

Special Tools for Scientific Writing

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October 6, 2017

- Introduction to L^AT_EX

- Introduction to \LaTeX
- Input file structure

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- Basic mathematics with \LaTeX

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- Customising \LaTeX

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- Chemical structures and equations

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- Customising \LaTeX
- Chemical structures and equations
- Citations and bibliography

\TeX

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- It was originally written by Leslie Lamport.

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- It was originally written by Leslie Lamport.
- It uses the T_EX formatter as its typesetting engine.

Advantages of \LaTeX over normal word processors

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Disadvantages of \LaTeX

- Not suitable for people who have sold their souls . . .
- It is very hard to write unstructured and disorganized documents.

Installing L^AT_EX on Windows



MiKTeX ...typesetting beautiful documents...

Home About Download Portable Help Contact Give Back

Getting MiKTeX

Windows Mac Linux Docker All downloads

Install for Windows 7, 8 and 10 (64-bit)

To install a basic TeX/LaTeX system on Windows, download and run this installer.

Date: 6/3/2017

File name: basic-miktex-2.9.6361-x64.exe

Size: 191.13 MB

[Download](#)

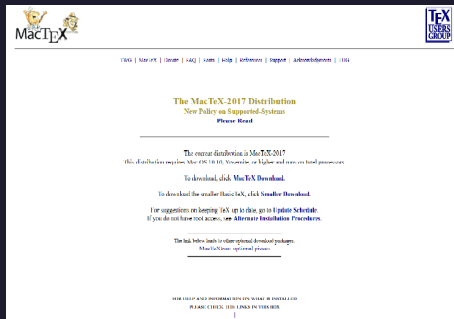
Please read the [tutorial](#), if you want step-by-step guidance.

When you have installed MiKTeX, it is recommended that you run the [update wizard](#) in order to get the latest

If you want to install MiKTeX on many client computers, then you should use the [MiKTeX Setup Utility](#) to deploy. Read the [deployment tutorial](#), if you want step-by-step guidance.

<https://miktex.org/download>

Installing L^AT_EX on Mac



The screenshot shows the MacTeX website homepage. At the top left is the MacTeX logo with two cartoon figures. At the top right is the TeX Users Group logo. Below the logos is a navigation menu with links: TUG | MacTeX | Downloads | FAQ | Help | Reference | Support | Administration | Site. The main content area features the heading "The MacTeX-2017 Distribution" and "New Policy on Supported-Systems". Below this is a horizontal line and the text "Please Read". Another horizontal line follows, then the text "The current distribution is MacTeX-2017" and "this distribution requires Mac OS 10.10, Yosemite, or higher and runs on Intel processors". Below that is "To download, click [MacTeX Download](#)." followed by "To download the smaller BasicTeX, click [Smaller Download](#)." Then "For suggestions on keeping TeX up to date, go to [Update Schedule](#)." and "If you do not have root access, see [Alternate Installation Procedures](#)." Another horizontal line is present, followed by "The link below leads to other optional download packages." and "MacTeXUsers optional packages". At the bottom of the page, there is a footer with the text "SEE HELP AND DOCUMENTATION ON WHAT IS INSTALLED" and "PLEASE CHECK THESE LINKS IN YOUR BROWSER".

<http://www.tug.org/mactex>

Installing L^AT_EX on Linux

TeX Live

TeX Live is an easy way to get up and running with the TeX document production system. It provides a comprehensive TeX system with binaries for most flavors of Unix, including GNU/Linux, and also Windows. It includes all the major TeX-related programs, macro packages, and fonts that are free software, including support for many languages around the world.

- [How to acquire TeX Live: \(download, on DVD, other methods\)](#)
- [Quick install for Linux, installation and release notes for Windows](#); for Mac OSX, see the [MacTeX distribution](#)
- [Documentation and mailing lists](#)
- [Known issues and highlights of changes](#) in the current release (details for [Linux](#), [Netix](#), [MacTeX](#))
- [Portable \(CD-ROM and DVD\) images of TeX Live](#)
- [Installing/Updating packages after installation and full upgrade from previous years](#)
- [TeX Live for macOS and integration with operating system distributions](#)
- [Installation, system architecture, and building the system](#)
- [How you can help](#)

• Current release: TeX Live 2017 is [available since the Internet](#) and [on DVD](#). It was released on 4 June 2017, and [previous releases are available](#).

