



ACTIVITY 1

HOW CAN SPICES BE CLASSIFIED?


EXPERIMENT OBJECTIVES AND CONTENT

In this activity, students learn about the concept of dichotomous classification. They learn that there are many ways to scientifically classify things, depending on whether the classifiers chosen are more or less complex.


SUGGESTED MATERIALS
Scientific equipment:

- Magnifying glasses and any other available observation equipment

Perishable non-scientific materials:

- Spices and herbs in different forms (cinnamon sticks and ground cinnamon, cumin, thyme, pepper corns and ground pepper, oregano, paprika, cloves, aniseed, ginger, nutmeg, saffron, sage, vanilla, curcuma, herbes de Provence [i.e., mixed herbs], mustard, etc.)

Household materials:

- Graters
- Pepper mills
- Small plastic containers

School supplies:

- Adhesive tape, crayons
- Sheets of paper
- Large pieces of cardboard

Note: Ask students to bring spices from their countries of origin to class.



CAUTION: CHECK TO SEE IF ANY STUDENTS HAVE SPICE ALLERGIES.


ESSENTIAL KNOWLEDGE
Matter:

- Properties and characteristics of matter in different states (solid, liquid, gas): shape, color, texture
- Changes in matter: physical changes (breaking, grinding)

Appropriate language:

- Terminology related to an understanding of the material world
- Conventions and types of representation specific to the concepts studied: graphs, tables


CONTEXT: SITUATIONAL PROBLEM OR RESEARCH QUESTION

Do you ever eat spicy dishes? Have you ever noticed whether your parents add one or more spices when preparing meals or a barbeque? Do they add spices do decorate, flavor or spice up a dish?





SUGGESTED PREPARATORY ACTIVITIES (INTRODUCTION)

Before starting the activity, it is suggested to do an exercise that teaches the students the difference between sorting (e.g., from smallest to largest) and dichotomous classification (e.g., students wearing dark shirts compared to those wearing light shirts; among students with dark shirts, some wear glasses and others do not, etc.). The students are also asked to pay special attention to the flavors in their meals for a few days, whether they are from their lunch box or the cafeteria. They might take note of the various flavors that characterize the main meal (sweet, salty, spicy, etc.).



INITIAL IDEAS AND HYPOTHESES

Here are a few examples of hypotheses the students might formulate based on their initial ideas:

Example 1

I predict that if I compare the texture of spices, I can easily classify them into two categories: powdered spices on one hand and non-powdered spices on the other. I predict this because in our kitchen cupboard at home we have powdered cinnamon and whole cloves.

Example 2

I predict that if I taste spices, I can classify them into two categories: hot and mild. I predict this because we add pepper to make dishes spicier, and we add cinnamon to pastries.

Example 3

I predict that if I compare spices' forms, I won't be able to classify them. I predict this because there are too many different kinds of spices.



WORK PLAN AND EXPERIMENTATION

Here are a few examples of experiments the students can carry out to verify their hypotheses:

Example A

The students observe the spices, choose a classification criteria and gather together all the spices based on that criteria. Using all five senses, they come up with criteria among the following: texture, size, taste, smell, color or shape (e.g., spices in powder form and those that are not powders). They reflect on the relevance of their criteria and suggest others.

RECORD ALL YOUR IDEAS AND OBSERVATIONS IN YOUR EXPERIMENT WORKBOOK.





CAUTION: SOME SPICES ARE EXTREMELY SPICY (DIFFERENT TYPES OF PEPPER), WHICH THE STUDENTS SHOULD AVOID TASTING.

Example B

The students observe the spices and select a classification criterion (e.g., texture, size, taste, smell, color or shape) and gather together all the spices based on that criteria. They then determine if there are similarities and differences between the spices of these two groups. They then try to divide them into two other categories using another criterion (e.g., shape, size, taste, smell, color or texture), and so on, to refine the classification.

EXPERIMENTAL FACTORS

To ensure scientific rigor, the students should evaluate the experimental factors that might influence the experimental results.

- Samples whose properties have changed over time (e.g., old spices)
- Storage conditions of spices



DISCUSSION: SUGGESTED INTEGRATION ACTIVITIES (CONSOLIDATION)

The teacher goes over the activity with the whole class. Did all the students find a way to classify the spices? Each team could present their classification to the class in table or graph form, drawing it on a large piece of cardboard or sticking spices to it. If the students have access to computers, they could create classification tables using MS Excel.



SUGGESTED ACTIVITIES FOR APPLYING KNOWLEDGE (APPLICATION)

To apply their knowledge, the students could decide to identify the countries of origin of the spices. They also might want to make some gingerbread.



 **SCIENTIFIC CONCEPTUAL CONTENT****Dichotomous classification**

This means that we divide what we are trying to classify into two branches (from the Greek dichotomia meaning “to cut in two”). Each subsequent branch is again divided into two branches, and so on.

