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THE USE OF MICROSOFT ACCESS TO EXPRESS SOLUTIONS CONCENTRATION

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ABSTRACT
The aim of the paper is to present a different system to express solutions concentration, a system meant to help students more and to measure the concentration more easily and efficiently. Initially, the technical support used for measuring the concentration is being presented, and to express the concentrations, a computer simulation was run by through a Microsoft Access database.
KEYWORDS
solutions concentration, students, computer simulation, Microsoft Access database

1. INTRODUCTION

A solution is a homogeneous mixture of two substances. One of the compounds is the solvent which exceeds in amount the solute. If, prior to obtaining a solution, one of the compounds is liquid, than this compound is the solvent, regardless the amount.

Solution concentration, for a specific compound is expressed in terms of the amount of compound in a specific amount of solution or solvent.

Common units used to express concentration are: percentage of composition of solution, molarity, normality, molality, titration, mole fraction.

Percentage of composition of solution is based on the mass or volume of the components of solutions. Percent composition by mass means grams of substance dissolved in 100 grams of solution. For example, 20% solution means 20 grams of solute in 100 grams of solution. Percent composition by volume means volume of solution dissolved in 100 ml solution. For example, 15% volume solution means a solution that contains 15 volume of solute in 100 cm^3 of solution.

Solution concentration is industrially expressed in degrees Baume (Bé). 0°Bé marks the water density and 10°Bé marks the concentration of a 10% NaCl solution. The space between the two points is divided into 10 units, units that can extend beyond the selected space. For liquids lighter than water the following formula is used to measure the density:

d=144,30/(144,30+n), where "n" stands for degrees Baume;

for liquids heavier than water, the formula used is:

d=144,30/(144,30-n)

A 1 molar (1m) solution is a solution in which 1 mole of a compound is dissolved in a total volume of 1 litre. Molarity has multiples and submultiples, that means the solutions are: dmol(m/10), cmol(m/100), mmol(m/1000), 2molar(2m), 3molar(3m), etc. Solution concentration is measured in moles of substance dissolved in 1000g of solvent. This concentration is molality(m). Solution concentration is measured in gram equivalent weight of a solute per liter of solution. This concentration is called normality (N).

Concentration is measured in mole fractions. Mole fraction is marked X and it is defined as the number of moles of a compound divided by the total number of moles of all components in the solution. Titration is quantity of substance in grams contained in m³ of solution and it is marked T.

2. THE PRESENTATION OF APPLICATION

A simple interface is being used to run the program (Fig.1).

