

Tobacco & Organisms

Adapted from "Tobacco and Organisms" by Kathryn M. Hopkins. See http://www.accessexcellence.org/AE/AEC/AEF/1995/hopkins_tobacco.html

Subjects: Science, Health

Overview:

The students receive a letter from an imaginary company asking them to do research about the effects of tobacco on organisms; the premise of the letter is that stockholders of the company have asked for a review of the company's holdings, especially those in the tobacco industry. Students work in teams to design and carry out experiments which will show the effects of tobacco / nicotine on organisms. They write reports which are submitted to "The Company" and prepare oral reports which are presented to the class by each team and which, ideally, are videotaped.

Teacher Note:

This activity can be used with middle school life science students or in an interdisciplinary, theme-based setting. Since it is done in cooperative learning groups, it can be used successfully with mainstreamed special needs students. This activity allows the students a great deal of freedom and can create a mess. For optimal success, students need good group skills. This is not a lesson which can be done before students have been exposed to team-building activities.

Suggested Time:

A week of 45 - 55 minute periods is ideal for completion of the lab, though it can be completed in two periods, if necessary. If the lab is part of an interdisciplinary activity, another week for follow up is desirable.

Resources/Materials:

The following items are needed:

- Indicators (phenol red, bromothymol blue)
- Microscopes and slides
- A large supply of jars, beakers, petri dishes or other containers
- Radish seeds
- Yeast
- Small Fish
- Brine Shrimp

OBJECTIVES:



Students will:

1. Learn about the effects of tobacco on organisms
2. Think critically about the role of science in public policy

Materials (Cont.):

- Funnels and filter paper
- Large plastic syringes (e.g. B - D Plastipak from Carolina Biological)
- A piece of tubing to fit each syringe in which to place a cigarette
- Cigarettes

Preparation:

Make copies of the "Dear Scientist" letter.

Procedures:

1. Distribute the "Dear Scientist" letter to each cooperative learning group.

2. Students meet in their cooperative learning groups to analyze the letter, take notes in their journals about what is expected of them, and brainstorm how to do the research.



3. Each team prepares an experimental design diagram which is submitted to the teacher for approval, along with a list of materials needed for their work. These designs are returned with suggestions about how to proceed.

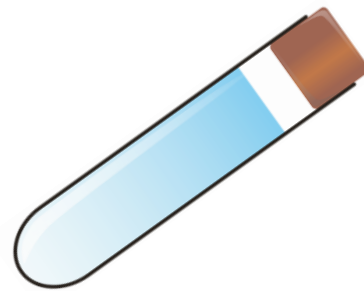
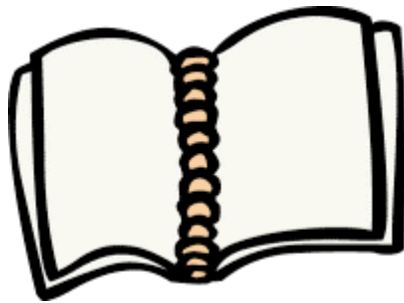
4. Teams pick up their materials and begin doing the procedures which they have written in their experimental design diagrams. Tasks are assigned to all team members. Depending on the time frame, students may do one set of experiments or several.

The cigarettes are "smoked" (in a fume hood or outdoors) with the syringes and the smoke is bubbled slowly into a container of water which is then capped and set aside to be used when needed. If chewing tobacco is used, a small amount is soaked in water and filtered and the liquid is stored in a capped container. Students should use gloves when handling the tobacco products and syringes. Some students have soaked the filters from smoked cigarettes in water or placed cotton in the syringe and then soaked the cotton in water to use in their experiments.

Procedures (cont.):

The students apply the tobacco water in some way to the organism(s) they have chosen and devise some way to quantify the results. Seeds can be soaked and germinated. Blood vessels in fish tails can be observed. Gill beats can be counted. Brine shrimp heartbeats can be counted. Yeast cell reproductive rates can be observed. (Incidentally, the fish always recover and go home with students so there is no trauma from the organisms succumbing.)

Students must set up controls, record all procedures and results, do data tables and graphs and make journal entries. Teams must maintain a log of jobs accomplished and by whom they were done.



The teacher must "lead" the students towards the procedures which will work, while still letting them use their own ingenuity. There are always some students who want to use mice or dogs or see if some organisms will get cancer. Asking leading questions and reminding students of time constraints will steer them towards very simple organisms. It is essential to allow the students to make mistakes, but to "rescue" them with well-placed suggestions for alternative solutions.

5. Students prepare reports of their findings to be submitted to "the company" that requested the research. Reports can include large visual displays, summary letters, or ... use your imagination!

6. Students present their reports to the class.



Follow-up: You might want to prepare a brief report of the exercise and the students' findings for the team newsletter.



Method of Evaluation:

Teams must prepare an oral report of their findings and their conclusions which is presented to the class and videotaped. Each student must prepare a written report with hypotheses, procedures, data tables, graphs and conclusions. Performance points are earned for quality of work done in the laboratory.

Extension/Reinforcement:

Students use a peer review process of presentations / findings. They then can write a five paragraph position paper on tobacco sales and advertising.

