



# Use of I.C.T. Tools In Chemistry

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**Abstract :-** IUPAC naming and other organic chemistry topics. All though chalk and talk method has gain attention of the students but it has been found that using ICT to teach such topic of chemistry helps teacher to overcome from class room difficulty like presenting 3 D structure of molecule with model. The objective is to reveal teachers' ICT experiences and views on ICT integration into teaching-learning process as well as uncover the perceived obstacles to the integration process. Chemistry education pedagogy in this country will have to shift its present at all levels attracts the best talen, retains them and works for their professional development. To acquire this goal teaching profession will have to be made more attractive.

**Keywords:** ICT, Chemistry software, ICT Tools in education, Education

## Introduction

A large number of commercial software packages offer teachers exciting and visually appealing approaches to teaching. These often drive the pedagogy and to a certain extent might restrict flexibility in teaching. In addition, some teachers resist the opportunity of teaching someone else's lesson and report that commercial software packages might not be available to pupils outside school. Sharing lesson material is helpful for colleagues who can customize files to suit their own approach.

Successful technology integration involves the allocation of time for teachers to experiment with new technologies, collaborate with peers, and the provision of professional development opportunities. As teachers collaborate and plan lessons that integrate technology, they reframe their perceptions towards innovative technology implementation and, ultimately, student achievement.

## ICT in Chemistry

In chemistry education, ICT can provide solutions to many of the problems afflicting chemistry education and thus help enhance the quality of chemistry education in chemistry. Traditional classroom teaching, as we all know, is basically a talk- and- chalk method. Besides, there is also pressure on the teacher to finish the syllabus on time and therefore, even though a teacher wants his students to acquire an in depth understanding of the subject. Chemistry extended knowledge of information and communication technology, with particular emphasis on tools and methods are used in teaching chemistry at the lower and upper secondary school level. There are many concepts that can be used to describe the motivational aspect of science teaching and learning. Computers have been used in education in many ways from the very beginning of their history. Several ways to analyses use of computer and ICT in education is govern the importance of one and all. Any particular technology is often treated as a particular tool to accomplish their task in more efficient way.

ICT increases teacher efficiency and can reduce teachers' time spent performing administrative tasks (Koszalka & Wang, 2002; et al.). It is important for both students and teachers to use ICT regularly in their courses (Figg, 2000 et al.). Students higher-order thinking skills are enhanced in learning environments where ICT is used (Allegra, Chifori, & Ottaviano, 2001 et al.).

To be able to use ICT in the courses effectively, teachers should;

- be aware of its potential,
- select tools and methods which are appropriate with the needs of students,
- design their teaching methods effectively,
- develop new teaching strategies,
- Know and apply classroom management rules in order to cope with problems encountered in technology-aided learning environments (Becker, 2001 et al.).

