CITATION COMMENTS

BY EUGENE GARFIELD

ISI®'s founder discusses practical applications of citation data for information retrieval, analysis of the journal literature, and evaluation and assessments of research performance. His commentary appears each month in these pages.

Just Browsing: The Reaction Citation Index

Serendipitous discovery is commonplace in the annals of scientific research. A well-known example is the discovery of penicillin, and there are many others.[1] In searching the literature, we take serendipity for granted. In fact, most of us have accidentally encountered a critical piece of information in the conscious pursuit of something altogether different. And in our routine skimming of journals and books, we stumble upon unexpected connections to our research.

Current Contents® readers often say that electronic search systems, while very convenient for specific searches, limit opportunities for the chance encounter with unexpected references. They feel that browsing can only be done with printed material. But when the software is properly designed, electronic systems can indeed create the conditions for serendipitous encounters. For example, ISI®'s own *Current Contents on Diskette*® allows the user to "turn the pages" of a *CC*® issue electronically.

Hypertext and Browsing

Hypertext-based retrieval systems—in which words or documents or other keys are linked nonsequentially—offer even greater potential for electronic browsing.[2,3] In a previous essay, I described a new chemical information system, the Reaction Citation Index™ (RCI™), that uses citations as hypertext links.[4] These links open a large dataset of reactions and corresponding references to creative and context-sensitive exploration.

Browsing the Literature of Reactions

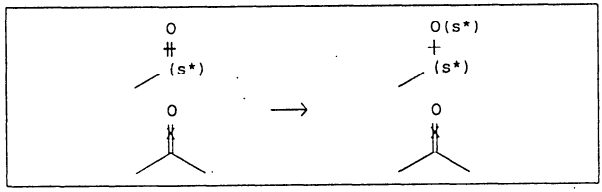
Suppose that you are interested in the chemoselective reduction of an aldehyde in the presence of a ketone. A reaction substructure search would retrieve several reactions, all of which meet the exact criteria set by the initial query. Figure 1 shows three, all of them reductions of an aldehyde in the presence of a ketone.

Figure 2 shows one of the retrieved reactions in the RCI along with that reaction's *Related Records*®, which are articles that cite some of the same references as the original article in question.

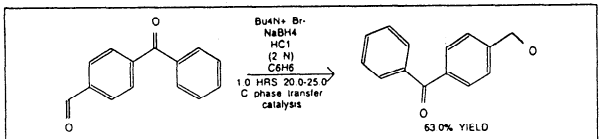
Now you can browse through the titles of these RELATED articles and, with a click of a mouse, view their reactions. Figure 3 shows two reactions identified through this process. The first reduces a different type of compound—an organic halide instead of an aldehyde—using the same reagent, tri-n-butyltin hydride. The second is a selective addition of an alkyl to an aldehyde in the presence of a cyano group. Neither of these reactions were retrieved by the initial reaction substructure search.

Figure 1

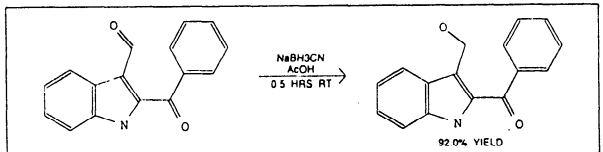
Query:



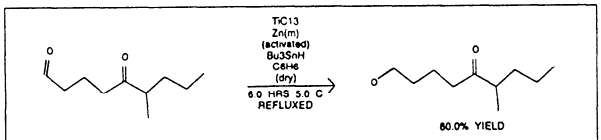
Results:



RAO C S, DESHMUKH A A, PATEL B J, INDIAN J CHEM B 25(6),626-629(1986).
A SIMPLE ECONOMICAL PROCEDURE FOR SELECTIVE REDUCTION OF ALDEHYDES IN PRESENCE OF KETONES.



DJURIC S W, HERBERT R B, HOLLIMAN F G, J HETEROCYCLIC CHEM 22(5),1425-1428(1985).
CHEMOSELECTIVE REDUCTIONS OF 2-ACYL-1H-INDOLE-3-CARBOXALDEHYDES.



ADAMS C M, SCHEMENAUR J E, SYNTHETIC COMMUN 20(15),2359-2364(1990).
CHEMOSELECTIVE CARBONYL REDUCTION MEDIATED BY LOW-VALENT TITANIUM.

