EDUCATIONAL SOFTWARE USED IN CHEMISTRY FOR DETERMINING CHEMICAL COMPOSITION/MOLECULAR WEIGHT CHEMICALS

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ABSTRACT

We must admit that within the last years the importance of using computers became more and more obvious. Thus it was important to train specialists with skills in using computers to find, acquire, and understand information; to apply information and communication technologies to processing it; to build virtual models of real world objects and actions.
Advanced information technologies have increased motivation to study some subjects which may have nothing in common with computers, because they facilitate learning by considering the individual characteristics of the students, by providing feedback information amongst pupils/students and programs, and by increasing the efficiency of education.
To sum up, we stated that implementation of information technologies in teaching/ learning is a priority. The best example is this paper work. This is further evidence of the interference between technology and traditional methods.
It's no surprise that in an information society, the real and the virtual world tend to merge, thanks to new communication and information technologies, education is able to change its traditional methods and be "up to date".
Educational software of this paper is addressed to pupils/students who wish to use another variant, which is much easier and more attractive in terms of solving some calculations to determine the chemical composition of molecular weight chemicals.
The software can be used by any pupil/student with minimal knowledge of PC use, since it has a modern design and attractive interface, with the help of Microsoft Access.
Keywords:
molecular weight, chemical composition, database, interface.

1. INTRODUCTION

Over 20 years have passed since the educational system introduced computerization. If above normal specialist in our field could not dream to having a personal computer at the office, now we can say that they we cannot imagine a home without a computer.
In all cases, the computer is a tool who helps us organize our learning environment better, guided by our teacher or developed by software application. Computers provide self-teaching, but remain an educational tool which assists training - self-teaching; we combine it with other means and methods of work organization, as elements of the teaching strategy.
In the second half of last century, the changes of the planet (information explosion, population growth, economic development, and political empowerment) have generated new demands

from school in general and university in particular, especially with regard to meet high education demand.

We should not wonder whether training and evaluation improves by using computers, but how can we use them better for their unique qualities, which distinguish them from other media. These unique qualities are computer interactivity, precision operations, ability to carry out and provide multiple representations of dynamic phenomena, and especially how they interact differently with each pupil/student separately.

Almost all research show the benefits of using computers compared with other learning methods and assessment:

- reducing the time of study;
- enabling a positive change towards complex attitudes;
- computers are used more efficient in teaching and learning than any other method;
- computer-assisted instruction is more effective as an alternative form of training than alternative methods;
- students who learn slowly and those left behind have better results than top students.

Chemistry is a natural science and enables science progress. To show pupils/students that chemistry is present all around us and it is essential in everyday life, they must observe that learning this discipline not only allow the acquisition of theoretical knowledge but develops practical skills, too.

Chemistry teaching-learning methods require the active participation of pupils/students for learning and being aware of new knowledge. A modern lesson is an active lesson. This can be achieved only if the teacher uses his teaching skills. The teacher must find different ways to determine his pupils/students to attend class, to use active techniques of self-control, to keep heuristic conversation, collective debate, by questioning and investigating.

2. DETERMINING THE CHEMICAL FORMULA OF SUBSTANCES WITH MICROSOFT ACCESS

Using Microsoft Access, you can manage all information in one database (Database). Inside this Microsoft Access file, data are divided into separate structures called tables (Tables); to view, add, and update data from a table using forms (Forms); data are available and can be extracted using queries (Queries); data could be analyzed or printed in a special format using reports (Reports). Tables, Queries, Forms, and Reports are the most important entities to create an Access database.

Data is stored in one location (the table), but can be viewed in different forms: query, report or form. When that changes and saves the information in table then it will be seen in other forms.

To find and retrieve information only in certain conditions specified by the user and who include information from several tables, you can create a query.

To view, enter or change data directly in a table, you have to create a form. When opening a form, Microsoft Access extracts data from one or more tables and displays them on screen using the display method selected/created by the user (by shape).

Chemistry, and other related disciplines (Physics, Mathematics, etc.) enjoyed new perspectives due to computers and Internet training (teaching/learning/assessment). Chemistry learning by computer is a challenge and a necessity at the same time.

Using Computer Assisted Training in Chemistry teaching is a method more efficient than any traditional method, for at least two reasons: attractive method of teaching/learning; the opportunity of a virtual presentation of chemical phenomena which is impossible otherwise.
Chemistry uses a wide variety of educational software for learning used to acquire new knowledge through static or dynamic simulation of events/processes. This kind of software has the advantage that it enables us to see some images again and use the so-called image selection. Still, there is some software that shape up features of objects and concepts (with diagrams, graphs, etc.).
There is also some software that represents still models and turns them into dynamic, like animations. They stimulate the functionality of high complexity devices or devices impossible to study directly. Educational Software is designed to be interactive.
The book and the additional software are designed as a new tool for the Chemistry teacher and not as a substitute.
Therefore, we have developed this application, which primarily addresses to secondary schools students and for I and II-year college students, to develop their understanding of the determination of chemical formulas, knowing the percentages corresponding components of substances, or their mass report.
We hope that program will be useful to pupils/students and it is a means of verification of science knowledge.

