Atoms, Symbols and Equations
© copyright Ray Le Couteur 1996-1999

Contents

System Requirements
The program should work with any computer running Windows 3.1/95 or 98. A mouse is also required. Sound effects will be generated whether or not you have a soundcard.

Installation
1. Unzip, if necessary, and run 'Setup'. Then follow simple on-screen instructions. In the case of the self extracting version, simply run 'chemxa20.exe' instead.

Running The Program
Win 3.1: Run Atoms, Symbols and Equations by clicking on the 'equations' icon in the *Atoms Symbols & Equations* group which will be on your desktop.

Win95/98: From the start menu, select programs and then *Atoms Symbols & Equations*. Then select the 'equations' icon to run the program.

Uninstall
Simply click on the uninstall icon to remove 'Atoms, Symbols and Equations' from your system. The uninstall can be password protected to prevent accidental erasure, via 'Change Options'. The password will be the same as that used to trap users within a unit the default is 'equation'.

Features of the Program.

The program contains eight teaching units plus a reference section. Each unit consists of a number of sequential *pages* and they all teach and test pupils as they learn; sounds are used to indicate correct and wrong answers (using the speaker if you don't have a soundcard). As far as possible, skills are taught through familiar examples to help reinforce general chemical knowledge, and with frequent reference to the online Periodic Tables.

The notebook symbol suggest notes which pupils could make as they use the program, for later reference. Personally, I always insist that these notes are made - it prevents pupils from rushing through a unit.

Click the information, *i*, symbol for hints, extra explanation or background information.

The program includes TWO interactive Periodic Tables, one for use with younger pupils (UK Key Stage 3) and one more suitable for older pupils (UK Key Stage 4). The later units (4 - 8) have a '<***back'*** button at the top left of most pages which allows reference back to the previous page.

There is also an option to 'trap' the user within a unit once started (to help teachers ensure that pupils stay on task), with a code required to exit. Details at the end of this manual.

Points Score/Certificate

The program automatically adds up totals of correct and wrong answers for each unit as you go along. This score can be displayed by clicking the RIGHT mouse button on the bottom right of most screens.

The score will be shown on a certificate which is displayed at the end of each unit and which can be printed out. Note that if the date or time on the certificate appear incorrect, you should adjust your computer settings via the date/time section of the control panel.

Using the Program

The early units are intended for use at Key Stage 3 and the rest at Key Stage 4 (UK). Ideally, the program would be used with a whole class, each pupil with their own computer (a site licence would be required). However, it could be also used for individul work, extension, or demonstration (ideally with a large monitor or projector).

The units should be seen as *resources* that form part of a teaching scheme. For the most able, they might be used as an introduction; for the less able they could be used after introductiory work or as reinforcement They can also be used as for quick revision of a topic. The program will also be useful in helping non specialists teach some of the more abstract aspects of Chemistry.

It is definitely NOT intended that the program be worked through from beginning to end. Rather, it should be used one unit at a time over a number of years, as pupils build their skills.

A typical unit might require about a lesson to complete (if the suggested notes are made), although 'Elements and Symbols' is somewhat shorter and 'Models of Reacting Molecules' a little longer.

Reference Section
In addition to the teaching units, the contents page of the program contains a reference section which can be accessed at any time. It has the following sections:

Simple Periodic Table - a simple, interactive Periodic Table
Periodic Table - an interactive Periodic Table
Atom Builder - build up the structures of any of the first 20 atoms (up to calcium) on screen.
The Ionizer - an interactive simulation enabling pupils to work out, on screen, the formulas of more than 120 ionic compounds from their ions.

Unit 1 - Word Equations

This units introduces word equations, the use of state symbols and the naming of simple compounds. Pupils are taken stepwise through the word equations for rusting, burning magnesium, making water, burning methane and respiration.

Unit 2 - Elements and Symbols

The concept of an ***element*** is introduced and explained and pupils are introduced to a simple interactive Periodic Table which provides the names, symbols, basic properties and uses of some of the more common elements. Pupils are tested on the properties and symbols of some of these elements.

Unit 3 - Valency (Valence) and Formulas

In this unit, formulas are developed through the concept of valency (valence), (illustrated with diagrams) and linked to use of the simple Periodic Table introduced in the previous unit. Pupils are encouraged to make frequent reference to the Periodic Table. The patterns of valency (valence) for different Groups in the Periodic Table are emphasised, as they work out the formulas of a variety of common compounds.

