Lesson Plan: Dyeing Wool in Year 5 Science

Objective:

Students will learn about the process of dyeing wool using natural dyes. They will explore how different natural materials can be used to dye wool and understand the basic chemistry behind the dyeing process.

Materials Needed:

- Raw wool or wool yarn
- Natural dye sources (e.g., onion skins, beetroot, spinach, turmeric, berries)
- Mordants (e.g., vinegar, alum, salt)
- Large pots for boiling water
- Water
- Spoons or sticks for stirring
- Rubber gloves
- Aprons or old clothes to protect students' clothing
- Strainers or colanders
- Measuring cups
- Bowls or buckets for soaking wool
- Notebooks for recording observations

Lesson Structure:

1. Introduction to Dyeing (10 minutes)

- Discuss the history of dyeing fabrics and how people used natural materials before synthetic dyes were invented.
- Explain the concept of mordants and why they are used to fix dyes onto fibers.

2. Materials and Safety (10 minutes)

- Introduce the natural dye sources you will be using and explain how each one can produce different colors.
- Discuss safety precautions, such as wearing gloves and aprons, and handling hot water carefully.

3. Preparing the Wool (15 minutes)

- Show students how to prepare the wool for dyeing by soaking it in a mixture of water and mordant.
- Each student or group of students can prepare their own piece of wool.

4. Extracting the Dye (20 minutes)

- Demonstrate how to extract dye from natural materials by boiling them in water.
- For example:
    - Onion skins for yellow to orange hues

    - Beetroot for pink to red hues
    - Spinach for green hues
    - Turmeric for bright yellow hues
    - Berries for purple to blue hues
- Allow students to help with adding the natural materials to the pots and stirring.

5. Dyeing the Wool (20 minutes)

- Once the dye is extracted, strain out the plant materials.
- Add the prepared wool to the dye pot and simmer gently for about 15-20 minutes, or until the desired color is achieved.
- Discuss how different factors, such as time and concentration of the dye, can affect the final color.

6. Rinsing and Drying (15 minutes)

- Carefully remove the wool from the dye bath and rinse it in cool water until the water runs clear.
- Squeeze out excess water and hang the wool to dry.

7. Observation and Discussion (15 minutes)

- Have students observe the colors they have achieved and compare them to their expectations.
- Discuss why some colors might be more vibrant than others and the role of mordants in the dyeing process.

8. Conclusion (10 minutes)

- Summarize the key points learned during the lesson.
- Emphasize the scientific concepts of dye extraction, mordanting, and the chemistry of natural dyes.

9. Homework/Extension Activity

- Ask students to write a short report or create a poster showing the steps of the dyeing process, including the natural materials used and the colors achieved.
- For an extension activity, students can experiment with dyeing different types of fabric or using other natural materials to see what colors they produce.

Example Procedure for Dyeing with Onion Skins:

1. **Prepare the Wool:**
    - Soak wool in a mixture of water and vinegar (1 part vinegar to 4 parts water) for at least 30 minutes.
2. **Extract the Dye:**
    - Boil onion skins in water for about 30 minutes until the water is a deep yellow-orange color.
    - Strain out the onion skins, leaving the dye liquid.
3. **Dye the Wool:**

    - Add the soaked wool to the dye pot.
    - Simmer gently for 20 minutes, stirring occasionally.
4. **Rinse and Dry:**
    - Remove the wool from the dye bath and rinse in cool water.
    - Hang the wool to dry.

By the end of the lesson, students should understand the basics of dyeing wool with natural materials, the importance of mordants, and how different natural sources can produce various colors. This hands-on activity will also help them appreciate the intersection of science, art, and history.