Figure 2

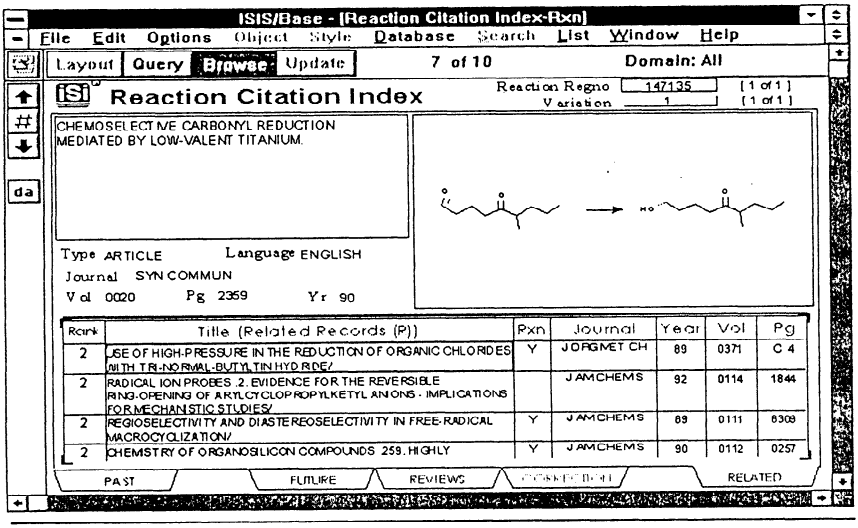
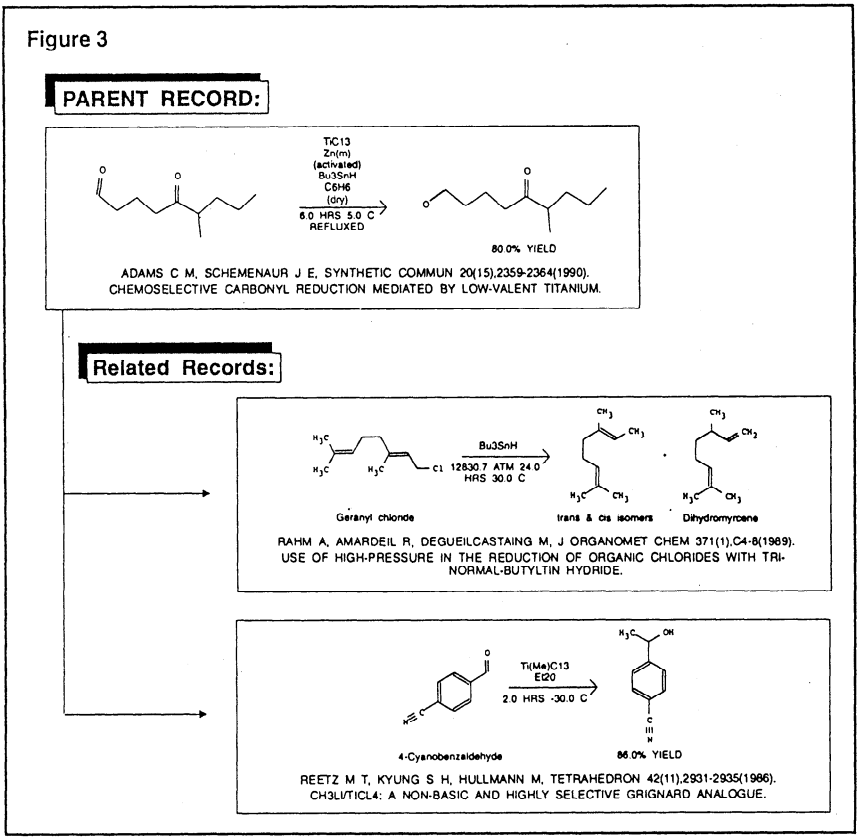


Figure 3



These reactions and their corresponding references can, in turn, serve as branching-off points for further browsing.

Using the RCI™, a chemist can find valuable information without depending on precise queries that yield a static answer set. It makes searching the chemical literature a more interactive, more engaging enterprise. It sets the stage for citation indexing and "systematic serendipity" to work its magic, as Julian Smith described over 30 years ago.[5]

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Chairman Emeritus

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