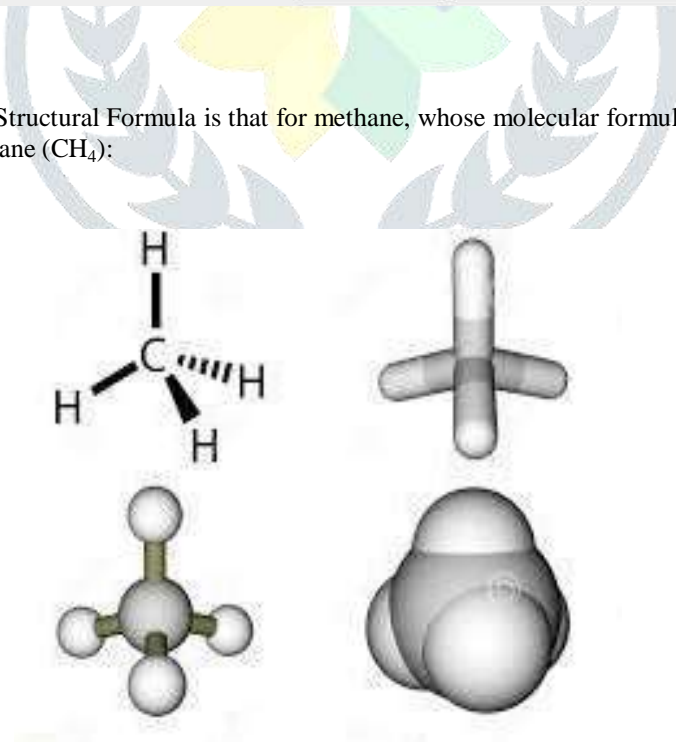
### Periodic Table

Concept of periodic table used in every aspects of chemistry. Whether it is organic, inorganic and physical chemistry or pharma, drug, and medicinal chemistry. But it is always a challenge to remember all the properties of periodic table. With the help of this tool we can teach periodic table in more effective manner. All elements from atomic numbers 1 (hydrogen) to 118 (ununoctium) have been discovered or synthesized, with elements 113, 115, 117, and 118 being confirmed by the IUPAC on December 30, 2015 (Chemistry: Four elements added to periodic table". *BBC News*) The periodic table is organized like a big grid. Each element is placed in a specific location because of its atomic structure. As with any grid, the periodic table has rows (left to right) and columns (up and down). Each row and column has specific characteristics. For example, beryllium (Be) and magnesium (Mg) are found in column two and share certain similarities while potassium (K) and calcium (Ca) from row four share different characteristics.

The screenshot shows a software window titled "Periodic System" with a "Periodic Table" tab and an "Advanced" sub-tab. A detailed information box for Nitrogen (N) is displayed, showing its name, atomic number (7), mass (14.0067), electronegativity (3.0), and oxidation states (-3, 3, 5, 2). Below the information box is a periodic table grid with elements color-coded. At the bottom, there are buttons for "Atom list", "NOT list", and "Clear list", along with "Color schema" and "Color legend" options.

### 3D Structure

- A simple example of a 3D Structural Formula is that for methane, whose molecular formula is  $\text{CH}_4$ . Compare the following two representations of methane ( $\text{CH}_4$ ):



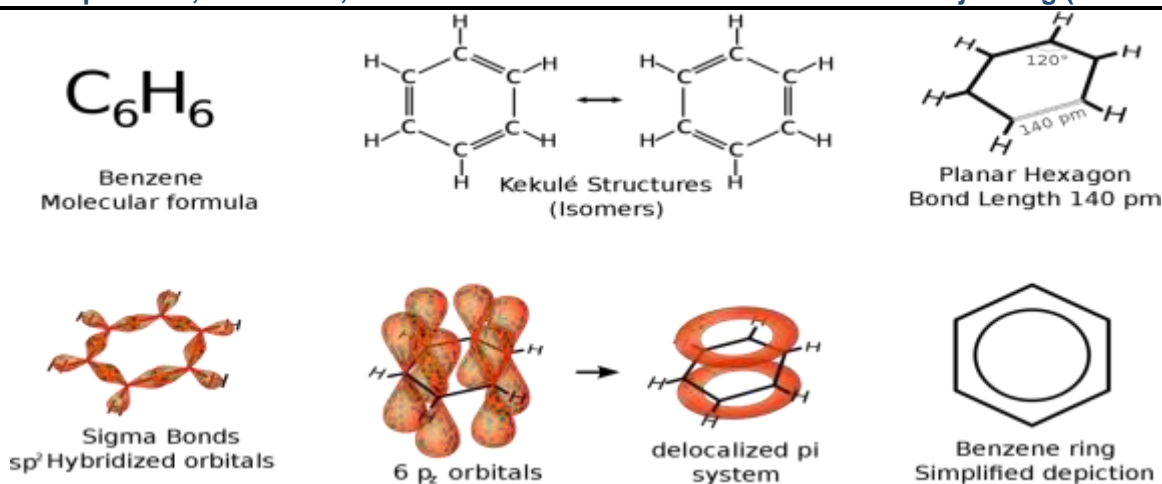


Fig. : Various Possible Structure of Benzene Tools of ICT in Chemistry

Various Software for Chemists The Information technology is helping to design software tools & programmes for chemistry teachers & researchers. Few of them are discussed in this section.