Some starting points for actually using TeX are in the: [introduction to the TeX world](#).

TeX Live has been developed since 1999 by collaboration between the TeX user groups. TeX Live was originally prepared by Sebastian Raabe. Present maintainers include Alexander Klotz, Karl Berry, Luigi Sporno, Mads M. Skov, Stefan Brunning, Donald Knobel, Tom Ridd, Michael Storch, Hans-Werner Hupel, and David Carlisle.

ID: 20170602 22:51:03,
[11.0.html page: content overview](#) [Search history](#) ([view instructions](#))

www.tug.org/texlive/2017.html

<http://www.tug.org/texlive/debian.html>

Some open-source \LaTeX editors

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- TeXworks – default for MiKTeX.

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- TeXstudio – another multi-platform L^AT_EX editor.
- Kile – ideal for Linux users

Some non-free \LaTeX editors

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- BaKoMa T_EX

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- BaKoMa \TeX
- Inlage

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- BaKoMa T_EX
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- WinEdt

Document Classes

```
\documentclass[options]{class}
```

```
\documentclass[11pt,twoside,a4paper]{article}
```

Packages

```
\usepackage[options]{package}
```

```
\usepackage[left=1.5cm,top=2cm,nofoot]{geometry}
```

Document body

```
\begin{document}  
  some latex codes goes here  
\end{document}
```

A Minimal L^AT_EX File

```
\documentclass[a4paper,11pt]{article}
  % define the title
\author{M. A. Akanbi and A. S. Wusu}
\title{A Minimal LATEX File}
\begin{document}
  % generates the title
\maketitle
  % insert the table of contents
\tableofcontents
\section{This is a section heading}
Thank you for attending this workshop.
\section{Another section heading}
Here, all is about LATEX
\end{document}
```

Output of Minimal L^AT_EX File

A Minimal L^AT_EX File

M. A. Akanbi and A. S. Wusu

October 6, 2017

Contents

1 This is a section heading 1

2 Another section heading 1

1 This is a section heading

Thank you for attending this workshop.

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Here, all is about L^AT_EX

Output of Minimal L^AT_EX File

Compilation steps

Compilation steps

- Edit/Create your L^AT_EX input file: "*minimal.tex*"

Compilation steps

- Edit/Create your L^AT_EX input file: "***minimal.tex***"
- Run L^AT_EX on your input file: "***latex minimal.tex***"

Compilation steps

- Edit/Create your L^AT_EX input file: ***"minimal.tex"***
- Run L^AT_EX on your input file: ***"latex minimal.tex"***
- View the DVI file: ***"xdvi minimal.dvi &"***

Compilation steps

- Edit/Create your L^AT_EX input file: ***"minimal.tex"***
- Run L^AT_EX on your input file: ***"latex minimal.tex"***
- View the DVI file: ***"xdvi minimal.dvi &"***
- Convert the dvi file to Postscript for printing: ***"dvips -Pcmz minimal.dvi -o minimal.ps"***

Compilation steps

- Edit/Create your L^AT_EX input file: ***"minimal.tex"***
- Run L^AT_EX on your input file: ***"latex minimal.tex"***
- View the DVI file: ***"xdvi minimal.dvi &"***
- Convert the dvi file to Postscript for printing: ***"dvips -Pcmz minimal.dvi -o minimal.ps"***
- Convert your .dvi files straight into .pdf : ***"dvi2pdf minimal.dvi"***

Text Formatting

Latex codes:

- `\textbf{bold text}`

Outputs:

- **bold text**

Text Formatting

Latex codes:

- `\textbf{bold text}`
- `\textit{italicized text}`

Outputs:

- **bold text**
- *italicized text*

Text Formatting

Latex codes:

