



*Grade Level: Grade 8*

*Title:*

## **Chemical and Physical Changes & External and Internal Changes in Spiritual Life**

*Denomination: Catholic*

*Lesson ID: PS-G8-01-CA*

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**PHYSICAL SCIENCE – GRADE 8 - CATHOLIC**  
**LESSON TITLE: Chemical and Physical Changes & External and Internal Changes in Spiritual Life**

**GENERAL CONCEPT: Change**

**SCIENCE LESSON CONCEPT**

- Evidence of a chemical change: color, temperature, change in state of matter
- Evidence of physical change: different forms of the same substance

**GOAL OF SCIENCE LESSON**

- Students will differentiate between chemical and physical changes.

**OUTCOME EXPECTED**

- Students will correctly identify physical and chemical changes.

**RELIGION LESSON CONCEPT**

- Evidence of internal spiritual change: hard to detect
- Evidence of external change: what is said and what is done

**GOAL OF RELIGION LESSON**

- Students will recognize that prayer and reception of the sacraments are change agents in their lives.

**OUTCOME EXPECTED**

- Students will recognize that prayer and reception of the sacraments are change agents in their lives.

## **MATERIALS NEEDED**

- Science Journal page: Physical and Chemical Change
- Pen or pencil
- Matches
- Birthday candle
- Cup
- Baking soda
- Water
- Thermometer
- 2 packages of Jello
- 1 cup of fresh pineapple
- 2 bowls
- 2 spoons
- Refrigerator
- Ice cubes for Jello
- Spoon for mixing
- Ruler or tape measure

## **MATERIALS NEEDED**

- Religion Notebook
- Pen or pencil
- Bible: Luke 13: 6-9 – Parable of the Barren Fig Tree
- Bible: Luke 8: 16 – A Lamp Under a Jar
- Bible: Luke 11: 33-36 – The Light of the Body

## SCIENCE METHODOLOGY

- **WRITE** “Change” on board.
- **SAY:** Take out the Science Journal page: Physical and Chemical Change.
- **ASK:** What is change?
- **SAY:** I want you to observe and record the items I have on the table. (matches, paper, baking soda, water, cup, thermometer, Jello, spoons, bowls, ruler or tape measure) Record them on the Science Journal page.
- **ALLOW** time for students to record items on their Science Journal page.
- **SAY:** A hypothesis is a statement of what a scientist thinks will be the result of some action. (see Science Links) For example, if I go to the light switch and flip it up, what do you believe will happen? (light will go on)
- **ASK:** What evidence do you have that your hypothesis “The light will go on” could be true? (has happened many times before)
- **SAY:** I am going to give you an action and I want you to write a hypothesis about the result. Write the action on your Science Journal page and then write your hypothesis.
- **SAY:** Action #1: What will happen when baking soda and water are mixed?

## RELIGION METHODOLOGY

- **SAY:** Just as a substance can undergo physical and chemical changes, people demonstrate evidence of internal and external spiritual changes.
- **SAY:** Please suggest some examples of external changes, such as new clothing. (hair cut, glasses, weight loss)
- **LIST** the external changes.
- **SAY:** There are three Theological Virtues - Faith, Hope, and Charity. These virtues change your substance. You begin to long for God, hope in God and love God. These Theological Virtues orient you to your spiritual side.
- **HAVE** the students write the Theological Virtues in their Religion notebook and define them.
- **SAY:** There are 4 Cardinal Virtues: Prudence, Justice, Fortitude, and Temperance.
- **HAVE** the students write the Cardinal Virtues in the Religion notebook and define them.
  - ~ Prudence guides the intellect.
  - ~ Justice guides the will.
  - ~ Fortitude guides the spirit to be brave and enduring.
  - ~ Temperance helps us conform our physical appetites and our emotions to what is good for us.
- **SAY:** Please suggest some examples of evidence of

- **SAY:** Write the action “baking soda and water are mixed” and then write what you think will happen.
- **ALLOW** time for students to write.
- **SAY:** Some possible hypotheses are:  
 The water will turn cloudy.  
 The baking soda will disappear.  
 The baking soda will collect on the bottom of the cup.
- **ASK:** Does anyone have a different hypothesis?
- **ALLOW** and record other hypotheses.
- **SAY:** Action #2: The birthday candle is lit?
- **SAY:** Write the action on the Science Journal page and record your hypothesis.
- **ALLOW** time for students to write.
- **ASK:** What hypotheses did you formulate?
- **LISTEN AND RECORD** student hypotheses.
- **IF THESE WERE NOT INCLUDED, SAY:**  
 The wick will burn.  
 The wax will melt.  
 The flame will go out.
- **SAY:** Action #3: The Jello is made.

internal changes, such as being kind. (being angry, working hard)

- **LIST** the internal changes.
- **CONNECT** the new behaviors to possible causes... someone teasing you in class might lead you to take it out on a sibling, etc.
- **SAY:** I am assigning you to one of three groups. Each group will have a Scripture selection to look up, read silently, and then discuss as a group.

*Group One:* Luke 13: 6-9 – Parable of the Barren Fig Tree

*Group Two:* Luke 8: 16 – A Lamp Under a Jar

*Group Three:* Luke 11: 33-36 – The Light of the Body

As a group decide if Jesus was calling for external, internal, or both kinds of change.

