

PLASTIC FAMILIES

GOALS

- Find out what a plastic material is
- Learn what a polymer is
- Learn about the division between different types of plastic and the characteristics of their disposal



WHERE

In the classroom

TIME

About 1 hour

TOPIC

Knowledge of the different plastic materials; disposal and recycling of plastics

LEVEL OF PHYSICAL ACTIVITY

Low-medium





BASE CONCEPT

We often think of plastic as a single material, but in reality, there are types of plastics with very different characteristics, and according to which the impact on the environment and their recyclability also vary. Knowing plastic and knowing how to distinguish between the different types is an important step towards awareness for their correct disposal and to direct one's consumption choices



HOW DO YOU DO IT?

FIRST PHASE: DISCOVERING PLASTIC

The activity begins by asking the students what they think the meaning of the word plastic is. Everyone can write their own definition, then together with the whole class the meaning and etymology of the term "plastic" is searched in the dictionary, which derives from the Greek word "plastikos", which means suitable to be molded, thus referring to the malleability or plasticity of the material during production, which can be malleable and resistant? This happens because plastic is a polymer.

At this point, the process of formation of a polymer is presented in a simplified way. This concept can be introduced in a concrete way by having the children line up. The individual children are the monomers, which join together in a chain to create a polymer.

It explains how plastic is born through a polymerization process, whereby the individual molecules join together to form long chains, the polymers, thus becoming more resistant. The thicker and denser the chain, the greater the rigidity of the material we obtain. You can then have the children try to form the chain in different ways. First by placing only the palms on those of one's neighbor, then only by the hand, then squeezing closer arm in arm and fitting more closely into each other. For each "mode" test the "resistance" and the characteristics of the chain, perhaps by making the children left out try to "break" the chain formed.

SECOND PHASE: PLASTIC FAMILIES

Precisely due to the great variety of ways in which polymer chains can be formed, as we have just seen, there is not just one type of plastic, but there are a great variety! You can start by introducing the topic of different types of plastics to kids by watching a short video like this one.

After watching the video, the game begins. For the game it is necessary to move the desks or in any case set up an empty space large enough for the children to move freely. Empty chairs are placed in the corners of the room, as many as the plastic families involved. Above the chair is attached the sign with the full name of that plastic "family". A card is distributed to each participant on which a plastic object corresponding to a certain "family" is represented. At the start, music is played.

As long as the music keeps going, the children have to exchange the slips of paper in their hands as many times as possible. When the music stops, everyone will have to look at the piece of paper in their hand and start trying to reunite their "family", i.e. with objects with the same symbol.



When the whole family is gathered, the children will have to sit on the right chair in the corners of the room, stacking themselves on top of each other. The first family to sit down wins the challenge. The head game will have to check that the families are formed correctly.

The game can be repeated several times so that the children become familiar with the different categories. At the end of the game, with the families formed, the specific characteristics of each single typology can be better presented.

CHARACTERISTICS OF PLASTIC MATERIALS

A first division can be made between two main polymer families:

- ☐ **Thermoplastics** (which soften with heat and stiffen again with cooling).
- ☐ **Thermosetting** (that never soften after being shaped).

Examples of thermoplastics-Recyclables

Polyethylene(PE) – can be low density (LD-PE) or high density (HD-PE), it is potentially infinitely recyclable

Polyethylene terephthalate (PET) - potentially infinitely recyclable

Polyvinyl chloride (PVC)

Polypropylene (PP) - can be recycled a maximum number of times, usually 3

Polystyrene (PS)

Examples of thermoplastics-Not recyclable

Epoxide (EP)

Phenol-formaldehyde(PF)

Polyurethane (PUR)

Polytetrafluoroethylene (PTFE)

Unsaturated polyester resins (UP)

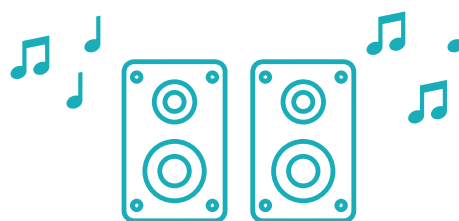
[Learn more about the characteristics of the different materials.](#)



WHAT DO I NEED?