- `\textbf{bold text}`
- `\textit{italicized text}`
- `\textsc{small caps}`

Outputs:

- **bold text**
- *italicized text*
- small caps

Text Formatting

Latex codes:

- `\textbf{bold text}`
- `\textit{italicized text}`
- `\textsc{small caps}`
- `\underline{underlined text}`

Outputs:

- **bold text**
- *italicized text*
- small caps
- underlined text

Text Formatting

Latex codes:

- `\textbf{bold text}`
- `\textit{italicized text}`
- `\textsc{small caps}`
- `\underline{underlined text}`
- ‘single’ and “double quotes”

Outputs:

- **bold text**
- *italicized text*
- small caps
- underlined text
- ‘single’ and “double quotes”

Equations

Latex codes:

- The roots of $ax^2 + bx + c = 0$ can be obtained by using the formula:

```
\begin{equation}\label{quadEqu}  
x = \frac{-b \pm  
\sqrt{b^2 - 4ac}}{2a}  
\end{equation}
```

The formula (`\ref{quadEqu}`) is known as the quadratic formula

Outputs:

- The roots of $ax^2 + bx + c = 0$ can be obtained by using the formula:

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \quad (1)$$

The formula (1) is known as the quadratic formula

Matrices

Latex codes:

```
• \begin{displaymath}
  \mathbf{X} =
  \left( \begin{array}{ccc}
    x_{11} & x_{12} & \dots \\
    x_{21} & x_{22} & \dots \\
    \vdots & \vdots & \ddots
  \end{array} \right)
\end{displaymath}
```

Outputs:

•

$$\mathbf{X} = \begin{pmatrix} x_{11} & x_{12} & \dots \\ x_{21} & x_{22} & \dots \\ \vdots & \vdots & \ddots \end{pmatrix}$$

Arrays

Latex codes:

- `\begin{displaymath}`
`|x| = \left\{ \begin{array}{l} x \\ 0 \\ -x \end{array} \right. \text{if } x > 0 \\ \text{if } x = 0 \\ \text{if } x < 0`
`\end{array} \right.`
`\end{displaymath}`

Outputs:

- $$|x| = \begin{cases} x & \text{if } x > 0 \\ 0 & \text{if } x = 0 \\ -x & \text{if } x < 0 \end{cases}$$

Integrals

Latex codes:

- `\begin{displaymath}`
`\int_{e}^{e^2}{\frac{1}{x}}`
`\sin\left(\log_{e}{x}\right)dx`
`\end{displaymath}`

Outputs:

•
$$\int_e^{e^2} \frac{1}{x} \sin(\log_e x) dx$$

Integrals

Latex codes:

- `\begin{displaymath}`
`\int_{e}^{e^2} \{\frac{1}{x}`
`\sin\left(\log_{e}\{x}\right)dx`
`\end{displaymath}`
- `\begin{displaymath}`
`\oint_{c}^{\{ }\{y^2 dx + x^2 dy`
`\end{displaymath}`

Outputs:

- $$\int_e^{e^2} \frac{1}{x} \sin(\log_e x) dx$$

- $$\oint_c y^2 dx + x^2 dy$$

Integrals

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`\int_{e}^{e^2} \{\frac{1}{x}`
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Outputs:

- $$\int_e^{e^2} \frac{1}{x} \sin(\log_e x) dx$$

- `\begin{displaymath}`
`\oint_{c}^{\{ }\{y^2 dx + x^2 dy`
`\end{displaymath}`

- $$\oint_c y^2 dx + x^2 dy$$

- `\begin{displaymath}`
`\int \int \int_{B}^{\{ }\{`
`\left(x^2 e^y + xyz\right)dV`
`\end{displaymath}`

- $$\int \int \int_B (x^2 e^y + xyz) dV$$

Summations and Product

Latex codes:

- `\begin{displaymath}`
`\sum_{i=1}^n \quad`
`\int_0^{\frac{\pi}{2}} \quad`
`\prod_{\epsilon}`
`\end{displaymath}`

Outputs:

