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Properties of glass, oil's formation...how to explain it? The secret is to amaze!

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The design and testing of numerous routes for teaching and dissemination of topics in physics, biology, geology and energy is born from a collaboration between teachers and researchers that lasted for many years in Parma, Italy. These projects are implemented by the association "Parma Casa della Scienza", which promotes the dissemination of scientific culture in schools and among the public. The main purpose of the association is to create a science center in Parma, offering also training opportunities on techniques for teaching science. The funds for the projects come from European competitions and Cariparma Foundation. Currently the association is proposing laboratory activities, with the widespread diffusion of 20 educational programs, included in school curricula. The approach is informal and aims at the stimulation of curiosity and surprise. Students who participate arise so spontaneously in an attitude of research - action, working directly on the phenomena under study. This avoids the clichés of standard passive listening.
Our work is a constant search for ideas, ways and means to demonstrate, for the purposes of school education, how useful is the game and the interaction with the phenomena, many of which are usually only seen in books and not lived with awareness.
Two in particular are the educational proposals that we would like to present , relating to content of great importance that are rarely addressed in the context of schooling completed
First Path: explains the physico-chemical properties and structural properties of glassy materials; enters the details of the molecular structure of "amorphous solid" contrasting it with that of crystalline solid; llustrates the process of formation; gives reason for its peculiar properties from which derive extreme flexibility of working and the many optical properties.
This is achieved through the actual processing of a fluid "pseudo glassy" realized at low temperatures, which simulates the processes described and allows children to follow stages and the secrets of the process: the sugar caramel! The true nature of the material is revealed only at the last: this leads to great fun and enjoyment of student, amazed to be able to enjoy the results of their experiments.
Second path: it illustrates the processes involved in the formation of coal deposits and oil fiels. It explains the complex physical and chemical phenomena that led to the formation of fossil fuels from plant or animal remains of the Carboniferous era. The emphasis is reserved to the properties of the rocks in which hydrocarbons are trapped and to the physical processes that induce their migration from the deep layers to the more superficial crust. The students argue stimulated by curious and fun experiments on the concepts of density, temperature and pressure: they build real models of fields, using common materials, such as sponges with different porosity, water, oil, soil, peat and charcoal . During the experimental process the boys arrive at rigorous justification of the phenomena, working with the same attitude of the detectives in the course of an investigation, finding the right way to get the correct scientific explanation.