The Most Effective Sunscreen

Background:
Sunscreen works by combining organic and inorganic active ingredients. Inorganic ingredients reflect or scatter ultraviolet (UV) radiation. Organic ingredients absorb UV radiation, dissipating it as heat. Some sunscreens protect us from the two types of damaging UV radiation: UV-A and UV-B. Both UV-A and UV-B cause sunburns and damaging effects such as skin cancer.

Purpose:
To research and compare the effectiveness of various SPF levels in sunscreen lotions for blocking UV (ultraviolet) radiation from the Sun using UV Light Detector Beads.

Materials:
- UV light detector beads
- Multiple types of sunscreen, with various SPF ratings
- 1 box of clear, quart-sized sealable bags

Procedure:
1. Complete the Research Questions prior to starting the investigation.
2. Create an appropriate data table similar to the one shown to collect your data. Use the terms "White", "Light blue", "Medium blue", and "Intense/dark blue" when recording the UV-bead color intensity.
3. Place the UV light detector beads inside of a clear plastic bag and seal. Make sure that only the plastic is between the sun and the beads.
4. In the data table, record the color intensity reading shown on the scale. This is the control reading, and will be a baseline to compare the other readings to see if they increase or decrease.
5. Apply a uniform layer of the first sunscreen sample over the bag. Make sure the bag is thoroughly covered. Allow the lotion to dry.
6. Place the bag in direct sunlight.
7. Wait 10 minutes to allow the UV light detector beads to change color. Record the SPF value of the sunscreen and any color change in the data table.
8. Remove the UV light detector beads from the bag.
9. Place the UV light detector beads in area where it will not receive sunlight until the beads turn back to white.
10. Place the UV light detector beads inside of another clear plastic bag and seal.
11. Repeat steps 3-9 for each different sunscreen sample.
12. For a scientifically accurate investigation the entire processed should be conducted at least 3 times.
13. Calculate the average UV reduction (if any) for each sunscreen.
Using the data in the table, plot a bar graph with SPF Value along the x-axis and the UV Penetrating Intensity Level along the y-axis.

**Research Questions**

- What is the difference between UV-A and UV-B radiation?
- Why is prolonged exposure to ultraviolet radiation harmful to the eyes and skin?
- What protection from UV radiation should an effective sunscreen offer?
- What does a sunscreen's "SPF" rating mean?
- Does SPF tell how well a product blocks UV-A or UV-B?
- How does sunscreen differ from sunblock?
- Which sunscreen is most effective at blocking UV light?
- Are the experimental results consistent with the SPF rating for each sunscreen tested?
- What safety features are designed into the UV light detector beads?
- Does SPF 30 have twice as much protection as SPF 15?
- What reduces the effectiveness of sunscreen?
- What should one look for when buying sunscreen?