Lewis Structures in LaTeX

Using the `lewis` package

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Introduction

From the Wikipedia article on Lewis Structures:

> Lewis structures, also called electron-dot structures or electron-dot diagrams, are diagrams that show the bonding between atoms of a molecule, and the lone pairs of electrons that may exist in the molecule. A Lewis structure can be drawn for any covalently-bonded molecule, as well as coordination compounds. The Lewis Structure was named after G.N. Lewis, who introduced it in his 1916 article The Molecule and the Atom.
>
> Lewis structures show each atom in the structure of the molecule using its chemical symbol. Lines are drawn between atoms that are bonded to one another (rarely, pairs of dots are used instead of lines). Excess electrons that form lone pairs are represented as pair of dots, and are placed next to the atoms on which they reside.

Thus, the `lewis` package enables the user to typeset rudimentary Lewis Structures within LaTeX documents.

Usage

There is but one command in the `lewis` package:

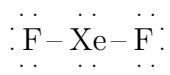
`\lewis{X}{.}{.}{.}{.}{.}{.}{.}`

Such that `X` is the desired chemical symbol around which the electron dots will be placed. Each {.} represents the symbol that will be placed in the electron dot position, beginning with the lower left hand position and proceeding clockwise around the symbol, `X`. Thus, `\lewis{X}{1}{2}{3}{4}{5}{6}{7}{8}` would produce:

Because the most common usage of the lewis structures is to place dots within positions 1-8, the period {.} is an ideal choice:

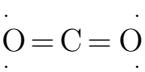
There is one caveat, however, which is that the infinite configurability of lewis structure diagrams is very difficult to program and so arrays and alignment tweaks such as `\hspace` may ultimately be needed to achieve the desired results. What follows are several textbook examples of Lewis Structures, as well as the code needed to produce them.

Examples

1) The bonding of two fluorine atoms with a xenon atom to produce xenon difluoride (XeF_2) may be represented as 

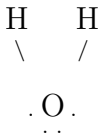
The responsible code:

```
\lewis{F}{.}{.}{.}{.}{}{}{.}
{.}\hspace{-0.5em}--\hspace{-0.75em}\lewis{Xe}
{}{}{.}{.}{}{}{.}{.}\hspace{-0.5em}--\hspace{-0.75em}\lewis{F}
{}{}{.}{.}{.}{.}{.}{.}
```

2) Carbon dioxide (CO_2) would look like 

The responsible code:

```
\lewis{O}{.}{.}{.}{}{}{}{}
{.}\hspace{-0.5em}=\,C\,=\hspace{-0.75em}\lewis{O}
{}{}{}{.}{.}{.}{.}{}
```

3) Water (H_2O) might look like 

The responsible code:

```
\lewis{O}{.}{}{
\lewis{H}{}{}{}{}{}{}{{\backslash}}{}}{
\lewis{H}{}{}{}{}{}{}{}{{/}} }{}{.}{.}{.}
```

As you can see from the third example, more complex structures are both harder to code and less elegant. Nonetheless, the building blocks for individual electron dot diagrams are present and lend themselves naturally to more complex structures. Hopefully future versions will reduce the number of alignment issues and provide additional commands for higher energy level elements.