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Bringing Nobel Prize Physics in the Classroom

PLAYING WITH MY NEW BEST FRIENDS : MOLECULE AND ATOM

VASILIKI PSARIDOU

DCU ELLINOGERMANIKI AGOGI NUCLIO EGO EUROPEAN GRAVITATIONAL OBSERVATORY IASA Paris Centre for Cosmological Physics Co-funded by the Erasmus+ Programme of the European Union léargas

Background information for teachers

Vasiliki Psaridou : Primary school teacher, Sub-Headmaster of Minority school of Dokos in Greece, Master Degree entitled "MODELS PLANNING AND DEVELOPMENT OF EDUCATIONAL UNITS" , Leading Teacher in Coding

Overview of this lesson pack:

Name of the activity	**Playing with my new best friends : the Molecule and the Atom**
Topics introduced	CERN, atom, molecule, chemical compounds, chemical elements, proton, neutron, electrons
Curriculum Connection	IRELAND: PORTUGAL: GREECE:Primary school 5th grade Physics, “Structure of matter” FRANCE: ITALY:
Reference Demonstrator	How to accelerate particles
Age of students	10-11
Duration	1,5 hour

Overview of this lesson pack:

Type of activity	INQUIRY BASED LEARNING - ONLINE ACTIVITY
Description of activity	Teacher activities: ● Find pictures of chemical compounds and chemical elements in the internet, ● answers and explanations about what pictures show, ● Gather the necessary materials in order to create chemical compounds and chemical elements from school's physics lab , ● open in the computer lab the LHC Game in order the children to play with it Student activities: ● Read the school book ● ask questions and discuss ● introduction to CERN ● learn about molecule, atoms, neutrons, protons ● create chemical compounds ● play with CERNLand
Equipment requirements	Computers, internet connection, different colored plasticine, toothpicks, a projector , different colored balloons
Prior knowledge for students	There is no prior knowledge for 5th grade students for physics and this is the first chapter of the book

Background and overview of the discovering alien worlds demonstrator:

This exercise in an introduction to particle accelerators and high energy physics. The focus of the exercise is the world's most powerful accelerator, the LHC, which is located at CERN. Students learn about how it accelerates, bends and focuses proton beams and how it makes sure that the protons collide inside one of the four detectors located on its circumference.

To emphasise what they've learned after the lesson, the students play a game in which they have to apply what they've learned in a 'virtual accelerator'.

Presentation for students

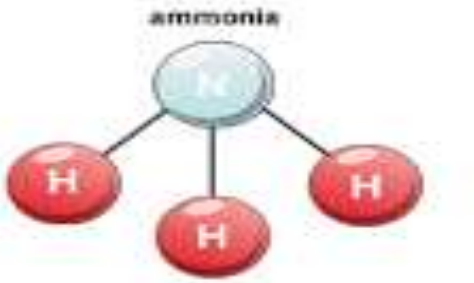
Activity 1: Students in 5th grade of Primary school in Greece have no prior knowledge of physics. That's why we will start by reading the chapter of the school book

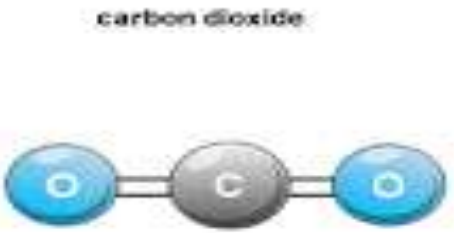
Δομή της ύλης

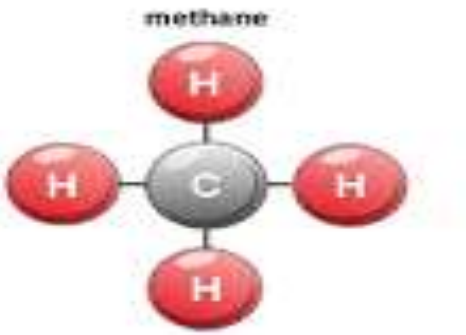
Αν κοιτάξουμε γύρω μας, θα διαπιστώσουμε ότι μας περιβάλλει ένα μεγάλο πλήθος διαφορετικών υλικών σωμάτων. Και όμως, αυτό το τεράστιο πλήθος διαφορετικών υλικών σωμάτων προέρχεται από 92 μόνο στοιχεία! Ας πάρουμε όμως τα πράγματα με τη σειρά.
Τα περισσότερα σώματα γύρω μας αποτελούνται από μίγματα. Αν διαχωρίσουμε τα συστατικά ενός μίγματος και αρχίσουμε να τεμαχίζουμε ένα από αυτά σε όλο και μικρότερα κομμάτια, θα φτάσουμε κάποια στιγμή στο **μόριο,** το μικρότερο τμήμα μιας χημικής ένωσης που διατηρεί τις ιδιότητές του. Η ζάχαρη, για παράδειγμα, είναι γλυκιά. Και το μόριο της ζάχαρης είναι γλυκό. Ο σίδηρος έλκεται από τον μαγνήτη. Και το μόριο του σιδήρου έλκεται από τον μαγνήτη...
Τα μόρια αποτελούνται από ακόμη μικρότερα σωματίδια, τα **άτομα.** Τα καθαρά σώματα χωρίζονται σε δύο κύριες κατηγορίες: στα **στοιχεία,** στα οποία τα μόρια αποτελούνται από ένα είδος ατόμων και στις **χημικές ενώσεις,** στις οποίες τα μόρια αποτελούνται από διαφορετικά άτομα.
Όπως ακριβώς όλο το πλούσιο λεξιλόγιό μας προκύπτει από τα 24 γράμματα του αλφάβητου, όπως η μαγευτική μουσική πολυμορφία προκύπτει από τις 7 νότες, έτσι και όλη η ποικιλία των υλικών σωμάτων προκύπτει από 92 μόνο διαφορετικά στοιχεία.

