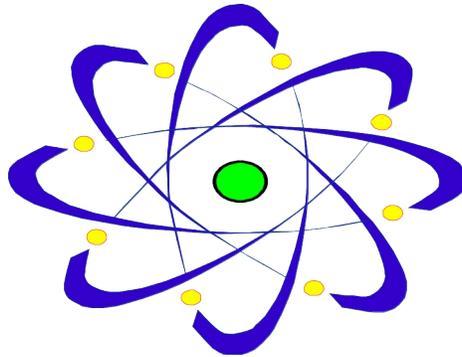


# Atoms, Symbols and Equations



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## **System Requirements**

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

## **Installation**

Installation is extremely easy

1. Run install.exe from the floppy disc (Win 3.1 - from program manager select file/run and type a:\install; Win95 - from the start menu, select run and type a:\install)
2. Follow simple on-screen instructions (answer yes or OK unless there is good reason). That's it! The program is now fully installed and ready for use.

You will be given the option to run the program immediately, and the opportunity to choose either UK or US spellings. Your preference will be stored, but can be changed later (see 'Changing Options').

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

## **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**

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.

## 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 individual 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 introductory 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 unit 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.

## **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.

## **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). Personally, I like to 'trap' users - but for ease of evaluation 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). The default password is *equation*, but this can easily be changed (see below).

## **Changing Options**

Both the above options can be changed by running the program "options.exe" (click on 'Change Options' icon in the 'Atoms Symbols & Equations' group or folder) and selecting 'Option to trap users' or 'Quick exit password'. The password is not secure and can be changed at any time. You can revert to the default password by deleting the file "pass.dat" from the "equation" directory.

On a network the 'options.exe' program should not be available to pupils.

This may seem complicated, but might help teachers keep one step ahead of pupils!

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

Note: 'Change Options' also allows you to choose between US and Uk spellings.