- **ALLOT** time for Scripture work.
- **HAVE** each group read the Scripture passage, tell the change Jesus mentions, and what kind of change it is.
- **DISCUSS** as a class what the group reports.
- **ASK:** Since Jesus wants us to make these kinds of changes, what helps did he give us so that we can make the changes? (prayer, sacraments, Holy Spirit, each other, community, the Church, family, example of the saints)

- **HAVE** the students write the action and their hypothesis on the Science Journal page.
- **ALLOW** time for the writing.
- **ASK:** What hypotheses did you record about the Jello being made?
- **LISTEN AND RECORD** student hypotheses.
- **IF THE FOLLOWING WERE NOT INCLUDED, SAY:**  
Some other hypotheses are:  
  
The Jello will become a liquid.  
When cooled, the Jello will become a solid.
- **ENCOURAGE** the students to use all of their senses in their observations and hypothesis-making.
- **USE** the science textbook to find or review the signs of physical change and chemical change.
- **RECORD** the signs on the board.
- **SAY:** Let's test our hypotheses about mixing baking soda and water.
- **HAVE** a student take the temperature of the water.
- **RECORD** the temperature.
- **HAVE** a student mix the baking soda and the water.

- **ASK:** If your behavior changes, why did it change?
- **DISCUSS** the internal change or event that causes behavior (external) to change. (sorrow for sins – you don't commit that sin again or not as frequently)
- **SAY:** There are virtues (good habits) which can be acquired by doing them over and over. For example, the virtue of compassion means how you treat others when you know they are struggling with something.
- **ASK:** How would you show compassion to this struggling person? (talk to them, be more patient, ask them to go some place with you)
- **SAY:** The more often you choose to be compassionate, the more that virtue becomes a part of you. Practice makes perfect.
- **ASK:** What are some virtues that you could acquire? Be sure to mention the Theological Virtues of Faith, Hope, Charity and the Cardinal Virtues of Justice, Fortitude Temperance, and Prudence.
- **HAVE** the students give examples of how to practice the virtues that they or you mention.
- **HAVE** the students write in the Religion Notebook one virtue they will practice during the week and what specifically they will do.
- **AT THE END OF THE WEEK,** revisit this lesson and have the students evaluate how well they practiced this

- **ALLOW** the students to observe for 3-5 minutes.
- **HAVE** a student take the temperature of the water again.
- **ASK:** What have we observed? (temperature changed)
- **ASK:** Did anyone have the temperature changes as a possible result? Why? Why not?
- **SAY:** Let's test action #2: A birthday candle is lit.
- **TEACHER** should light the candle. Students should record their observations. (candle flame could go out, candle will completely melt, wick will burn)
- **ASK:** What did you observe?
- **ASK:** Did it match your hypothesis? Why? Why not?
- **SAY:** Let's test action # 3: The Jello is made.
- **HAVE** 2 groups of students make the Jello according to the package directions and add the ice cubes as directed for a faster setting action. Other students should be recording the experiment on the Science Journal page.
- **SAY:** Since we will get to eat the Jello after the experiment, let's make one bowl a bit healthier by adding pineapple to it.
- **HAVE** one group mix the pineapple in one bowl of ~~it~~ |||

virtue. Remind them that bad habits are hard to break and good habits are hard to get.

- **POSIT:** External change can be easy to notice. Internal change is more difficult to assess. Everyone who follows Jesus is called to change.

- **REFRIGERATE** the two bowls of Jello for the time recommended.
- **LATER OR THE NEXT DAY** remove the 2 bowls of Jello and have the students observe them. (the bowl with the fresh pineapple will not have set)
- **ASK:** Was any part of your hypothesis correct?
- **SAY:** Scientists learn just as much, maybe more, when their hypothesis is incorrect as when the experiments prove the hypothesis to be correct.
- **SAY:** Make three columns on the Science Journal page. Above the first column write Physical Change, above the second column write Chemical Change, and above the third column write Evidence.
- **PUT** each of the three experiments under the correct heading and give the evidence which supports your listing.
- **GO OVER** the charts and be sure everyone understands which action goes under which heading and why.
- **POSIT:** Substances can undergo physical and chemical changes. There is evidence of the kind of change.

## SCIENCE LINKS

[www.learnnc.org/lp/pages/3724?ref=search](http://www.learnnc.org/lp/pages/3724?ref=search)

Physical and chemical changes – LEARN NC Physical and chemical changes. This is a PowerPoint presentation to help students distinguish...to check the students' understanding. A lesson plan for grade 8 Science .By...

[www.alex.state.al.us/lesson\\_view.php?id=7023](http://www.alex.state.al.us/lesson_view.php?id=7023)

ALEX Lesson Plan: Name That Change! (Physical and Chemical...teaches students to distinguish between physical and chemical changes..pair of students): 2 clear plastic cups(8 ox... This site includes a Power Point Presentation.

“A hypothesis is an educated guess based on observation. Usually a hypothesis can be supported or refuted through experimentation or more observation.”  
(See more information at the URL below.)

<http://chemistry.about.com/od/chemistry101/a/lawtheory.htm>

## RELIGION LINKS

[www.gotoquiz.com/are\\_you\\_smarter\\_than\\_a\\_catholic](http://www.gotoquiz.com/are_you_smarter_than_a_catholic)

[Are you smarter than a Catholic 8th grader?](#)

At Our Prince of Peace 8th graders prepared for their Confirmation, they had the chance to display their understanding of the Catholic faith and what we believe. Great fun quiz with lots of thought-provoking questions.

## KEY WORDS

- PHYSICAL CHANGE
- CHEMICAL CHANGE
- HYPOTHESIS
- EVIDENCE

## KEY WORDS

- INTERNAL CHANGE
- EXTERNAL CHANGE
- BARREN
- VIRTUE
- THEOLOGICAL VIRTUES
- CARDINAL VIRTUES