

LESSON PLAN
Electric piles

Date: 02.03.2007

Grade: 11th (17 years old students)

Subject: Chemistry

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Lesson theme: Electric piles used in technique

Lesson goals:

- verifying the knowledge of electrochemistry;
- developing the skills necessary for building a device based on materials given;
- using the educational software “Electric piles“ to understand how the electric cells work and how they look like and their application in technique .

Lesson type: Mixed (combined)

Operational objectives: to point out the knowledge way, understanding evaluation and application of the knowledge of the student , such as:

- defining a galvanic element;
- making the difference between metals using chemical reactivity;
- knowing the types of galvanic elements;
- understanding how the galvanic elements work;
- specifying a few utilities of the galvanic elements;

Teaching methods: conversation, problems, programmed teaching, independent observation, shaping.

Didactical tools: the educational software “Electric cell” on XPLORA KNOPPIX DVD 1.2, computers

Lesson display:

1. Organizing – writing down those absent from the lesson and establishing the proper atmosphere for carrying on the didactical activities.
2. Verifying the knowledge of the students using an interactive method in which the students are answering questions from the previous lesson “Galvanic Elements .Standard potentials and the sense of the chemical reactions.”
3. Communicating the new knowledge: the title of the lesson is announced and then the content of the theme is announced like this:

Electric cells with practical use are :

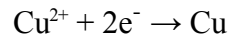
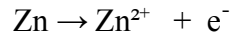
- a) Daniell Cell
- b) Lead Accumulator
- c) Leclanché Cell
- d) Combustion Cell

a) Daniell Cell is composed from:

- compartmented vessel through a diaphragm
- Zn and Cu electrodes in solutions of $ZnSO_4$ and $CuSO_4$
- electric conductor
- voltmeter

The diaphragm replaces the salt bridge. She doesn't let the solutions to mix, but it allows the passing of the ions SO_4^{2-} .

The processes that take place in the electrodes are:

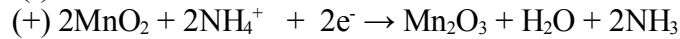
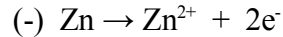


The Daniell Cell has a t.e.m. = 1,1V

b) **Leclanché Cell:** it's a dry cell built by the engineer Leclanché in 1868

It's composed from a zinc cylinder (-) filled with a NH_4Cl , ZnCl_2 , H_2O paste and a filling material. The electrode (+) is composed from a bare of coal surrounded by MnO_2 .

The processes that take place are:

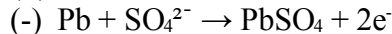


T.e.m. = 1,5 V

c) **Lead Accumulator:** it's an electric cell with very much practical use, one of the most important is the car batteries. The electrode (-) is composed from a lead grill which eyes are filled with spongy Pb, and the electrode (+) is composed also from a grill of Pb, but the eyes are filled with PbO_2 .

The electrolyte is a H_2SO_4 solution 38 % (with 1,29 g/cm³ density).

The processes that take place are:



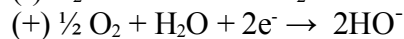
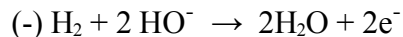
T.e.m. = 2V, is usually used with 3-6 batteries with elements tided in series.

d) **Combustion Cell**

The H_2 and O_2 are put through coal electrodes compressed in which the catalysers were incorporated.

The electrodes are dived in concentrated solution of NaOH.

The processes that take place are:



The H_2 and O_2 are consumed during the functioning of the cell, and the water formed is evaporated.

All this information, and many more, were offered to the students by the education software presented.

Advantages:

- Every student can see how every galvanic element looks like how they function and what is their use;
- Using the computer at the chemistry course is in the benefit of the students which are passionately found of the computer and that way they can understand chemistry easily,
- These galvanic elements can't be presented in the chemistry laboratory, therefore this lesson is better learned in the computer laboratory with an adequate software.
- This educational software is well done, easy to use and especially is has an easy to learn content.
- The teachers activity gains new horizons, and the student develops the self-control capacity and the leading of his own intellectual activity (in his own rhythm).

Disadvantages of using the educational software? I don't think there are. All students want to do as many hours as possible in the computer laboratory with a well designed and interesting software.