- $$\sum_{i=1}^n \quad \int_0^{\frac{\pi}{2}} \quad \prod_{\epsilon}$$

Summations and Product

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- `\begin{displaymath}`
`\sum_{i=1}^n \quad`
`\int_0^{\frac{\pi}{2}} \quad`
`\prod_{\epsilon}`
`\end{displaymath}`
- `\begin{displaymath}`
`\sum_{\substack{0 < i < n \\ 1 < j < m}}`
`P(i,j) =`
`\sum_{\begin{subarray}{l} i \in I \\ 1 < j < m \end{subarray}}`
`Q(i,j)`
`\end{displaymath}`

Outputs:

- $$\sum_{i=1}^n \quad \int_0^{\frac{\pi}{2}} \quad \prod_{\epsilon}$$
- $$\sum_{\substack{0 < i < n \\ 1 < j < m}} P(i, j) = \sum_{\substack{i \in I \\ 1 < j < m}} Q(i, j)$$

Lists

Latex codes:

- `\begin{itemize}`
 `\item First Item`
 `\item Second Item`
`\end{itemize}`

Outputs:

- • First Item
- • Second Item

Lists

Latex codes:

- `\begin{itemize}`
 `\item First Item`
 `\item Second Item`
`\end{itemize}`

- `\begin{enumerate}`
 `\item First Item`
 `\item Second Item`
`\end{enumerate}`

Outputs:

- - First Item
 - Second Item
- - 1 First Item
 - 2 Second Item

Lists

Latex codes:

- `\begin{itemize}`
 `\item First Item`
 `\item Second Item`
`\end{itemize}`

- `\begin{enumerate}`
 `\item First Item`
 `\item Second Item`
`\end{enumerate}`

- `\begin{description}`
 `\item[Username] Latex123`
 `\item[Password] cbaXETAI`

Outputs:

- • First Item
- • Second Item

- ① First Item
- ② Second Item

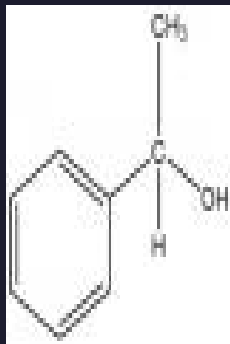
- Username Latex123
 Password cbaXETAI

Figures

Latex codes:

- ```
\begin{figure}
 \centering
 \includegraphics[width = 3cm,
 height=4.5cm]{figures/sampleFigure}
 \caption*{\emph{\textbf{This is a
 sample figure}}}
 \label{samplefigure}
\end{figure}
```

Outputs:



***This is a sample figure***

## New Commands

```
\newcommand{name}[num]{definition}
```

Latex codes:

- `\newcommand{\RPlus}{[0,\infty)}`

Outputs:

- $[0, \infty)$

## New Commands

$$\backslash\text{newcommand}\{\text{name}\}[\text{num}]\{\text{definition}\}$$

Latex codes:

- $\backslash\text{newcommand}\{\backslash\text{RPlus}\}\{[0,\infty)\}$
- $\backslash\text{newcommand}\{\backslash\text{norm}\}[1]\{\backslash\text{left}\backslash\text{Vert}\#1\backslash\text{right}\backslash\text{Vert}\}$

Outputs:

- $[0, \infty)$
- $\|\Omega\|$

## New Commands

$$\backslash\text{newcommand}\{\text{name}\}[\text{num}]\{\text{definition}\}$$

Latex codes:

- $\backslash\text{newcommand}\{\backslash\text{RPlus}\}\{[0,\infty)\}$
- $\backslash\text{newcommand}\{\backslash\text{norm}\}[1]\{\backslash\text{left}\backslash\text{Vert}\#1\backslash\text{right}\backslash\text{Vert}\}$
- $\backslash\text{newcommand}\{\backslash\text{abs}\}[1]\{\backslash\text{left}\backslash\text{vert}\#1\backslash\text{right}\backslash\text{vert}\}$

Outputs:

- $[0, \infty)$
- $\|\Omega\|$
- $|\rho|$

## New environments

```
\newenvironment{name}[num]{before}{after}
```

Latex codes:

```
• \begin{myEnv}
 This is a Title text \ldots
 \end{myEnv}
```

Outputs:

```
• ■ This is a Title text ... ■
```

declaration:

```
\newenvironment{myEnv}
{ \rule{1ex}{1ex}\hspace{\stretch{1}} }
{ \hspace{\stretch{1}}\rule{1ex}{1ex} }
```

## Features



## Features

- Draw groups of atoms.