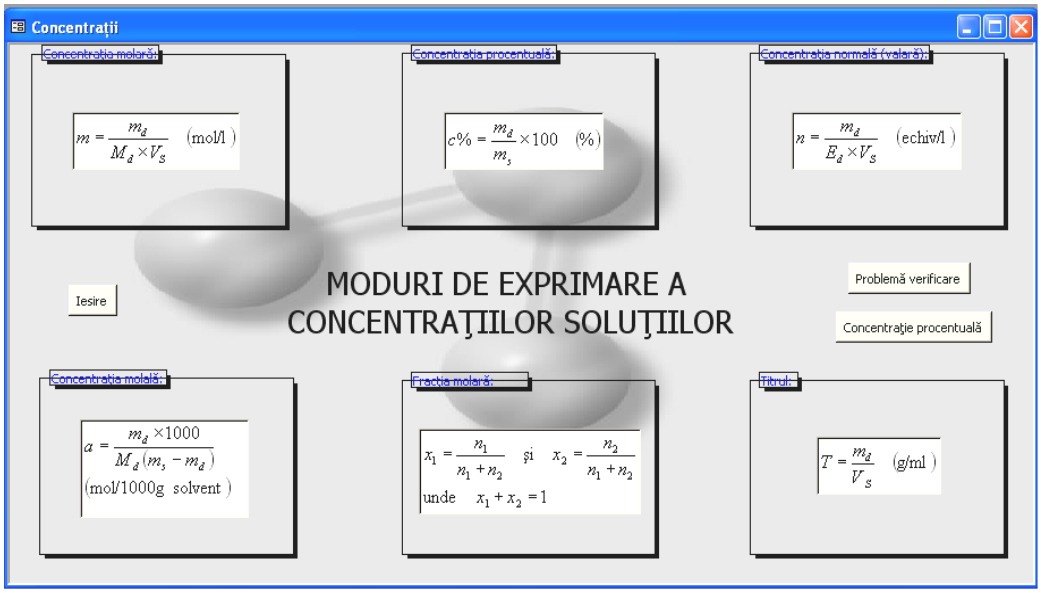

Figure1. Simple interface

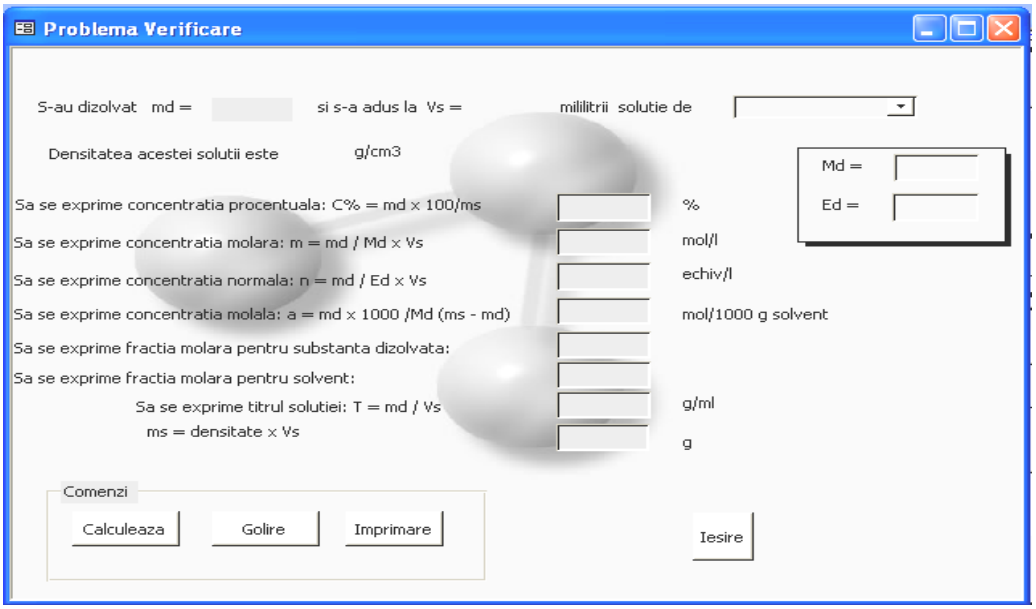

Figure 2. Verification problem

The form *Concentrations* includes 6 images captured together with formulas for concentrations calculation, a button to close the form and 2 buttons to open windows that verify the concentration problems. As it follows, the form *Verification problem* is being presented; this form illustrates all the units used to express concentration (Fig. 2).

On the first line of the form, within the 2 text boxes, values are given by the students and the solution to calculate different concentrations for is chosen from combo box; the combo box relates to *Substances* table. Md and Ed values are taken from the table and are filled in automatically, the rest of the text boxes are automatically calculated by pressing the button *Calculate.*