Spices

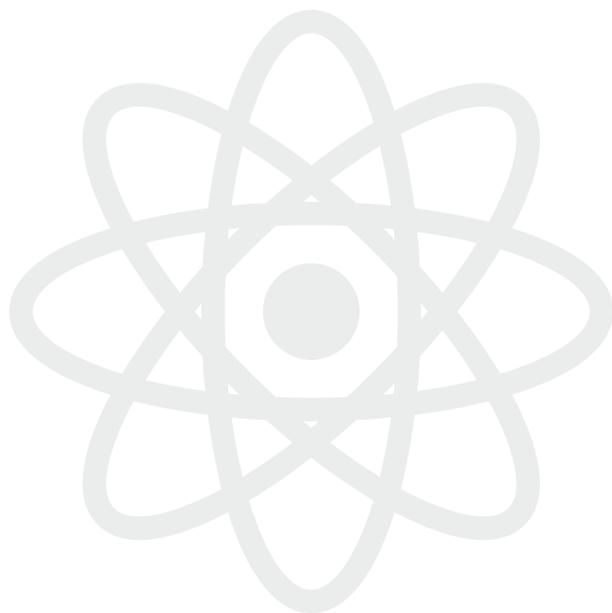
Spices are aromatic or spicy plant-based substances used to flavor food (herbs, seasoning and condiment).

Seed, leaf, root or flower?

Spices are not a botanical family, but rather they are parts of plants: seeds (coriander, cumin, fennel, cardamom); flowers (saffron); buds (cloves); leaves (bay leaf, thyme, rosemary, oregano, parsley, cilantro); bark (cinnamon); roots, rhizomes or bulbs (ginger, garlic); and fruits (hot peppers). They are used to flavor main dishes and desserts.

Spices also include herbs, some of which are fresh, while others are dried (present both fresh and dried thyme and have the students taste the difference).

Other spices are peppers that have been ground (have the students compare Cayenne pepper to whole hot peppers). Some spices are “pure,” while others are mixtures of spices, such as curry powder, which is used to make rice or meat dishes.





CULTURAL REFERENCES

Geography

All spices come from a specific region of the world, even if they have since been exported elsewhere. Their origin is often indicated on the spice container or forms part of the spice's name (e.g., Kerala pepper). Some are very expensive, such as saffron, which is from the flower of a crocus that is hand-picked in Morocco, Spain and India. It requires 100,000 flowers to obtain one kilogram of saffron. Spices play a significant role in the economies of a number of countries.

History

From antiquity, spices have been used in cooking, medicine, perfumes and even embalming (in Egypt). Arab merchants and later, in the 15th century, European seafarers, developed lucrative spice trading routes.

Cooking

Knowing how to properly use spices in cooking is an art. Give examples of world-renowned chefs.

**FOR MORE CULTURAL REFERENCES,
VISIT THE ÉCLAIRS DE SCIENCES WEBSITE:
www.eclairsdesciences.qc.ca**





REFERENCES

Amor, Safia. *Les aliments: mode d'emploi*. Paris: Père Castor Flammarion, 2000.

Boisvert, Clotilde and Annie Hubert. *ABCdaire des épices*. Paris: Flammarion, 1998.

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Conception

L'île du savoir (CRÉ de Montréal)

A project of



Produced by



Major financial partners



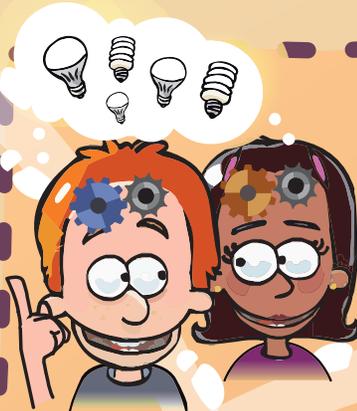
PROCESS OF ACTIVE DISCOVERY

GENERAL LEARNING PROCESS IN SCIENCE AND TECHNOLOGY (IN ELEMENTARY SCHOOL)

Context related to everyday life



- Situation problem or
- Discovery question or
- Need to be fulfilled
- Question related to the operation of an object (how does it work?)



Initial ideas and hypothesis

My initial ideas:

- I share my own ideas.

My hypothesis:

- I predict that... I think that because...
- I imagine my prototype.
- I think it works like this...

Planning and carrying out



My equipment:

- I observe and handle the equipment.
- How could this equipment be useful to me?
- I choose my equipment and my materials.

Carrying out my process:

- What will the steps be?
- What precautions should I take?

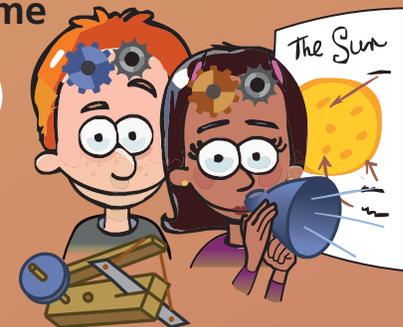
My actions:

- I carry out the steps of my protocol.
- I note or draw what I observe, what I do and what I discover.

My results:

- What is my answer to the problem, question or need?

Outcome



My outcome:

- Do my results confirm my hypothesis or not?
- Are my results similar to those of the other teams?
- Can the other teams' results help me to find answers to my problem, my question or my initial need?
- What could I communicate concerning my discoveries?

What I learned:

- What do I retain from this activity?
- What could I communicate concerning my results or my discoveries?

New question?