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- Draw different types of bonds.

## Features

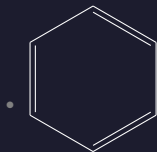
- Draw groups of atoms.
- Draw different types of bonds.
- Flexible bond angles.

## Features

- Draw groups of atoms.
- Draw different types of bonds.
- Flexible bond angles.
- Customization of bonds.

## Benzene Ring

Outputs:

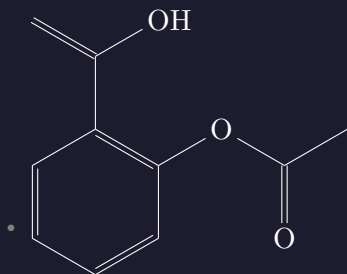


Latex codes:

- `\chemfig{*6(-==-=)}`

## Aspirin

Outputs:

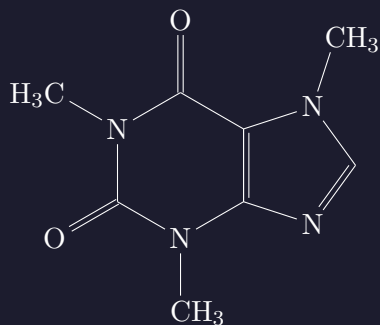


Latex codes:

- `\chemfig{*6(-=(-O-[:-60])(=[:-60]O)-[:+60])=(-(=[::+60])-[:-60]OH)-=)}`

## Caffeine

Outputs:



Latex codes:

- `\chemfig{*6((=O)-N(-CH_3)-*5(-N=-N(-CH_3)-=)--(=O)-N(-H_3C)-)}`

## Embedded Bibliography

```
\begin{thebibliography}{99}
\bibitem{WAF2015}
Wusu A.S., Akanbi M. A. and Fatimah B.O.
{\em On the Derivation and Implementation of a
Four Stage Harmonic Explicit Runge-Kutta Method},
Applied Mathematics,
Vol.(6),
(2015).
\end{thebibliography}
```



## External Bibliography

```
@article{WAB2016,
 author = "Wusu, A. S. and Akanbi, M. A. and Bosede, A. O.",
 year = "2016",
 title = "Exponentially--Fitted 2--Step Simpson's
 Method for Oscillatory/Periodic Problems",
 journal = "Journal of Applied Mathematics and Physics",
 volume = "4",
 pages = "368--375"
}
```

## External Bibliography

```
\bibliography{my_bibtex.bib}
```

### Bibliography Management with natbib

Latex codes:

- `\cite{WAB2016}`

Outputs:

- #id#

## Bibliography Management with natbib

### Latex codes:

- `\cite{WAB2016}`
- `\citet{WAB2016}`

### Outputs:

- #id#
- Wusu et al. (2016)

## Bibliography Management with natbib

### Latex codes:

- `\cite{WAB2016}`
- `\citet{WAB2016}`
- `\citep{WAB2016}`

### Outputs:

- #id#
- Wusu et al. (2016)
- (Wusu et al., 2016)

## Bibliography Management with natbib

### Latex codes:

- `\cite{WAB2016}`
- `\citet{WAB2016}`
- `\citep{WAB2016}`
- `\citet*{WAB2016}`

### Outputs:

- #id#
- Wusu et al. (2016)
- (Wusu et al., 2016)
- Wusu, Akanbi, and Bakre (2016)

## Bibliography Management with natbib

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- `\citet{WAB2016}`
- `\citep{WAB2016}`
- `\citet*{WAB2016}`
- `\citep*{WAB2016}`