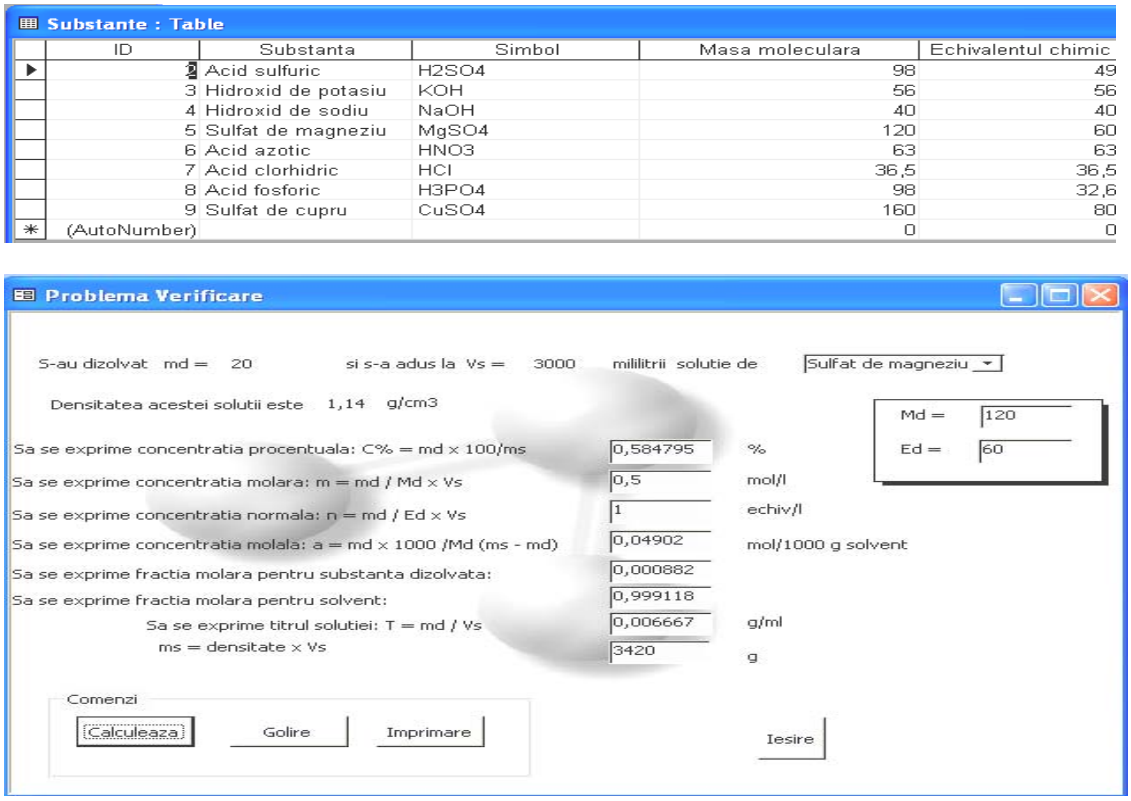

Figure 3. Example

To express the percentage of composition, or to calculate one of the masses (mass of solution or mass of solute) the form *Percentage of composition* is being used.

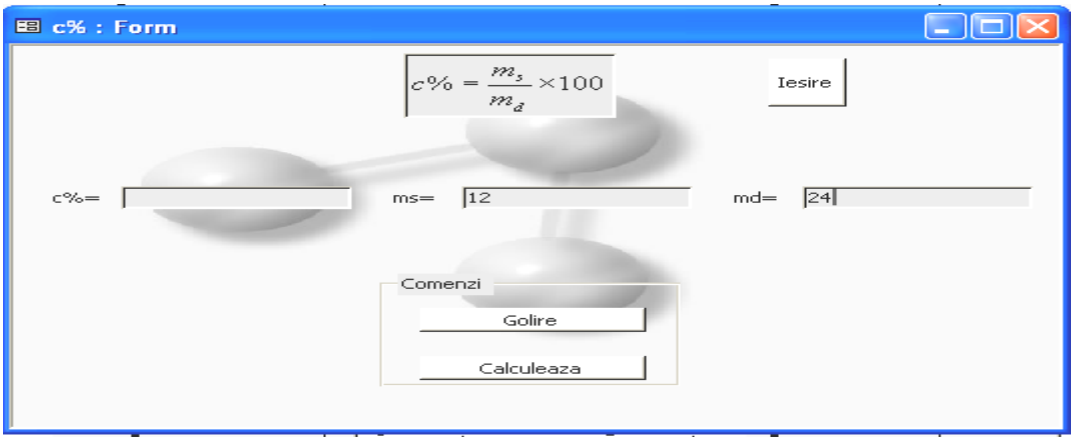

Figure 4. The percentage of composition (mass of solution)

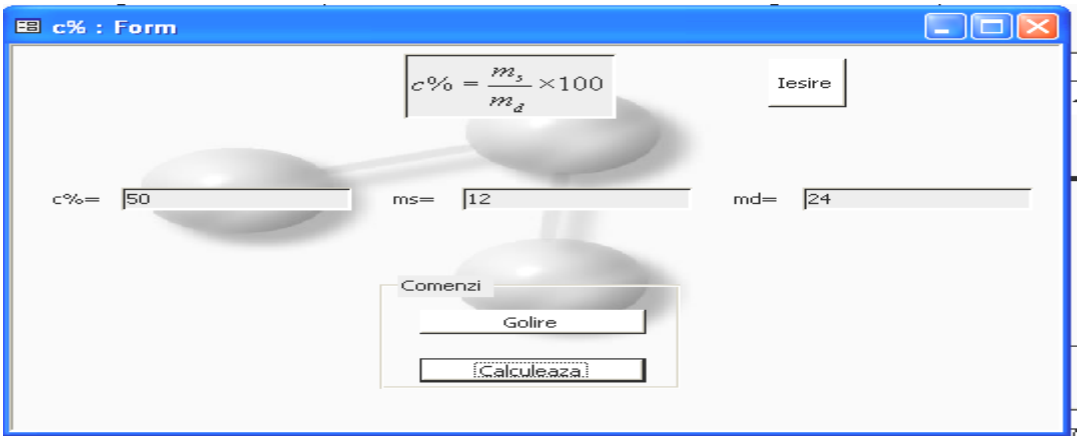

Figure 5. The percentage of composition (mass of solute)

3. CONCLUSIONS

The use of educational soft will increase the ability and the creativity of the students, will improve their knowledge at a medium and high level and consequently informatics will be used more and more in many other fields of activity.

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