

## EDITORIAL

## CHIMIA in Comparison: Citation Data and Impact Factors

In the context of a recent CHIMIA Advisory Board Meeting, we intended to compare CHIMIA to journals of chemical societies like *Nachrichten aus Chemie, Technik und Laboratorium* (Gesellschaft Deutscher Chemiker), *Chemistry in Britain* (Royal Society of Chemistry), and *Chemical and Engineering News* (American Chemical Society) with a mission similar to our journal. Although we were well aware of the fact that the use of citation data (impact factors and others) to 'rank' journals, institutions, or individual scientists, is not without short-comings and has to be interpreted in the context of other criteria and data, we still considered such data to be of interest to indicate the position of our journal in the marketplace and in the appreciation of its readers.

Table 1 shows impact factors and related citation data 1994–97 taken directly from the *Journal Citation Reports* (JCR, see <http://www.isinet.com/hot/essays/22.html>) CD-ROM produced by the *Institute for Scientific Information* (ISI, Philadelphia PA, U.S.A.). *Nachr. Chem. Tech. Lab.*, which we think is important in our context, is not included in JCR and has only since 1994 been indexed in the *Science Citation Index* (SCI).

With regard to this, and in an attempt to compare ISI's 'impact factor' to a similar, but different measure, we defined in this study **our own 'citation factor'** that we could generate with information available from public databases in a simple way:

'citation factor' = number of citations to articles from the journal in the year *n* as given in the *Science Citation Index*/average number of articles published in the journal over the last five years (*n* to *n-4*) as indexed by *Chemical Abstracts* (CA)

During our searches, we were reminded of disquieting variations in the abbreviated titles of cited journals in the *Science Citation Index*, due to negligence of scientists to use the proper, standardized abbreviations for journals. This problem is solved by ISI using a proprietary 'JCR unification dictionary' that takes care of the journal name variations for the calculation of the 'impact factor'. ISI's 'impact factor' (see [http://www.isinet.com/help/glossary.html#impact\\_factor](http://www.isinet.com/help/glossary.html#impact_factor)) is defined as:

'impact factor' = number of citations in year *n* to articles from the journal published in years *n-1* and *n-2*/ number of articles published by journal in years *n-1* and *n-2*.

Table 1. ISI's 'Impact Factor' and Citation Data from ISI's 'Journal Citation Reports (JCR)'

Year	CHIMIA			Chem. Br.			Chem. Eng. News		
	Impact Factor	Articles	Cites	Impact Factor	Articles	Cites	Impact Factor	Articles	Cites
1994	0.604	119	856	0.593	66	596	0.331	666	1204
1995	0.517	83	841	0.986	65	611	0.402	729	1380
1996	0.450	126	861	1.115	70	642	0.320	485	1285
1997	0.632	117	961	1.141	132	669	0.364	413	1334

Explanations to Table 1: Impact Factor: see text. Articles: total number of published articles per year. Cites: total number of cited articles per year

Our 'citation factor' differs from this in several major aspects:

- The **number of articles published is taken from Chemical Abstracts** instead of from *Science Citation Index*, both because this gives the desired data for *Nachr. Chem. Tech. Lab.* and overall limits the numbers to those publications with defined chemical content, excluding editorials etc., additionally covered by the *SCI* (see Table 2).
- Second, instead of limiting to citations of articles published in the two preceding years as in ISI's 'impact factor', we count **any citation in year n** regardless of the year the cited article was published.
- Finally, we replace the number of articles published in the last two years by the **average number of publications in the journal over the last five years**. This was inspired by the fact that often more than 50% of citations are to articles from this time range.

Interestingly, some of the journals compared here differ significantly in this 'cited half-life' (<http://www.isinet.com/help/glossary.html#c:> 'number of years, going back from the current year, that account for 50% of the total citations received by the cited journal in the current year') as determined by *ISI* and published on the *JCR* CD-ROM: **CHIMIA (1995: 8.5, 1996: 9.8 years)**, *Chem. Br.* (4.9, 5.5), *Chem. Eng. News* (3.1, 3.6) – a possible explanation is that **the review-type articles published in CHIMIA are more 'persistent'** than the type of information, e.g., found in *Chem. Eng. News*.