Note to teachers: the concept of valency is applied here to both ionic and covalent compounds as an aid to writing simple formulas. I avoid reference to ionic 'molecules' but I am not too concerned about the distinction on the basis that users, at this introductory stage, will have little, if any, knowledge of bonding.

Unit 4 - Models of Reacting Molecules

Liberally illustrated with interactive molecular ***models*** this unit is intended to give pupils a greater understanding of what we mean by a chemical equation

(in molecular terms), an introduction to the structures of some simple hydrocarbons and a basic understanding of what is meant by a balanced symbol equation. Previously, I have carried out this activity using molecular models. This simulation appears to be far more effective at teaching pupils that a chemical reaction is a rearrangement of atoms which can be represented by a balanced equation.

Unit 5 - Symbol Equations

The writing of symbol equations is linked to the use of word equations and formulas which were introduced in previous units. Pupils are taken carefully through the processes of writing a word equation, converting this to formulas (by reference to valency and the online Periodic Table) and finally the balancing of this equation. A number of familiar reactions are considered.

Unit 6 - Atomic Structure

This unit teaches pupils about the structure of atoms in terms of the various particles involved, their names and properties, and their arrangement in atoms. The terms *Atomic Number* and *Mass Number* are explained and applied. The 'Atom Builder' section (also available as reference) is an interactive simulation that allows pupils to 'build' any of the first 20 atoms (up to calcium) on screen. This is an easy and painless way of teaching about atomic particles and atomic structure.

Unit 7 - Formation of Ions

This unit looks at the formation of ions by the gain and loss of electrons and teaches pupils how to predict the charges on ions by reference to the Periodic Table. A variety of familiar and not so familiar ions are considered.

Unit 8 - Ions, Formulas and Equations

This unit looks at how ions combine to form ionic compounds and teaches pupils how to predict the formulas of ionic compounds (including those involving radicals) . It includes an interactive simulation called 'The Ionizer' that allows pupils to work out, on screen, the formulas of more than 120 ionic compounds from their constituent ions. The *ionizer* is also available in the reference section. The unit finishes by encouraging pupils to apply their new ability to write formulas in the context of some rather more complex chemical reactions, for which they must write balanced symbol equations. A number of neutralisation reactions are considered.

Use of Clipboard
Whenever you click on the the 'information' or 'notes' symbols, or on an element in the Simple Periodic Table, the text is automatically sent to the clipboard and can be pasted into other programs (eg Notepad, Wordpad, Word).

Change Options

Most options can be changed by clicking on the 'Change Options' icon in the 'Atoms, Symbols and Equations' group or folder.

Sound Effects
These can be switched off from within the main program - but this setting is not saved as the program is designed for use with sound.

Trapping Users
The program can work in 2 modes: one offers a menu on each page so that users can enter and leave program units at will; the other 'traps' the user within a unit once started (to help teachers ensure that pupils stay on task). The default setting is for a menu on each 'page'.

Quick Exit
When in the mode that traps the user, you may wish to terminate the program rapidly (perhaps at the end of a lesson). Do this by typing a password into any answer box and clicking the page heading (on pages without answer boxes RIGHT click the page heading and enter the password - this works at all times for the quiz pages.). The default password is ***equation,*** but this can easily be changed and is not secure. You can revert to the default password by deleting the file "eqpass.opt" from the "equation" directory.

Answers
There is an option to give answers to most questions after 3 consecutive wrong attempts . Home users, or those using the program for self study, will probably benefit from being given the answer. Teachers may want to force students to work out answers for themselves! In the unregistered program, the option to provide answers only works for Units 1 and 2

High Scores
The symbols game has a High Score option ('Hall of Fame') for users to enter their

name. This could be abused in a school context and so there is an option to switch off High Scores.

Print Certificate
A printable certificate is displayed at the end of each unit. If you don't want students to print certificates, then there is an option to hide the 'Print certificate' button. Also, some systems/printers seem only to print blank pages. Again, opt to hide the print button.

Spelling Preference
'Change Options' also allows you to choose between US and Uk spellings.

On a network the 'Change Options' and uninstall programs should not be available to pupils.

Please ensure that all teachers have a copy of this page! And let them know if you change the password.

Warranty Disclaimer
These programs and documentation are provided "as is" and without any express or implied warranties. I have run the programs on a number of machines but cannot possibly anticipate all possible variations of software and hardware that the programs may be run under. Therefore, the user must assume the entire risk of using these programs. Under no circumstances will I be liable for any damages arising from the use of, or inabilty to use, these programs.

Ray Le Couteur   January 1999