GAME SHEETS



MUSIC



SYMBOL	NAME	CHARACTERISTICS	RECYCLING
PET 	Polyethylene terephthalate	It is a thermoplastic resin of the polyester family. It has characteristics of transparency, resistance and gas barrier: for this reason, it is particularly suitable for the production of bottles for carbonated drinks and trays. Main applications: bottles, films, tubes, trays, blisters, containers and packaging, labels.	Recycled PET (r-PET) maintains characteristics very similar to virgin polymer. PET bottles are among the most easily sortable and recyclable packaging.
HDPE 	High density polyethylene	Polyethylene is the most common and simplest of synthetic polymers: it is a thermoplastic resin obtained from the high-intensity one is made up of linear chains that give greater strength and rigidity, making it particularly suitable for the production of cans and rigid containers. More stable and inert, it is considered the best plastic for long-term food storage. Main uses: containers and bottles of detergents and food, toys, caps and pipes for the transport of water and natural gas.	Recycled HDPE is very similar to virgin polymer, but residues from previous use can affect quality. HDPE packaging has a high degree of recyclability (bottles for food and household and personal care products are among the easiest to sort and recycle).
PVC 	Polyvinyl chloride	Thermoplastic obtained from the polymerization of vinyl chloride. It finds application above all in the production of semi-finished and rigid products (PVC-Ue flexible (PVC-P thanks to the addition of plasticizers. Main uses: production of flacons and bottles for cosmetics, labels, blister packs and single-portion packs. It is widely used in construction for pipes, such as gutters or drinking water pipes, window frames and vinyl floors. Also used in the production of rigid and plasticized film for packaging and phonograph records.	Creating efficient recycling streams from PVC packaging is complicated due to the limited quantities of PVC packaging present in separate collection. Instead, it is successfully recycled in other sectors, such as construction.



SYMBOL	NAME	CHARACTERISTICS	RECYCLING
LDPE  LDPE	Low density polyethylene	It is the lightest ductile and flexible material of the polyethylene family. Main uses: in the production of flexible materials such as films, foils, bags used for packaging and in agriculture. It is used in coatings for cables and flexible pipes.	Recycled maintains the mechanical properties of the primary material even if it loses transparency. The degree of recyclability depends on its application: many flexible packaging, for example, are printed on the printed on the outside, metallized or coupled with other materials (e.g., aluminum).
PP  PP	Polypropylene	Obtained from the polyaddition of propylene, it has good thermal resistance, high rigidity and is impermeable to water vapour, but not to gases (therefore not suitable for bottles for carbonated drinks). Main uses: many commonly used objects such as household items and toys but also many rigid (jars and bottles) or flexible (trays or packaging film) packaging).	Recycled PP maintains characteristics similar to the original, but its degree of recyclability is linked to the heterogeneity of its applications in the field of packaging, which can make it more difficult.
PS  PS	Styrofoam or polystyrene,	Thermoplastic polymer of styrene. Expanded polystyrene (EPS) is made by soaking polystyrene in water and adding pentane. Main uses: production of many products, from disposable tableware to office items and packaging. In its expanded version it is used for the creation of lightening insulating and sound-absorbing packaging.	The recyclability of rigid PS is conditioned by its poor impact resistance. Furthermore, many expanded PS packaging, such as the trays used to package meat, are contaminated by product residues and therefore difficult to select for recycling.



ANNEXES

POLYPROPYLENE



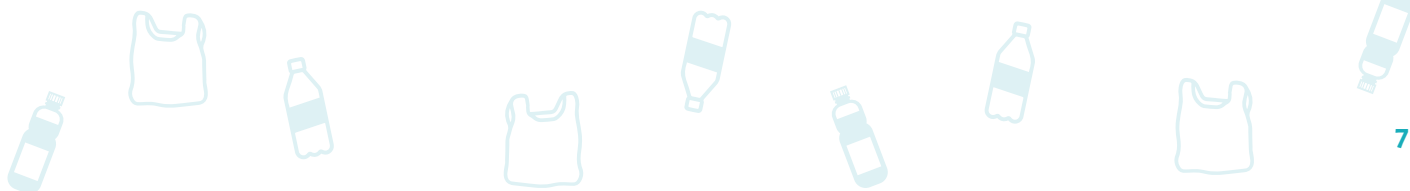
POLYSTYRENE



POLYVINYL CHLORIDE



POLYETHYLENE TEREPHTHALATE



HIGH DENSITY POLYETHYLENE



LOW DENSITY POLYETHYLENE



REMEMBER THAT SHARING IS IMPORTANT!

Take a picture to tell us about your experience in class and send us an email at: info@istituto-oikos.org.
Share it on social media with the hashtags: **#LifeBeyondPlastic#PlasticLessSchool!**

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