

Mixtures and Solutions

(Chemistry)

God is Pure and Holy

Spiritual Awareness: God cleanses us from sin

Water is a symbol of purity. When water is mixed with impurities, it can be filtered or evaporated to its pure form.

God is pure and He wants His children to be pure. We can never be pure in God's sight by trying to be good. Only the washing away of sin after repentance can make us pure in God's sight.

Our response to 'God is Pure and Holy'

Because God is Pure and Holy I will...

- Obey Him.
- Try to do the things He wants me to do.
- Ask God to forgive me when I sin.
- Ask Him to make me clean inside.
- Admit when I make mistakes.
- Remember the fruits of the Spirit and try to show them in my life.
- Have respect for other people.
- Put God first in my life.

Supporting devotional resource

Themes Level for Christian Studies 2, (Pure): God is pure because He is without sin.

Biblical references

Bible stories and passages

Genesis 6-8 - The world was purified by a flood.

Matthew 9:1-7 - Jesus not only healed the paralyzed man but forgave his sin.

John 4 - Jesus forgave the sins of the woman at the well.

Matthew 21:12-13 – Jesus did not tolerate the use of the temple for personal gain

1 Peter 1:19; Hebrews 9:14 - Jesus was without sin.

Mark 15; Luke 23; John 18 - 19 - Because Jesus was without sin He was able to die for us.

Exodus 30:17-21 - Those presenting an offering had to wash their hands for purity.

Memory verses

1 John 1:9 - If we confess our sins to God He will forgive us our sins and purify us from all wrongdoing.

Psalms 51:1-7 - Wash me and I shall be whiter than snow.

Isaiah 1:18 - I will wash you as clean as the snow.

Psalms 145:17 - The Lord is righteous in everything He does.

Isaiah 43:25 - I am the God who forgives your sins.

Key Questions

Why does God choose water, (and snow), to remind us of purity?

Which people in the Bible did Jesus forgive?

Why is Jesus able to forgive us for our sins?

Why do we need to ask Jesus to forgive us for our sin?

Could anyone get to Heaven by just trying to be good?

Outcomes

Students will

Knowledge

- Identify solutions and mixtures.
- Demonstrate a variety of methods for removing sediment from water: filtering, distillation, skimming, straining and sedimentation.
- Explain why solid particles may float or sink.

Skills

- Classify substances that float, sink or dissolve.
- Observe reactions of substances with hot and cold water.
- Predict the outcomes of experiments and infer why.
- Safely use substances, liquids and equipment during experiments.

Values

- Use wisdom and care when working with hot water.
- Make connections between Biblical illustrations of purity and the experiments.
- Desire to please God in all they do.
- Aim to do their best.
- Be honest and trustworthy.

Activities

- Test substances and materials to see whether they float or sink in water.
- Make a mixture, (e.g. from soil and water), and a solution, (e.g. from sugar and water). Define each.
- Evaporate salty water and collect condensation. Taste the condensed water.
- Mix salt or sugar in hot and cold water. Compare dissolving times.
- Repeat experiment with stirring.
- Investigate what mass of sugar or salt can be dissolved into a given volume of water.
- Mix soil with water, Suggest ways of purifying the water.
- Experiment with straining, filtering and sedimentation and decantation, to separate water and sediments.
- Repeat the experiment with other mixtures e.g. sand and water; wood chips and water; iron filings and water
- Decide on the best method of purification for various mixtures or solutions. Record results in table form.
- Suggest ways of purifying water that contains organic contaminants.

- Examine a sample of tank or pond water under a microscope to note presence of living organisms, then re-examine it after boiling it. Repeat the experiment using water purification tablets.
- Discuss importance of pure drinking water.
- Find out the location of reservoirs or rivers supplying local water.
- Find out how local water is purified.
- Find out what happens to household water once it leaves the home.
- Find out what happens at sewage treatment plants, and the reasons for sewage treatment.

Lesson Plan

To understand the basic components of a mixture and a solution

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<http://www.brighthubeducation.com/lesson-plans-grades-3-5/53109-mixtures-and-solutions-chemistry-lesson/>

Materials

Cups
 Water
 Salt
 Sugar
 Sand
 Pepper
 Gravel (optional)
 Plastic spoons
 Strainers
 Salad mix
 Lemonade
 Science journal or notebook paper
 Pencils
 Chocolate syrup (optional)
 Milk (optional)
 Gravel (optional)

Prior Knowledge

Place students into groups of four or five. Give each group a cup of salad mix and a cup of lemonade. Ask students to separate the salad mix and the lemonade into its original ingredients.

Teach

Discuss students' findings. Talk about how the salad could be easily separated and the lemonade could not. Talk about how a mixture can be easily separated and a solution cannot be easily separated because one substance has dissolved into another. Have students copy salt/water, sand/water, sugar/water, and pepper/water into their journals or on notebook paper leaving space between each phrase. Allow students to discuss in their groups if they think each pair is a mixture or solution. Have each student write a prediction beside the combination.

Procedure

Pass out four cups of water to each group. They will also need a small amount of salt, sugar, sand, and pepper. Give each group a couple of plastic spoons. Have scientific tools available, such as strainers. This lesson will work best if the strainers have very small holes that can retain sand and pepper.

Have students combine the salt and water. Ask them to write observations as they stir the two together. Then, tell them to separate the two. Allow them to use whatever scientific tools you have available. Remind them if they cannot separate it easily that it is a solution. Have them repeat the same process of combining the water with the sand, sugar, and pepper. When they have finished, debrief about the experiment. Talk about what students discovered. See if students can come up with other examples of mixtures and solutions.

Read about mixtures and solutions using your science textbook or from *Mixtures and Solutions*. Define mixture and solution. Talk about the important parts of each, like a mixture has two or more materials with different properties. A solution, on the other hand, is a type of mixture that is formed when one material dissolves into another.

Assessment

1. Set up an assessment station, e.g. at the back of your classroom or the science lab. Prepare a mixture of sand and gravel and a solution of chocolate syrup and milk. Also, have strainers and spoons available. Have students try to separate them and identify which one is a mixture and which one is a solution.
2. What have I learned from the study of mixtures and solutions...
 - about God?
 - about doing what God wants me to do?
 - about the Bible?

Link with Australian Curriculum

Science Year 2: Chemical Science – Properties of materials; mixtures: materials can be combined

Learning Connections

English: Science reports; retelling/sequencing events in Bible stories; vocabulary lists concerning materials and mixtures

Mathematics: weigh wet sand and dry sand; capacity observations: Take two equal quantities of sand and add water to one. Does the wet one take up more space?

Art: Collages using mixtures, e.g. sand mixed with food dyes; sand/ pieces of bark/rice/lentils mixed with glue. Experiment with colour mixing using paint.

Health: Importance of drinking pure water; health problems caused by fizzy drinks

Cooking: Mixtures and solutions in cooking