Cicada Education

# Physical Matters Classroom Kit

**Slick Sand Fun Facts:**

**Mars-Like Properties:** Slick Sand closely emulates Martian soil, displaying a reddish hue and a dry, dusty texture. Its hydrophobic nature mirrors that of Mars sand, attributed to an absence of water exposure for over 13 million years.

**NASA Mars Exploration:** Currently integrated into NASA Mars Exploration Classroom Experiments, Slick Sand provides an immersive experience for students to investigate conditions akin to those on Mars.

**Hydrophobic Experiments:**

- Demonstrates hydrophobicity by contrasting water interaction with Slick Sand and natural sand.
- Explores the sculpting capabilities of Slick Sand underwater and observes its wet/dry characteristics.

**Chemical Reactions:**

- Investigates the reactions of Slick Sand and natural sand when exposed to vinegar, oil, and water with dish detergent.
- Freezing experiments delve into the impact of freezing on both Slick Sand and natural sand.

**Surface Tension Experiment:**

- Examines surface tension by introducing Slick Sand and beach sand to water with varying salt concentrations.
- Observes the ability of each cup to support floating sand and assesses the wetness of the sand raft.

**Discussion Questions:**

- Explores the factors determining molecule polarity, providing examples of polar and non-polar molecules.
- Considers potential applications and environmental benefits of Slick Sand.

# Instant Solid Powder

- Instant Solid Powder, also a cross-linked polymer, engages in water absorption through osmosis, resulting in a gel-like consistency.

**Experiments with Instant Solid Powder:**

- Measures water absorption capacity in different cup sizes, identifying the saturation point
- Investigates colour dispersion in Instant Solid Powder with varying water temperatures.

**Conservation of Mass Experiment:**

- Examines the conservation of mass by weighing cups with Instant Solid Powder before and after hydration.

**Chemical Reactions:**

- Introduces salt to hydrated Instant Solid Powder, observing resultant effects.
- Tests the reaction with soda and fruit juice.

**Evaporation Rate Experiments:**

- Measures the rate of evaporation in open cups, cups with lids, and cups exposed to heat.
- Explores the influence of different environments on the evaporation of coloured polymers.

**Discussion Questions:**

- Investigates the fundamental principles behind the functionality of  Instant Solid Powder, defining the concept of polymers.

**Notes:**

# Slime and Slime Formation

- Measure 237 ml water into a cup. Slowly Stir in 10g of Slime powder (add more powder for a thicker solution)

The powder undergoes a magical transformation into slime, and this enchanting process is governed by the distinctive properties of slime. In contrast to liquids such as water, which are composed of individual molecules called monomers, slime is a liquid polymer made up of numerous repeating units. This particular composition imparts a slimy and stringy texture to the substance.

**Preventing Erosion:**

- Upon mixing slime with water, it releases negatively charged sodium ions. These ions allow slime to attach to suspended soil particles in water, increasing their weight and preventing them from being easily washed away. This unique characteristic makes slime an effective agent in preventing erosion, the process of soil wearing down or being washed away by natural elements like rain or rivers.

**Slime Formation Experiments:**

**Water Pour Test:**

- Pour water over a small pile of slime at the bottom of a cup.
- Observe the interaction between slime and water. The soil should become heavier, preventing it from washing away easily.

**Even Mixing Test:**

- Mix slime evenly into a cup of water using the recommended method.
- Compare the slime texture in two cups. The first cup will likely exhibit stringy and clumpy slime, while the second cup should have smoother slime.

**Temperature Effects:**

- Mix slime with hot water and observe the rapid formation of thick slime.
- Repeat the process with ice water, noting the slower formation of slime, which tends to clump together.

**Colourful Slime Creation:**

- Experiment with designing new colours of slime by preparing different colours of water and adding slime powder to each.

**How It Works:**

Understanding the distinction between monomers and polymers is crucial in grasping the behaviour of slime. Water, a monomer, flows easily as individual molecules. In contrast, slime, a polymer with many repeating units, exhibits a slimy and stringy texture. When mixed with water, slime releases negatively charged sodium ions, attracting hundreds of water molecules. This attraction creates structures that hinder the flow of molecules past each other, contributing to the unique texture of slime.