TECH STYLE

- **Grade Level: K-12**
- **Focus Area: Materials Science, Engineering**
- **Time: 30-45 Minutes**

ACTIVITY INTRODUCTION

Engage in a hands-on exploration of materials science by creating your own space-worthy material, connecting the ingenuity of designing astronaut gear with the innovative fusion of fashion and technology in space exploration.

BACKGROUND INFORMATION

The Apollo A7-L Spacesuit Boots and the Extravehicular Mobility Unit (EMU) are prime examples of the fusion between fashion and technology in space exploration. These suits are meticulously engineered to withstand the extreme conditions of space, providing life support and protection to astronauts. One of the critical aspects of these suits is the materials used in their construction. In this activity, participants will explore the importance of materials science in space technology by creating their own space worthy material.

STUDENT REAL-LIFE CONNECTIONS

- How do engineers and scientists select materials to protect astronauts from the extreme conditions of space?
- How does the fusion of fashion and technology in spacesuit design parallel the combination of materials you'll explore in this activity?
- How do you think astronauts' spacesuits are designed to handle extreme temperature fluctuations, radiation, and potential micrometeoroid impacts?

ACTIVITY OBJECTIVES

- Understand the significance of materials science in space exploration
- Learn about the challenges of designing materials to withstand the harsh conditions of space
- Apply scientific principles of material properties and their relevance to space technology

MATERIALS

- Aluminum foil
- Plastic wrap/cling film
- Cotton balls
- Straws
- Scotch tape
- Plastic grocery bags

*There are not specific quantities listed for supplies. Participants need enough materials to interact and experiment with for their project.

ACTIVITY DIRECTIONS

1. Depending on the age group, introduce the concept of materials science, explaining how materials are chosen based on their properties to create effective products.
2. For younger participants, focus on simple properties like strength and flexibility, while for older participants, discuss additional properties like insulation and reflectivity.
    a. Example materials for discussion:
        - Plastic: Many types of plastic materials have varying degrees of flexibility and strength. For example, PVC (polyvinyl chloride) pipes are strong and rigid, while some plastics are more flexible.
        - Glass: While glass is brittle and lacks flexibility, it is known for its transparency and hardness. Tempered glass is a type of glass that is stronger and less prone to shattering.
        - Aluminum: Aluminum is a lightweight metal known for its strength-to-weight ratio. It is used in aerospace and construction due to its strength and flexibility.
        - Paper: Paper is a flexible and lightweight material. It can be folded, bent, and creased easily, demonstrating flexibility.
3. Lay out the provided materials and let participants examine them. Ask them to think about the properties of each material – which ones are strong, which are flexible, which are reflective, etc.
4. Challenge participants to create their own space-worthy material by combining the provided materials. Encourage them to consider the desired properties for space exploration, such as protection from extreme temperatures, radiation, and micrometeoroids.
5. Once participants have constructed their space-worthy material, have them test its properties. For example, they could test its insulating ability by placing an ice cube inside and observing how long it takes to melt.
6. Lead a discussion about the different materials participants used and the properties they observed. Relate their creations back to the materials used in spacesuit design and how they contribute to astronaut safety and functionality.

TECH STYLE: STUDENT ACTIVITY SHEET

Directions: Test your created space-worthy material using the methods described below. Record your observations and thoughts.

Insulation Test

- Place an ice cube inside your space-worthy material.
- Observe and record how long it takes for the ice cube to melt.
- Think about how this property could be important for protecting astronauts in space.

Observation:

Reflection: How might this insulation property help astronauts during spacewalks or in the spacecraft?

Flexibility Test

- Gently bend and twist your space-worthy material.
- Note how easily it bends and whether it returns to its original shape.
- Consider why flexibility is important for materials used in spacesuits.

Observation:

Reflection: Why do you think flexibility is important for spacesuit materials?

Reflectivity Test

- Shine a flashlight onto your space-worthy material and observe how light interacts with it.
- Think about how reflectivity could be valuable in space.

Observation:

Reflection: Why might astronauts need materials that reflect light in space?

Strength Test:

- Gently tug nd pull your space-worthy material to test its strength.
- Record whether it feels sturdy or fragile.
- Consider why strength is crucial for spacesuit materials.

Observation:

Reflection: Why might astronauts need materials that reflect light in space?

Overall Impressions

- Describe your space-worthy material in a few words (e.g., flexible, insulating, strong).
- Explain why you think these properties are important for space exploration.

Description:

Reflection: How did creating this material make you think about the challenges of designing astronaut gear for space adventures?