add one teaspoon of Plaster of Paris to the water in cup B and stir until mixed
3. Add a mixture of half sand and half pebbles to cup B.
4. Mix well. DO NOT POUR ANY EXCESS PLASTER OF PARIS IN THE SINK. It could permanently seal the pipes closed
5. Set cup B in a place it will not be disturbed for 24 hours
6. Make a hypothesis
   What do you think you will observe when you look at cup B in 24 hours?
7. Record your initial data for cup B
   Part C
8. Pour sand into cup C until it almost fills the cup
9. Stir well
10. Carefully pour out any excess water and place pebbles on top of the wet sand
11. Set cup C in a place where it will not be disturbed for 24 hours
12. Make a hypothesis.
    What do you think you will observe when you look at cup C in 24 hours?
13. Record your initial data for cup C
14. Observe the samples in cups A, B and C the next day. Use a hand lens
15. Record your findings for cup A , B and C

Observation Questions:

1. What has happened to the saltwater and sand in cup A?
2. What type of sedimentary rock would the material in cup A represent? Explain why.
3. What has happened to the mixture in cup B?
4. What type of sedimentary rock would the material in cup B represent? Explain why.
5. What has happened to the sand in cup C?
6. What type of sedimentary rock does the material in cup C represent? Explain why.

Analysis Questions:

1. Which cups show the process of compaction?
2. Which cups show the process of cementation?
3. What material forms the natural glue or cement in each cup?
4. Which cup formed a conglomerate? Explain why.
5. Which cup formed the strongest sedimentary rock? Explain why.
6. Why are all the rocks in this lab classified as detrital sedimentary rock?
7. Explain why clay might work better than sand the in cup C part of this experiment?

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Follow-up:
Take an empty, clean, clear 1 liter plastic soda bottle. Mix an equal amount of Plaster of Paris (by weight) to sand, fine gravel, and pebbles. Add layers of each mixture into the liter bottle. Add seashells to one or two of the layers. Fill the layered container with water. Observe the next day and relate what you observe to the formation of sedimentary rocks on Earth.

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