### Outputs:

- #id#
- Wusu et al. (2016)
- (Wusu et al., 2016)
- Wusu, Akanbi, and Bakre (2016)
- (Wusu, Akanbi, and Bakre 2016)

## Bibliography Management with natbib

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- `\cite{WAB2016}`
- `\citet{WAB2016}`
- `\citep{WAB2016}`
- `\citet*{WAB2016}`
- `\citep*{WAB2016}`
- `\citeauthor{WAB2016}`

### Outputs:

- #id#
- Wusu et al. (2016)
- (Wusu et al., 2016)
- Wusu, Akanbi, and Bakre (2016)
- (Wusu, Akanbi, and Bakre 2016)
- Wusu, Akanbi, and Bakre

## Bibliography Management with natbib

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- `\citet{WAB2016}`
- `\citep{WAB2016}`
- `\citet*{WAB2016}`
- `\citep*{WAB2016}`
- `\citeauthor{WAB2016}`
- `\citeauthor*{WAB2016}`

### Outputs:

- #id#
- Wusu et al. (2016)
- (Wusu et al., 2016)
- Wusu, Akanbi, and Bakre (2016)
- (Wusu, Akanbi, and Bakre 2016)
- Wusu, Akanbi, and Bakre
- 2016



## Bibliography Management with natbib

### Latex codes:

- `\cite{WAB2016}`
- `\citet{WAB2016}`
- `\citep{WAB2016}`
- `\citet*{WAB2016}`
- `\citep*{WAB2016}`
- `\citeauthor{WAB2016}`
- `\citeauthor*{WAB2016}`
- `\citeyear{WAB2016}`

### Outputs:

- #id#
- Wusu et al. (2016)
- (Wusu et al., 2016)
- Wusu, Akanbi, and Bakre (2016)
- (Wusu, Akanbi, and Bakre 2016)
- Wusu, Akanbi, and Bakre
- 2016
- (2016)

## Bibliography Management with natbib

### Latex codes:

- `\cite{WAB2016}`
- `\citet{WAB2016}`
- `\citep{WAB2016}`
- `\citet*{WAB2016}`
- `\citep*{WAB2016}`
- `\citeauthor{WAB2016}`
- `\citeauthor*{WAB2016}`
- `\citeyear{WAB2016}`
- `\citealt{WAB2016}`

### Outputs:

- #id#
- Wusu et al. (2016)
- (Wusu et al., 2016)
- Wusu, Akanbi, and Bakre (2016)
- (Wusu, Akanbi, and Bakre 2016)
- Wusu, Akanbi, and Bakre
- 2016
- (2016)
- Wusu et al. 2016

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### Latex codes:

- `\cite{WAB2016}`
- `\citet{WAB2016}`
- `\citep{WAB2016}`
- `\citet*{WAB2016}`
- `\citep*{WAB2016}`
- `\citeauthor{WAB2016}`
- `\citeauthor*{WAB2016}`
- `\citeyear{WAB2016}`
- `\citealt{WAB2016}`
- `\citealp{WAB2016}`

### Outputs:

- #id#
- Wusu et al. (2016)
- (Wusu et al., 2016)
- Wusu, Akanbi, and Bakre (2016)
- (Wusu, Akanbi, and Bakre 2016)
- Wusu, Akanbi, and Bakre
- 2016
- (2016)
- Wusu et al. 2016
- Wusu et al., 2016

## Bibliography Management with biblatex

```
\bibliographystyle{stylename}
```

```
\bibliography{bibfile}
```

## Bibliography style for biblatex

plain, alpha, apalike, abbrv, acm, ieee, siam, unsrt



- *The Not So Short Introduction to L<sup>A</sup>T<sub>E</sub>X2* by **Tobias Oetiker**

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- *Advanced L<sup>A</sup>T<sub>E</sub>X* by **Tim Love**

- *The Not So Short Introduction to L<sup>A</sup>T<sub>E</sub>X2* by **Tobias Oetiker**
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- *ChemFig documentation* by **Christian Tellechea**