Activity: Junior Technologist of Floor Care

FOR THE TEACHER

Summary
In this activity students will take the role of the Junior Technologist of Floor Care, whereby students have the opportunity to study the properties of a chemical used for finishing floor tile. They will examine the tiles appearance to discover which chemical provides the best sheen and durability.

Grade Level
Elementary School

NGSS Alignment
This activity will help prepare your students to meet the performance expectations in the following standards:

- **2-PS1-2**: Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.
- **Scientific and Engineering Practices**:
  - Analyzing and Interpreting Data

Objectives
By the end of this activity, students should be able to

- Discuss various materials that formulate a quality finish.
- Understand real world applications for industrial chemicals (finishes and waxes).

Chemistry Topics
This activity supports students’ understanding of

- Physical Properties
- Chemical Properties
- Observations

Time
**Teacher Preparation**: 45 minutes
**Lesson**: 1 hour

Materials
- Student Handout
- A variety of floor tiles (see Teacher Notes for specifications)
  - 3 tiles needed per group
- Variety of Different Floor Waxes
  - Pledge Floor Care with Future Shine Floor Care
  - QuickShine Floor Finish
  - Trewax Stone & Tile finish
- Water
- Pennies
- Paper towel

Safety
- No specific safety precautions need to be observed for this activity.
Teacher Notes

- This activity would work well with groups of 3-4 students. If using groups assign the group members a task, for example group members could be supplier, recorders, and testers.
- Have on display at least three types of tile finishes and explain their purpose.
- Please remember that when purchasing tiles, one can use ceramic or stone, and can shop the clearance sections of your local hardware supply stores. Tiles can be found at local home improvement stores such as Home Depot, Lowes, etc. Many of these stores will provide teacher discounts, or donate these supplies to teachers/classrooms if requested!
- Explain that finishes are used to protect and coat floor tiles so that they continue to shine. Floor finishes are man-made substances that help the floor to remain durable.
  - Floor finishes include Acrylic–Polymers, Resin, Plasticizers, and Wax emulsion.
  - Some tile samples may be purchased with finishes already applied, while others may need to be applied by the teacher prior to the activity.
- The words above can be defined and explained to students as:
  - **Acrylic-Polymers**: essentially plastic particles or solids in the finish that give it the strength and durability against traffic and resilience to dirt.
  - **Resin**: the component that allows the finish to self-level, giving the finish an even coat.
  - **Plasticizer**: act as a hardener for the surface keeping the finish from cracking once it has set.
  - **Wax Emulsion**: used to affect the glossiness, hardness and slip resistance of the finish.
- The teacher should label the tiles and coordinating finishes A, B, and C. This is so that students can identify which tile has a certain finish on the tile.
- Teacher should explain that: The Senior Technologist makes a chemical compound that is applied to a surface so that the tile or flooring is protected, shined, scuff and stain resistant. Now the junior technologist has to test the coating with a scratch test and a water test, to see if the compound/finish works well.
- Teacher will explain that students will use the following rating scale to rate their results.
  - Teacher should explain that students are only allowed to scratch the tile with pennies (or an alternative can be used). Everyone should use the same tool.
  - Teacher should demonstrate how to perform a scratch and water test, modeling how to use a reasonable amount of scratching and water.

<table>
<thead>
<tr>
<th>Scratch Test</th>
<th>Water Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>1- No Scratch</td>
<td>1- No change</td>
</tr>
<tr>
<td>2- Light marking, little scratches are noticed</td>
<td>2- Light cloudy covering, see through, transparent</td>
</tr>
<tr>
<td>3- Heavy dark marks, pulled material, indentation in the tile</td>
<td>3- Heavy white cloud covering, non-transparent</td>
</tr>
</tbody>
</table>

- It may be helpful for the teacher to provide visual samples of tiles that have a results rating 1,2,3 for each test performed for student comparison.
- An opportunity for extension could be for the teacher to bring in a guest speaker, such as a Senior Technologist, or other Floor Care Specialist from a company such as Dow Chemical.
FOR THE STUDENT

Lesson

Junior Technologist of Floor Care

Background
The Senior Technologist of Floor Care has applied finishes to the floor tiles. The finishes include: Acrylic–Polymers, Resin, Plasticizers, and Wax emulsion, which are all meant to shine and protect the floor. Scientists (like the Senior Technologist) use trial and error to find the right solution for the problems they are attempting to solve. Today you are helping the Senior Technologist see how well his chemical finish works on the tile.

Objective
You will perform 2 types of test to determine which chemical performs at the highest level. The chemicals that were placed on the tile are on display in the front of the room. The tiles and the finishes are labeled Tile A, Tile B, and Tile C. On your activity sheet you will list your data that your team has collected from each test.

Materials
- Student Activity Sheet
- Pencil
- 3 Tiles for your group
- Penny
- Water
- Paper Towel

Procedure
1. One member will gather materials and distribute to team members.
2. Each student will complete a scratch test on each tile sample. To do this, Use a penny, and scratch the edge of the penny on the surface of the tile sample several times, in multiple directions.
3. Discuss what each member observed during their individual scratch testing. Record your results in the table below and determine a rating number based on the scale provided.
4. Each student will complete a water test. To do this, wet a paper towel so that it is extremely wet. Wipe the wet towel across the surface of the tile. Wait for the water to begin to dry and observe any changes.
5. Discuss what each member observed during their individual water testing. Record your results in the table below and determine a rating number based on the scale provided.

Rating Scale

<table>
<thead>
<tr>
<th>Scratch Test</th>
<th>Water Test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating “1” = No scratch observed</td>
<td>Rating “1” = No change/evidence of water after it dries</td>
</tr>
<tr>
<td>Rating “2” = Light marking, little</td>
<td>Rating “2” = Light cloudy covering, see through, transparent</td>
</tr>
<tr>
<td>scratches are noticed</td>
<td>residue</td>
</tr>
<tr>
<td>Rating “3” = Heavy dark marks, pulled</td>
<td>Rating “3” = Heavy white cloud covering, non-transparent</td>
</tr>
<tr>
<td>material, indentation in the tile</td>
<td>residue</td>
</tr>
</tbody>
</table>
Data

<table>
<thead>
<tr>
<th>Sample</th>
<th>Scratch Test Result</th>
<th>Water Test Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tile A</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tile B</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tile C</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Analysis

1. How did your group determine the rank for each tile?
2. Did team members have a consistent/same ranking for each tile, why or why not?
3. Why do you think different coating have different results from the scratch test and the water test?
4. As the Junior Technologist of Floor Care, which coating do you think is the best for use on floor tile?