Students' Card

The Rare Earth Elements Wheel

Objective: How to build the wheel and play with it

Introduction

A lot of electronic devices of daily usage, such as smartphones, computers or modern flat TVs, contain special metals named Rare Earth Elements (REEs). These metals are very important for their strategic applications, not only in the electronic devices, but also in the low-carbon energy technologies (e.g., wind turbines, energy-efficient lighting) and in the sustainable mobility (e.g., batteries of hybrid cars).
For this reason, in 2011, the European Commission drafted the first List of Critical Raw Materials (CRMs), being updated every three years.
Based on the last assessment published in 2017, the latest CRMs list includes 27 raw materials, comprising non-energy and non-agricultural raw materials. Their overall importance is related to both (i) high economic importance for the European Union and (ii) high risk of supply disruption. It follows that recycling is an important source of secondary raw materials, that can contribute to the security of raw materials supply and in advancing towards a more circular EU economy.
This activity will allow:

- to discover the most utilized Rare Earth Elements in daily electronic devices;
- to think about the end of life of such devices and learn their properly disposal for a correct management and recycling. In this way the Rare Earth Elements, together with other metals, can be recovered as secondary raw materials.

Necessities

List of materials/tools

- 1 Printed wheel in A4 or A3 format (1 for each group of students);
- 1 Carboard as rigid support where gluing the printed wheel (1 for each group of students);
- 1 Cork stopper;
- 1 Plastic knife/pointer (1 for each group of students);
- 1 Nail (1 for each group of students);
- 1 Scissor (1 for each group of students);
- 1 Cutter (1 for each group of students);
- 1 Hammer (1 for each group of students);
- 1 Glue (1 for each group of students).

Students' Card

The Rare Earth Elements Wheel

Procedure

1. Print the wheel (***The wheel_to be printed***), glue it onto a piece of cardboard and cut it along the circular edge.
2. Cut in half the cork stopper with the cutter.
3. Fix one of the cap halves in the middle of the wheel with the glue.
4. With the nail and the hammer, pierce the plastic knife/pointer.
5. Fix the nail and the knife/pointer in the middle of the upper face of the cork.

Additional Safety Notes

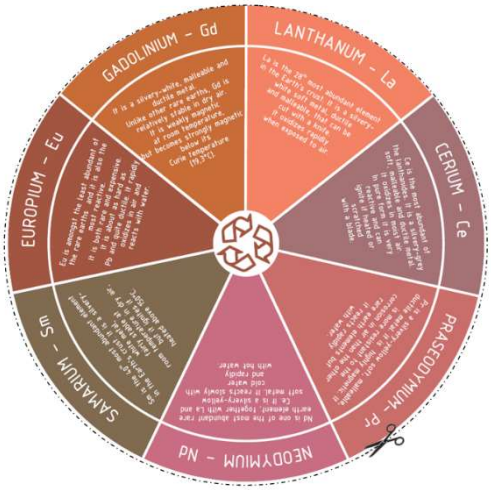
Be careful when using nail / scissor / cutter / hammer, and possibly ask for help to your teacher when using these potentially harmful tools.

How to play

When the wheel is ready, and cards have been prepared by the teacher, the game can start:

- one student per time is asked to launch the rotation of the knife/pointer and read out the description of the selected Rare Earth Element selected;
- then, the teacher shows all the cards to the class, asking the student who run the wheel, helped by his/her classmates, to guess in which electrical appliance is contained that Rare Earth Element, considering its characteristics.

Because sometimes it can be difficult finding the correct answer, the teacher can guide the activity helping and giving hints to the students, in order to find the correct answer.

The Rare Earth Elements Wheel

*For the game, students have to print and cut the Wheel present (**The wheel_to be printed**) analogous to the one showed on the right.*