Composition of substances can be expressed by:

- chemical reports;
- mass reports;
- weight percentage within the molecules' constitution.

The application opens with an attractive interface (Fig. no. 1), which in turn will open the "Application" form (Fig. no 2), which includes other forms. When you click the three buttons on the Application form, forms will open up.

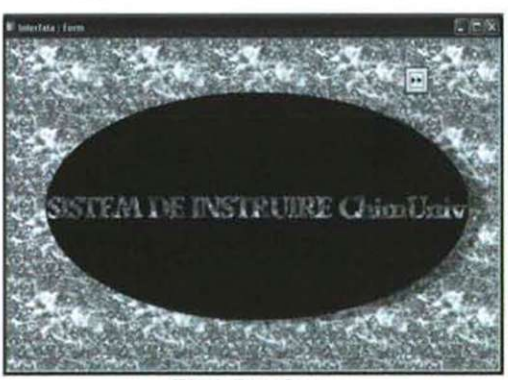

Fig.1. Interface

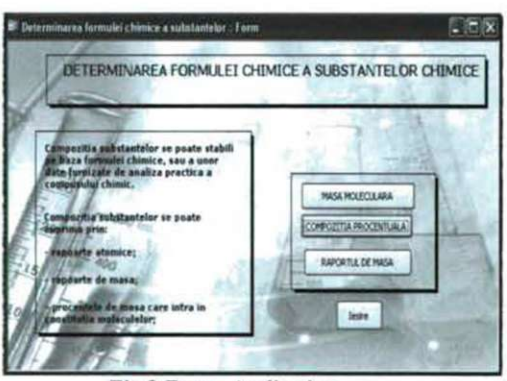

Fig.2 Form_Application

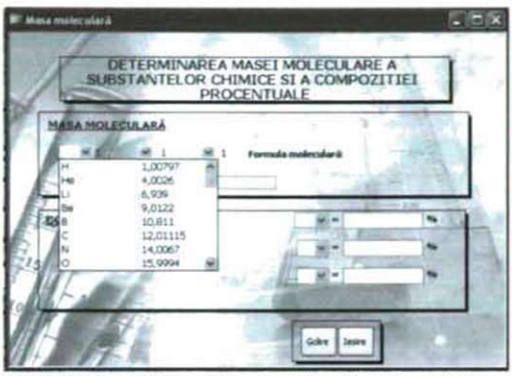

Fig.3. Form_Determination of molecular weight and percentage composition

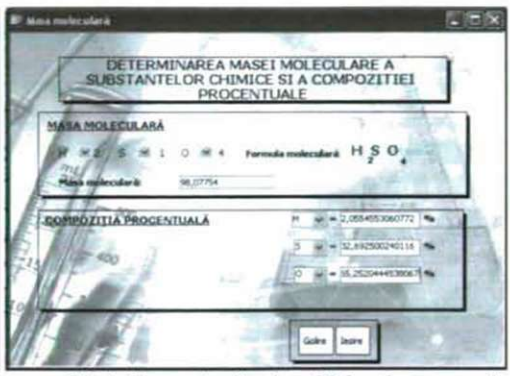

Fig.4. Form_Application_Molecular computing and percentage composition

"Molecular weight" form calculates molecular weight of substances we want. As we progress in entering data in combo boxes and text boxes below them, the chemical formula will be played in the side and so, whenever we will be filling in the text box, calculated molecular weight be displayed.

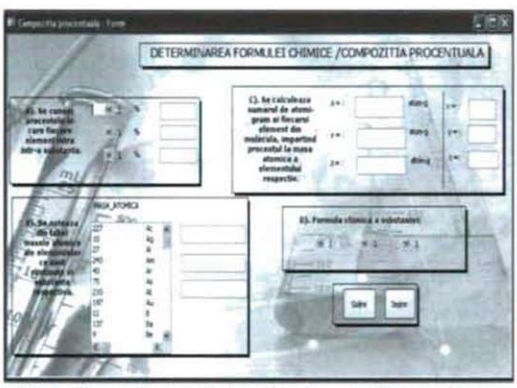

Fig.5. Form_Determining the chemical formula knowing the percentage composition

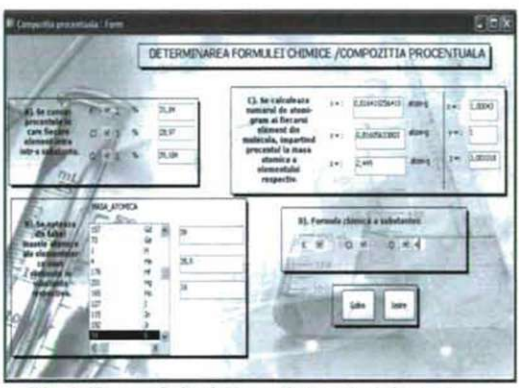

Fig.6. Form_Calculation of chemical formula knowing the percentage composition"

Percentage composition" form merely determines the chemical formula of a substance, knowing the percentage quantities of elements constituting the substance. (Fig. no. 5; Fig. no. 6).