(i) **ChemDraw** :-It is the most widespread drawing tool used for chemistry research. It is a division of the ChemOffice suite & is accessible for Mac & Windows. This tool allows us to draw chemical structures & One can also use it to find out properties of chemicals & view 3D structures, etc. It generates accurate structures from the chemical names and offers precise IUPAC names for the chemical structures.

(ii) **ChemDoodle** :- It provides advanced mechanism drawing tools to show lone electron, pair of electron, & arrow notation of bonds. It is the single chemical drawing ICT tool which has subscript & superscript merge formatting in text to simply generate atomic notations & chemical text.

(iii) **ChemSketch**: It helps us to draw chemical structures of organic chemistry, organometallics & polymers. It can compute molecular weight, density, molar refractivity, etc. It is used for viewing 2D and 3D structure. This is a molecular editing tool used to make & revise images of chemical structures. ChemSketch is a comprehensible molecular structure drawing tool having 20 lakhs users all over the world

(iv) **ChemWindow**: It is a chemical structure drawing molecule editor published by John Wiley & Sons .It is used for 2D & 3D-visualization of structures, computation of bond lengths, angles etc. It is used by chemists for realistic process flow diagrams.

(v) **Chem3D Pro**: It is also a division of the ChemOffice suite. It permits drawing of chemical structures, visualization of 3D structures, studying molecular properties, like name, molecular weight etc. It runs on windows OS.

(vi) **Marvinsketch**: It is a desktop toolkit used to draw, alter, publish, import-export molecular structures. It also permits conversion of various chemical & graphical file formats. It is a molecular editor for making science accessible on every platform. It interprets chemistry into a digital environment & supports almost all normal chemical file formats.

(vii) **BKChem**: It is a free drawing program for chemists that is written in Python. It can simply create the basic structure of each element & its association with the symbols of that element. It is a cross-platform application & permits drawing for chemical compounds & molecular structures. It is used for bond-by-bond drawing, ready-to-use templates for molecular charts or graphs. It is useful for chemical researchers to represent complex diagrams by using BKChem.

(viii) **JChemPaint**: It is a molecule editor tool developed by Chemistry Development Kit for 2D chemical structures. It is freely accessible software written in Java & can run on the Windows, Mac OS, Linux, and UNIX. It is used to draw chemical structures & also to import -export data in plain-text formats.. Drawing & removal of various chemical bonds can be done easily by using JChemPaint. It is available free of cost. Ring templates having size between 3-8 atoms are available for use.

(ix) **Jmol**: It is a molecular viewer for 3D- chemical structures written in Java. It is cross-platform that runs on Windows, Mac OS and Linux/Unix systems. It can read a range of file formats, quantum chemistry program outputs & animation of multi-frame files.

(x) **ChemWriter**: It is the molecular editor used to design web applications & making 2D chemical structures. It is the greatest ICT tool for displaying & making chemical structures online.

(xi) **XDrawChem**: It is a freely accessible software program used for drawing chemical formulas, run for Mac OS and Unix. In Windows this program is called WinDrawChem.

(xii) **ISIS/Draw**: It is developed by MDL Information Systems. It contains a lot of file formats for the storing chemical information. It is primarily a 2D-drawing program but has some 3D-rotation attributes also. It has ample facilities, to symbolize relative or absolute configurations for stereochemistry and to show geometrical isomers to visualize double bonds.

(xiii) **Avogadro**: It is a 3D- molecular editor & visualizer, made for cross-platform and has lot of applications in computational chemistry.

**Conclusion** :- Without ICT, Chemistry cannot make its way for carrying out high-level research. Research laboratories in chemistry are constantly using lot of softwares for various research activities. These softwares are used for carrying out different chemical research activities such as molecular modeling, simulation, chemical analysis, 2d & 3d- visualization of chemical structures, searching databases for Computational chemistry and many more. IT based instruments like UV, IR, NMR, Mass Spectrometers, X-Ray Crystallography, Flame Photometry; Scanning electron microscope etc. have been developed for performing chemical research & latest developments in chemical sciences. The most remarkable success is the development of these ICT softwares for the drawing of chemical structures & storing the information through Chemical Abstract Services.

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