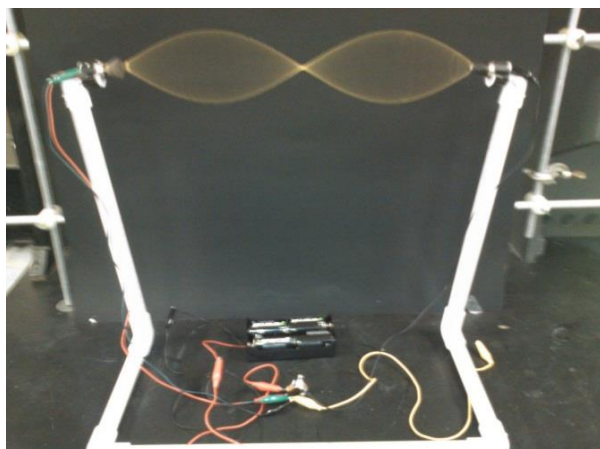




California State University of Bakersfield, Department of Chemistry

Wave Generator



Standards:

Grade 6. Physical Sciences, 3. A. Energy can be carried from one place to another by waves.

Grade 4, Physical Sciences, 1, C, Electric currents produce magnetic fields

Introduction

Heat, light, sound, electricity, radiation are all forms of energy which are transmitted by waves. Amplitude, frequency, node, and internode are concepts which help describe and define waves. This apparatus shows all four of these wave principles in real form. Two mounted fractional horse motors with counter rotating shafts induce a resonant frequency in a string connected to both shafts. Motor speed is controlled by a potentiometer with power supplied by four D cell batteries. The waves generated are perfect sine waves with from one to six nodes.

Material

- ½” PVC pipe: 2 ea. @6 “/ 2 ea. @ 12”/ 1 EA. @ 14”
- 6 ea. ½” PVC x 90 elbows
- 2 ea. fractional horse motors/ Radio Shack #
- 1 ea. potentiometer / Radio Shack #
- 6 ea. Wire connectors (14”) with alligator clips
- 4ea. D cell batteries with holder

- Two corks 3/8" dia x 1/2" long
- Construction string 16" long, woven works best.
- Tape or rubber bands

Safety:

- Always have an adult with you to help you during your experiment.
- Always wear eye protection and gloves when doing chemistry experiments

Procedure:

1. Using a hack saw, remove the top half of one leg on two elbows.
2. Assemble the frame with the 14" piece as back, two 6" pieces as legs and the two 12" pieces as verticals
3. The sawed elbows serve as motor mounts at the top of each 12" leg.
4. Mount the two motors and secure with tape.
5. Press the corks onto the motor shafts.
6. Attach the ends of the string with tape to each cork.
7. Using the wire leads, attach the battery pack to the potentiometer and then wire in the motors.
8. Using the potentiometer as a control, start the motors and determine the optimal width between the 12" vertical legs for formation of the waves.

Data and Observations:

Record your observations in this space

What did you see? Anything you were not expecting? Describe it here.

Questions:

1. Can multiple waves be generated? If so, what variables are necessary?

2. Does motor speed affect wave generation?

References:

1. Square Wheels by Don Rathjen, Paul Doherty and the Exploratorium Teacher Institute, String Machine, pg 119.