Table 2 shows the number of articles published in the journals and the number of citations. The number of articles published in the journals were taken from *Chemical Abstracts* (STN CA file, update 19990501), using journal CODENs as search terms in order to eliminate problems with different spellings or abbreviations of the journal titles. The number of citations was determined in

Table 2. Our 'Citation Factor' and Publication and Citation Data from Chemical Abstracts and Science Citation Index

Year	Number of Publications in <i>Chemical Abstracts</i>				Number of Publications <i>Science Citation Index</i>				Number of Citations in <i>Science Citation Index</i>			Citation Factor				
	CHIMIA	<i>Nachr. Chem. Tech. Lab.</i>	<i>Chem. Br.</i>	<i>Chem. Eng. News</i>	CHIMIA	<i>Nachr. Chem. Tech. Lab.</i>	<i>Chem. Br.</i>	<i>Chem. Eng. News</i>	CHIMIA	<i>Nachr. Chem. Tech. Lab.</i>	<i>Chem. Br.</i>	<i>Chem. Eng. News</i>	CHIMIA	<i>Nachr. Chem. Tech. Lab.</i>	<i>Chem. Br.</i>	<i>Chem. Eng. News</i>
1977	70	34	76	87	164		94		542	47	371	340	-	-	-	-
1978	54	41	69	90	108		166		500	49	356	324	-	-	-	-
1979	57	45	79	95	105		202	43	513	80	337	399	-	-	-	-
1980	55	41	66	54	104		154	145	506	97	316	395	-	-	-	-
1981	60	36	43	85	119		113	119	591	112	297	456	9.983	2.843	4.459	5.547
1982	42	34	40	58	127		144	122	558	116	311	486	10.410	2.944	5.236	6.361
1983	38	36	46	77	99		211	684	579	121	333	571	11.488	3.151	6.077	7.737
1984	44	44	40	77	72		234	938	544	129	352	789	11.381	3.377	7.489	11.239
1985	75	29	48	80	83		256	941	549	144	429	897	10.598	4.022	9.885	11.897
1986	64	27	61	71	81		281	946	580	166	441	882	11.027	4.882	9.383	12.149
1987	61	27	48	93	92		269	1025	644	164	422	911	11.418	5.031	8.683	11.445
1988	66	51	63	106	105		264	1005	702	160	450	863	11.323	4.494	8.654	10.105
1989	53	41	50	104	99		252	970	666	177	488	834	10.439	5.057	9.037	9.185
1990	56	42	51	111	96		260	1033	736	187	487	895	12.267	4.973	8.919	9.227
1991	68	34	43	95	90		328	1075	766	211	551	1008	12.599	5.410	10.804	9.902
1992	54	38	42	91	112		350	916	726	199	599	913	12.222	4.830	12.028	9.004
1993	53	46	50	102	125		272	934	751	236	559	964	13.222	5.871	11.843	9.583
1994	63	29	52	98	145	139	307	963	771	295	557	1011	13.112	7.804	11.702	10.171
1995	45	37	39	76	113	15	552	1101	761	241	571	1135	13.445	6.549	12.633	12.284
1996	85	39	47	105	153	179	725	1103	787	298	587	1111	13.117	7.884	12.761	11.769
1997	114	53	58	106	153	161	688	2368	864	313	653	1157	12.000	7.672	13.272	11.879

