

## On the Need for Multiple Lists of Chemical Information

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Presented at the Third International Electronic Conference on Synthetic Organic Chemistry (ECSOC-3, <http://reprints.net/ecsoc-3/e0001/e0001.htm>), September 1-30, 1999.

*Received: 14 January 2000 / Accepted: 14 January 2000 / Published: 21 January 2000*

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**Abstract:** Cambridge University Department of Chemistry has a list of University Chemistry Departments and Chemistry-related journals around the world: ChemSites (<http://www.ch.cam.ac.uk/ChemSitesIndex.html>). This article describes what makes it distinct from other lists, and justifies the existence of more than one such list.

**Keywords:** ChemSites, ChemJournals, Cambridge Chemistry Index, Chemistry2000.

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### Introduction

The Department of Chemistry at Cambridge has maintained a list of University Chemistry Departments with WWW servers and of Chemistry Journals with an internet presence, since 1994. This index is called ChemSites and is available on the <http://www.ch.cam.ac.uk/ChemSitesIndex.html> URL.

When it started, there were only a dozen or so such departments and the task was a very easy one. Now, the list is about two thousand sites. When the Cambridge index was started, the WWW virtual library had an up-to-date chemistry page at UCLA (<http://www.chem.ucla.edu/chempointers.html>) [1]. There are now many other useful lists of chemistry departments including Links for Chemists maintained at Liverpool by Michael Barker which has 6250 links (in July 1999) and started in 1995 [2], and ChemDex, maintained at Sheffield by Mark Winter, which started in 1993 and has 4036 links (in July

1999) [3]. There are also many other lists of links around the world.

Is there any reason to continue maintaining ChemSites, apart from habit, as it is just one of quite a large number of such lists?

## Discussion

The case against continuing the ChemSites [4] index seems clear:

- (i) it has fewer links than "Links for Chemists" and ChemDex.
- (ii) maintaining the site requires some effort.
- (iii) duplicate lists may confuse people.

Despite the strength of these arguments, the counter arguments appear to be stronger.

### *1. Not enough links*

How many university chemistry departments with WWW servers are there in the world? This is not an easy question, because it depends on the precise definition of each of the three words. Different countries have different academic structures, and so it is not always easy to translate "university". There are many research institutes which are not formally universities, but whose chemistry departments have a similar research function to those within universities. Should these be included? The definition of "chemistry" is even harder. Harvard recently renamed its chemistry department as the Department of Chemistry and Chemical Biology, but it seems clear it should remain on a list of chemistry departments. Very many other cases are less clear cut. Studies in chemical physics, or materials science, or biochemistry, or mathematical modelling may be done in departments of chemistry, or physics, or mathematics, or materials, or biochemistry, or chemical engineering, or many other places. Should a list of chemistry departments include everything which may be described as chemistry, or should it stick to a more exclusive definition? There is a similar problem in deciding whether a journal is really about chemistry, or if it is just not chemical enough to include on a list of chemistry journals. Some chemistry departments are separate departments of physical, organic, inorganic and analytical chemistry, or other divisions. Should these be counted separately?

There is no absolute answer to any of these questions, and so compilers of lists of departments of chemistry are compelled to make their own choices. Inevitably, different people will make different choices. The reason why the Cambridge ChemSites list is only two thousand links is that it is much more focussed than some other lists. For some purposes, this is a good thing. It is, however, comprehensive, so far as possible. The UK Research Assessment Exercise provides a list of all UK chemistry departments and so it is fairly certain that the UK section of the list is complete. The American Chemical Society publishes a list of accredited chemistry departments, and so the list for the USA should be

close to completion. However, there are undoubtedly many departments missing from the rest of the world, and possibly some entries which should not be there, due to mistranslations or other errors.

The presence of only about two thousand links on the ChemSites index is not, therefore, an intrinsic cause of concern. Many of the links on other lists refer to chemical companies, which are very useful, of course, but outside the scope of ChemSites.

## *2. Effort required to maintain the list*

Maintaining a list of links requires a significant amount of effort. This may seem surprising, since chemistry departments do not start up and close down very often. The same is not true for their web servers. ChemSites and Chemistry Journals are checked every month, and every month there are a number of links which need to be updated. The number varies from month to month, but is rarely less than 1% of the total, and is sometimes much more. Checking 2000 links by hand would take a very long time, and so most of the work is done by computer, which makes the task a manageable one. However, this always produces a list of suspect links which need to be checked and modified as necessary. The program which does this has evolved with experience, and will probably make different decisions as to whether or not a URL leads to a chemistry site than anybody else's program. It is very likely, therefore, that the reliability of different lists varies quite significantly. The half-life of a chemistry department URL has been surprisingly short.

This has consequences for the possible misuse of the list. The list is available to anyone to access and use, but not to copy and exploit. Copies have occasionally been found on other web servers, with neither permission nor acknowledgement. The rapid updating of the list means that the time at which the copy was made can be ascertained fairly precisely, and the copy is unlikely to be as reliable as the original.

## *3. Confusion from duplicate lists*

There would be advantages in there being one comprehensive, infallible and up-to-the-minute list of world-wide chemistry departments. However, the creation of such a list would be impossible, because of the difficulty of deciding what should be on it, and the challenge of keeping it constantly updated. It would be interesting to combine the lists at ChemDex and at Liverpool with the ChemSites at Cambridge, if permission to do this could be obtained from the administrators of all the lists. Since they contain about 4 000, 6 000 and 2 000 links respectively, how many links would be in the combined list? The answer is certainly less than 12 000 for many departments will be on all three lists. However, it is very likely that the answer is rather more than 6 000, as so many different decisions must have been made about the inclusion and exclusion of different sites.

If a single list is not an achievable aim, then a variety of lists, each with a different emphasis and focus, would seem to be a good alternative.

## Conclusions

The best way to index the chemistry world is to have a variety of lists, each with their own strengths and weaknesses. The ChemSites list has strengths in its focus on university chemistry departments and chemistry journals, and in the regular checking of the entries in the index. These strengths are not sufficient to make it a dominant index which makes all others unnecessary. The first strength, it may be argued, contains some idiosyncratic choices, and the second is useful, but imperfect. However, they do mean that it plays a useful role amongst the various lists of chemistry links, and this is reflected in the heavy use of the list from all around the world.

*Acknowledgements:* I would like to thank everybody who has contributed links to the ChemSites list, who are too many to name here, and the Royal Society for financial support.

## References and Notes

1. WWW Virtual Library: <http://www.chem.ucla.edu/chempointers.html>
2. Links for Chemists: <http://www.liv.ac.uk/Chemistry/Links/links.html>
3. ChemDex: <http://www.chemdex.org/>
4. Goodman, J. ChemSites (<http://www.ch.cam.ac.uk/ChemSitesIndex.html>).