Τα μικροσκοπικά σωματίδια της ύλης

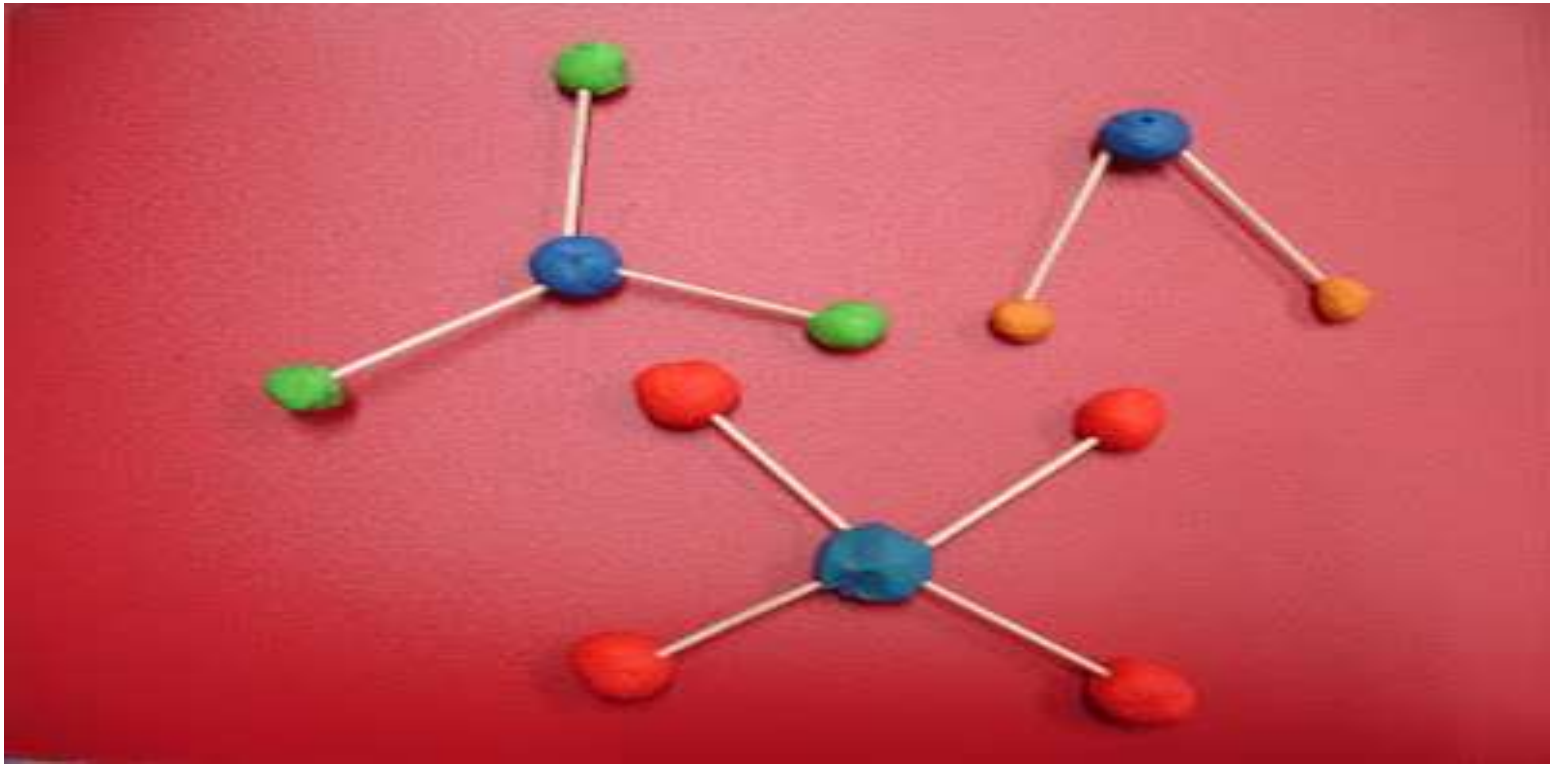
Activity 2: After discussions and answering to questions, students will see the pictures of chemical compounds and elements that the teacher will provide through internet and will be shown to the whole class through a projector. A discussion will follow and students will ask questions about the pictures.







Activity 3: Then students will form groups of two and with the help of the teacher will try to represent some basic chemical compounds and elements. They will use simple materials like different colored plasticine and toothpicks. For a simple bond they will use one toothpick, for a double bond two e.t.c.



Activity 4 :Then we will talk about the constituents of the nuclei: protons, electrons , and neutrons . In order to do that we will visit the CERLand .

Activity 5 : Students will visit the “Learn about CERN” section for a brief history background information .

Then they will play “Win the Proton TOTEM”

Activity 6 : We will continuing playing in CERNLand with "LHC game control room"

Activity 7 : Finally, we will become protons, neutrons and electrons by using different colored balloons