

CITATION ANALYSIS: INDIAN JOURNAL OF CHEMISTRY VOLUME: A

Magre Ujwala Yadavrao * Dr.Vivek S.Sathe**

*** Asst. Librarian**

Shri. Muktanand College
Gangapur, Aurangabad,
Maharashtra, India.

**** Librarian**

Chetna Shikshan Prasarak
Mandal's Arts Senior
College Aurangabad,
Maharashtra, India.

QR Code



Abstract: - *The present paper focuses 32218 citations of Indian Journal of Chemistry (Volume-A). It discusses on form-wise distribution of citations, distribution of e-citations and p-citation, chronological distribution of citations, authorship pattern of citations, ranking of authors, ranking of publishers, geographical distribution of citations, Indian and foreign distribution of citations, language-wise distribution of citations, ranking of journals and ranking of books.*

Keywords: - Citation, Citation analysis, Indian Journal of Chemistry.

INTRODUCTION

Citation analysis is one of the methodologies adopted by libraries for evaluating their collection as well as a tool for building an effective journal collection. Citation analysis is useful for librarians, teachers, researchers and information scientists to represent the relationship which exist between the cited and citing document, the technique of citation analysis involve the process of collection, counting and analysis given in various types of literature. Therefore citation

analysis is important study for any discipline of pure sciences and social sciences.

SURVEY OF LITERATURE

Citation analysis has many critics, and some have focused their criticism on the idea that citation analysis could be used as an input into the RAE – Research Assessment Exercise process (Norris and Oppenheim, 2003), citation analysis permits the researcher to comprehend current developments in subject fields, the properties of bibliographical usage, and research trends

(Chen,2004), citation analysis can be used to study the nature and characteristics of literature cited in the different discipline (Balasubramanian and Bhaskar, 1984).The review of literature shows the usefulness of citation analysis study to the librarians and researchers in the various disciplines. Citations analysis and citation impact analysis to satisfy ‘useful purposes’ in supporting the interests of the research environment (Wormell, 1998), Citation analysis is an effective but somewhat neglected technique of collection development and Evaluation. The method of Citation analysis consists of counting and ranking the number of times documents are cited in bibliographies footnotes, and/or indexing tool (Baker and Lancaster, 1991),

OBJECTIVES OF THE STUDY:-

1. To find out the Volume wise distribution of citations.
2. To find out form wise distribution of cited documents
3. To find out the distribution of E-citations and P-citations
4. To find out the chronological distribution of cited documents
5. To find out the authorship pattern of cited documents
6. To rank the cited author
7. To rank the cited publisher
8. To find out the county of origin of the cited documents
9. To find out Indian and Foreign distribution of cited documents

10. To find out the language wise distribution of cited documents

11. To rank the cited journals

DATA ANALYSIS:- VOLUME-WISE DISTRIBUTION OF CITATIONS PER ARTICLE.

The volume wise distribution of citations per article of “Indian Journal of Chemistry (volume A)” of 10 volumes was considered for the present study from the year 2005-2014. The span of 10 years was taken into consideration which is shown in the table No. 1.

Table No.1 Volume-Wise Distribution of Citations per Articles.

Sr. No	Vol. No	Year	Number of Articles	Number of Citations	Average Citation Per Article
1	44 A	2005	184	4419	13.72
2	45 A	2006	156	3717	11.54
3	46 A	2007	143	3199	9.93
4	47 A	2008	135	3230	10.03
5	48 A	2009	93	2394	7.43
6	49 A	2010	77	2564	7.96
7	50 A	2011	105	3333	10.35
8	51 A	2012	84	3872	12.02
9	52 A	2013	80	2646	8.21
10	53 A	2014	89	2844	8.83
Total	10	10	1146	32218	100

Table No. 3.1 Shows that the total number of articles published during 2005 to 2014, Were 1146 and the total number of citations were 32218. Year wise analysis of citations shows that average number of per article is maximum (13.72) in the year 2005 and it also seen minimum (8.21) in the year 2013.

