Is There Sodium in Bananas?

Flame Tests

Introduction

Flame tests are used as confirmatory qualitative tests for the presence of various metal ions. Here a flame test demonstrates that both potassium and sodium are present in bananas.

Concepts

- Qualitative analysis
- Absorption/Emission
- Flame tests
- Atomic structure

Materials

Potassium chloride, KCl, a few crystals
Sodium chloride, NaCl, a few crystals
Mashed bananas or dried banana chips
Bunsen burner
Nichrome or platinum wire loop or Q-Tips®

Safety Precautions

Potassium chloride is slightly toxic by ingestion. All food-grade items that have been brought into the lab are considered laboratory chemicals and are for lab use only.. Wear chemical splash goggles, chemical- and heat-resistant gloves, and a chemical splash apron. Please review current Material Safety Data Sheets for additional safety, handling, and disposal information.

Procedure

1. Moisten a Q-Tip or wire loop with some deionized water, and dip it into the sodium chloride crystals.
2. Hold the tip or loop in the edge of Bunsen burner flame and have students make observations of the color.
3. Repeat steps 2 and 3 with potassium chloride crystals.
4. Dip a clean loop into the banana mush and hold it in the edge of the burner. Observe the characteristic lavender flame with hints of gold to confirm the presence of both potassium and sodium.

Disposal

Please consult your current *Flinn Scientific Catalog/Reference Manual* for general guidelines and specific procedures governing the disposal of laboratory wastes. Wire loops can be cleaned with concentrated HCl, and saved for reuse. Q-Tips, excess banana, NaCl, and KCl may be disposed of in the trash according to Flinn Suggested Disposal Method #26a.

Connecting to the National Standards

This laboratory activity relates to the following National Science Education Standards (1996):

Unifying Concepts and Processes: Grades K–12
Systems, order, and organization
Evidence, models, and explanation
Content Standards: Grades 5–8
Content Standard A: Science as Inquiry
Content Standard B: Physical Science, properties and changes of properties in matter, transfer of energy
Content Standards: Grades 9–12
Content Standard A: Science as Inquiry
Content Standard B: Physical Science, structure of atoms, structure and properties of matter, chemical reactions, interactions of energy and matter

Publication No. 91831
061616

Discussion

Sodium and potassium ions are commonly found as mixtures in nature, and bananas are no exception. A simple flame test can confirm what students already know—that bananas contain potassium—and what they might not know—that sodium is present as well. When a substance is heated in a flame, its electrons absorb energy from the flame. This absorbed energy allows the electrons to be promoted to excited energy levels. From these excited energy levels, the electrons naturally want to make a transition, or relax, back down to the ground state. When an electron makes a transition from a higher energy level to a lower energy level, a particle of light called a photon is emitted. The energy of each emitted photon is equal to the difference in energy between the excited state and the state to which the electron relaxes. The energy of the emitted photon determines the color of light observed in the flame.

The color of light observed when a substance is heated in a flame varies from substance to substance. Because each element has a different electronic configuration, the electronic transitions for a given substance are unique. Therefore, the difference in energy between energy levels, the exact energy of the emitted photon, and its corresponding wavelength and color are unique to each substance. As a result, the color observed when a substance is heated in a flame can be used as a means of identification.

Acknowledgment

Jamie Benigna would like to thank Pat Vance, Retired, The Roeper School, Bloomfield Hills, Michigan, for providing him with the idea for this activity

Flinn Scientific—Teaching Chemistry™ eLearning Video Series

A video of the *Is There Sodium in Bananas?* activity, presented by Jamie Benigna, is available in *Flame Tests*, part of the Flinn Scientific—Teaching Chemistry eLearning Video Series.

Materials for *Is There Sodium in Bananas?* are available from Flinn Scientific, Inc.

Catalog No.	Description
P0183	Potassium Chloride, Reagent, 100 g
S0061	Sodium Chloride, Reagent, 500 g
AP1051	Inoculating Loop, Nichrome Wire

Consult your *Flinn Scientific Catalog/Reference Manual* for current prices.