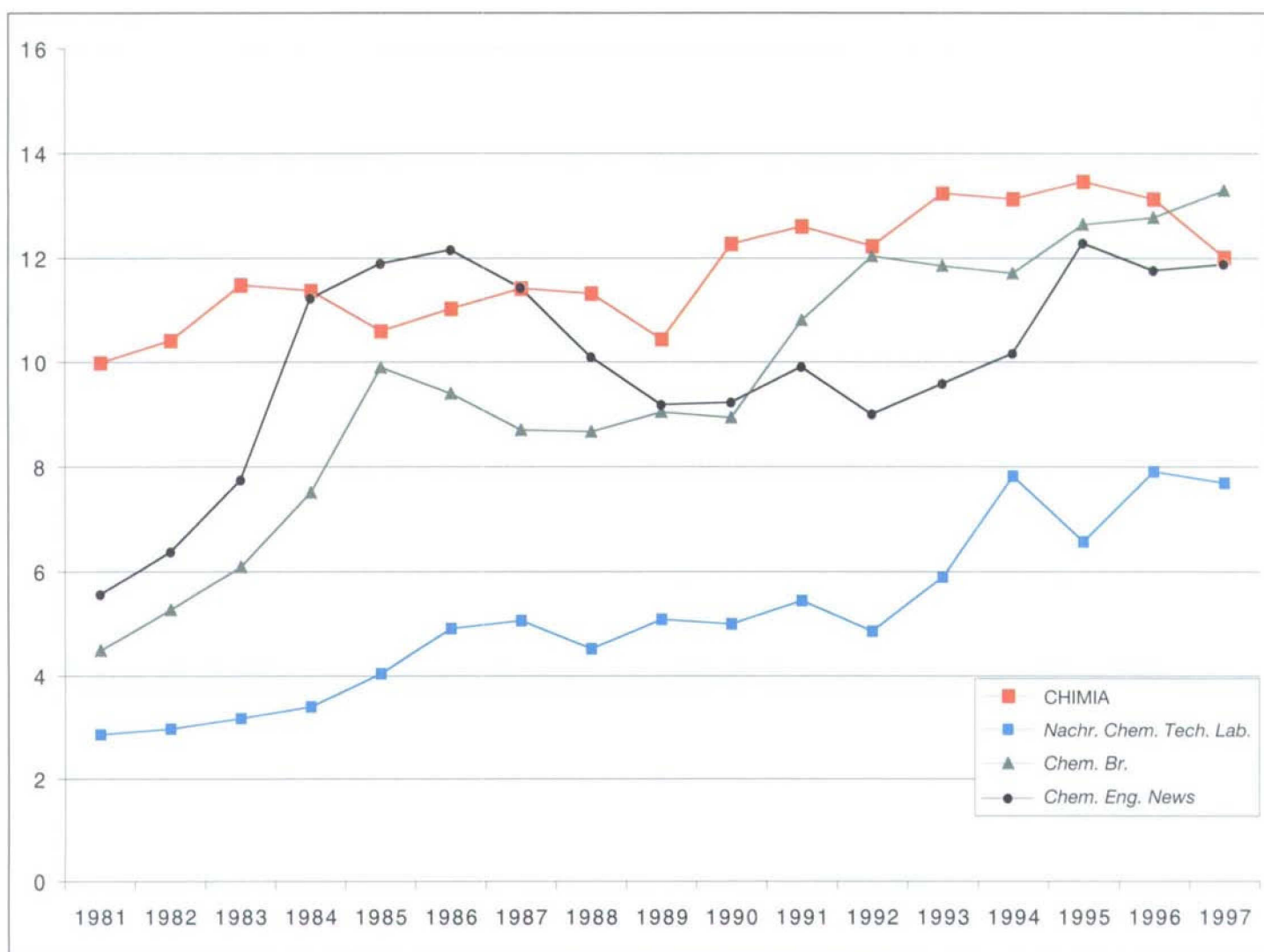


Figure. Journal ranking by 'Citation Factor'

the *Science Citation Index* (STN Scisearch, update 19990430). As this database contains no CODENs and only incomplete ISSNs (International Standard Serial Numbers for journals), searches had to be done by journal title in the JT (journal title) field for published items (given for comparison with the corresponding numbers from *Chemical Abstracts*), and in the RWK (referenced work) data field for cited articles, taking several spellings/abbreviations into consideration. *Microsoft Excel 98* on a *Macintosh* PC was used for the calculations.

Ranking of journals by our 'citation factor' is illustrated in the *Figure*. **Rankings by both factors show CHIMIA in positions relative to comparable journals which we consider both a confirmation for the past and an incentive for future editorial work.**

From the definitions given above, it is obvious that *ISI's* 'impact factor' favors journals that get cited heavily soon after publication, while our 'citation factor' favors journals that get cited over a longer period of

time. Nevertheless, we were surprised by the differences that appear when one uses either of these factors (see *Tables 1* and *2*). We think another important message of our examination is to take any rankings by whatever 'factor' with a 'grain of salt' (or even more of that).

Besides such impact factors, another possible criterion is the 'coverage' of a primary journal by the indexing & abstracting services. In addition to the number of articles indexed by *Chemical Abstracts Service* and the *Institute for Scientific Information* given in *Table 2*, we used the INDEX command in *STN International* to determine the number of other bibliographic databases available via STN that include 10 or more citations from these journals: CHIMIA (28 databases), *Nachr. Chem. Tech. Lab.* (12), *Chem. Br.* (28), *Chem. Eng. News* (35).

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