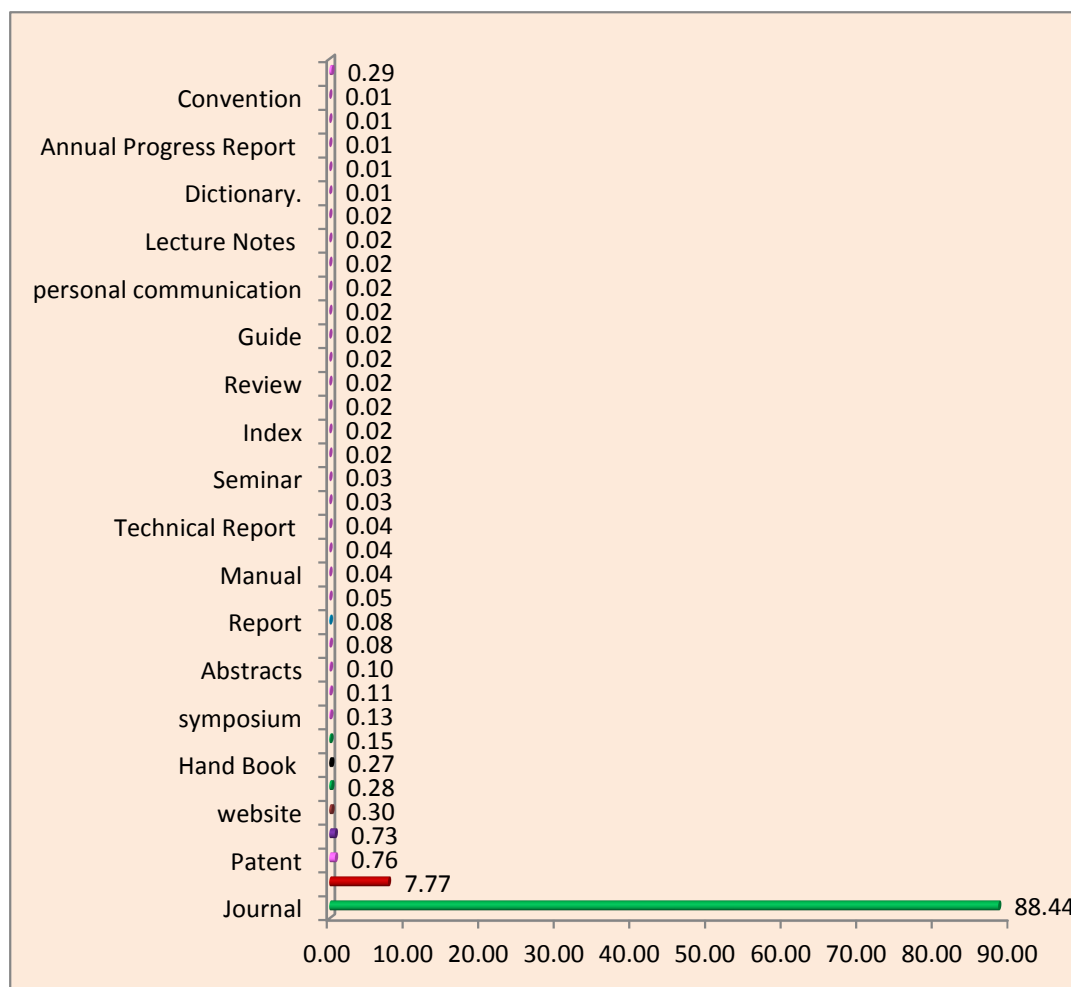
FORM WISE DISTRIBUTIONS OF CITATIONS

The form wise distribution of different forms of literature is used by researcher in Indian Journal of Chemistry Volume-A. A total number of 32218 citations of 120 issues in 10 volumes are distributed in different sources as per shown in table No.2 and figure No.1

Table No. 2 Form Wise Distributions of Citations

Sr. No.	Documents	Citations	Rank	Percentage
1	Journal	28494	1	88.44
2	Books	2503	2	7.77
3	Patent	244	3	0.76
4	Bulletin	236	4	0.73
5	website	96	5	0.30
6	Text Book	91	6	0.28
7	Hand Book	88	7	0.27
8	Ph D Thesis	48	8	0.15
9	Symposium	41	9	0.13
10	Conference Proceedings	36	10	0.11
11	Abstracts	32	11	0.10
12	Encyclopedias	27	12	0.08
13	Report	27	12	0.08