For example, if the analysis suggests that a substance containing 37.92% A, 20.72% B, and 41.36% C, the chemical formula should be $A_xB_yC_z$, the coefficients *x, y, and z* must be determined.

Steps in this form are:

- substance components and their respective percentages are selected;
- note atomic weights of substances that make up the particular substance down in the table;
- calculate the number of gram-atoms of each element within the molecule, dividing it to the atomic weight percentage of that element;
- determine the number of atoms of each element contained in its chemical formula (we divide the numbers obtained to the lowest quotient);

- finally, we write down the resulting chemical formula.

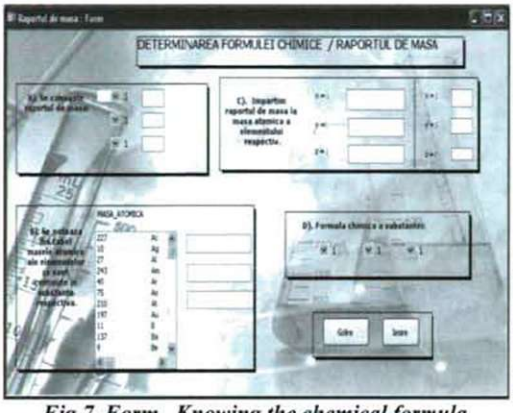

Fig.7. Form_ Knowing the chemical formula determination of mass ratio

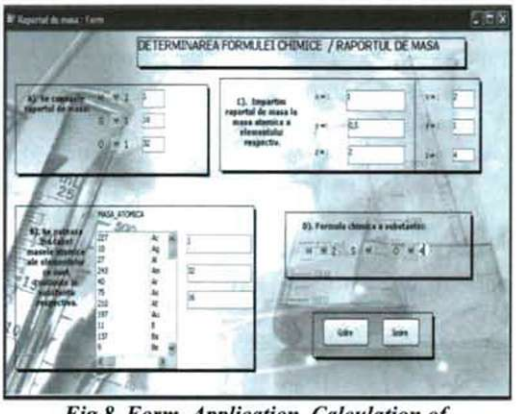

Fig.8. Form_Application_Calculation of chemical formula knowing the mass ratio

The form "Weight percentage" simply determines the chemical formula of a substance, knowing the mass ratio of elements constituting the substance. (Fig. no. 7; Fig. no. 8). If the analysis suggests, for example, that a substance containing the mass ratio A: B: C = 1: 1: 4, the chemical formula should be $A_xB_yC_z$, the coefficients *x, y, and z* should be calculated.
The steps in this form are:
we selected the components of the substance and their corresponding weight percentage;
we note down the atomic weights table record of substances that make up the particular substance;
we divide the atomic mass ratio by the weight of that element;
we calculate the number of atoms of each element contained in its chemical formula (we divide the numbers obtained to the lowest quotient);
finally, we write down the resulting chemical formula.

3. CONCLUSIONS AND PROPOSALS

- Using computers as an education means in teaching Chemistry is a real factor of progress, helping to optimize the training-education process, both by *improving the quality* of the teaching-learning process and motivation by increasing the motivation factors involved in this process;
- Generalizing Chemistry learning based on introducing ICT and communication as part of an effective method framework could improve the competence and development to attract learners to this area;
- The key element of using computers as teaching technology means is not mainly material, whose failure or failure is often invoked, but also the human factor (decision makers, trainers, trainers of trainers);
- Any attempt to reform this area should start by educating them in the spirit of the information society.

The development of the Chemical University system is aimed at creating usable means both for pupils/students and perhaps especially for teachers, given that its success depends on a very large extent on how responsive teachers are to making such educational programs more attractive. Feedback is always assured.

Developing educational software, with the help of the learners, is a way to attract those who are less interested in Chemistry.

I must mention that this application is part of my doctoral thesis (still unfinished at this point), which includes a number of such applications developed with Microsoft Access and more.

The starting point of the implementation of this system was that the information could greatly facilitate the study of Chemistry of pre-university and university Romanian teaching system, because using computer knowledge can become more intuitive and attractive.

Those interested in remodeling the Romanian education system required by the EU reform should be focused not so much on obtaining funds or national strategies, but especially on teacher education: psychological-technological preparation and teaching-method training.

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