14	Unpublished work	16	13	0.05
15	Manual	12	14	0.04
16	Survey	12	14	0.04
17	Technical Report	12	14	0.04
18	Copyright	10	15	0.03
19	Seminar	10	15	0.03
20	Dissertation	8	16	0.02
21	Index	8	16	0.02
22	Monograph	8	16	0.02
23	Review	8	16	0.02
24	Reference Manual	7	17	0.02
25	Guide	6	18	0.02
26	Laboratory Manual	6	18	0.02
27	Personal Communication	6	18	0.02
28	Preprint Archive	6	18	0.02
29	Lecture Notes	5	19	0.02
30	Working Paper	5	19	0.02
31	Dictionary.	4	20	0.01
32	Program Rev	4	20	0.01
33	Annual Progress Report	3	21	0.01
34	workshop	3	21	0.01
35	Convention	2	22	0.01
36	Documents not mention	94	*	0.29
	Total	32218	*	100

Figure No. 1 Form wise Distributions of Citation

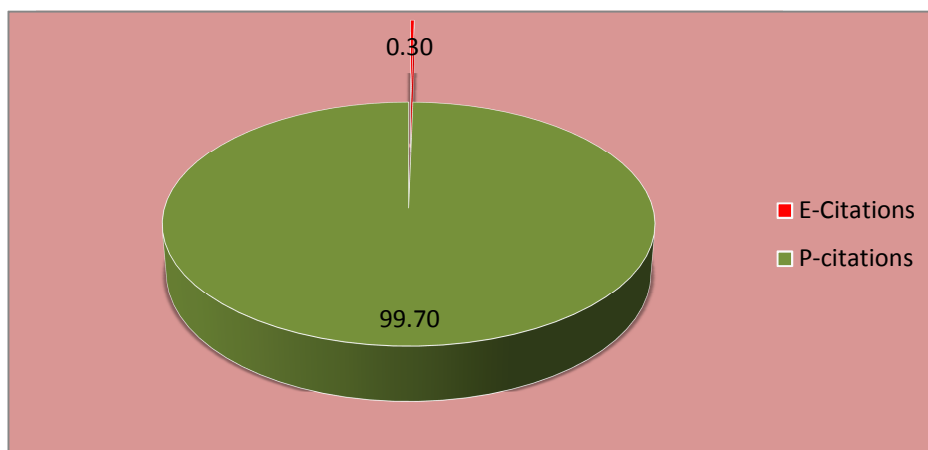
It was seen that different forms of literature was used by researcher in Indian Journal of Chemistry Volume-A which heavily depend on periodical sources for their studies. It was found that the journals are the major form of media used with citation count, of 28494 (88.44%) of total literature used, where as non-periodical sources account for 3724(11.55%) therefore periodicals are the first hand original and latest information in the subject and are most preferred channel of information use. Amongst citations of non periodical sources book occupy 2503 (7.77%) of citations, while the Patent occupy 244 (0.76%) and remaining 977 (3.03%) of literature contributes bulletin, website, text book ,hand book , Ph d thesis, symposium, conference proceedings , abstract, encyclopaedias, report, unpublished work, manual, survey, technical report ,copyright, seminar, dissertation, index, monograph, review ,reference manual ,guide, laboratory manual, personal communication, preprint archive, lecture notes ,working paper ,dictionary, program rev, annual progress report ,workshop, convention and documents not mention etc.

DISTRIBUTION OF E-CITATIONS AND P-CITATIONS

Table No. 3 Distribution of E-Citations and P-Citations

Sr. No.	Type of Citations	Citations	Percentage
1	E-Citations	96	0.30
2	P-citations	32122	99.70
	Total	32218	100.00

Figure No. 2 Distribution of E-Citations and P-Citations



The table No. 3 and figure No. 2 shows that of the total number of 32218 citations, 32122 (99.70%) are printed citations whereas 96 (0.30%) are electronic citations, which indicates that the researchers depend mostly on printed literature than the electronic form of literature.

CHRONOLOGICAL DISTRIBUTIONS OF CITATIONS

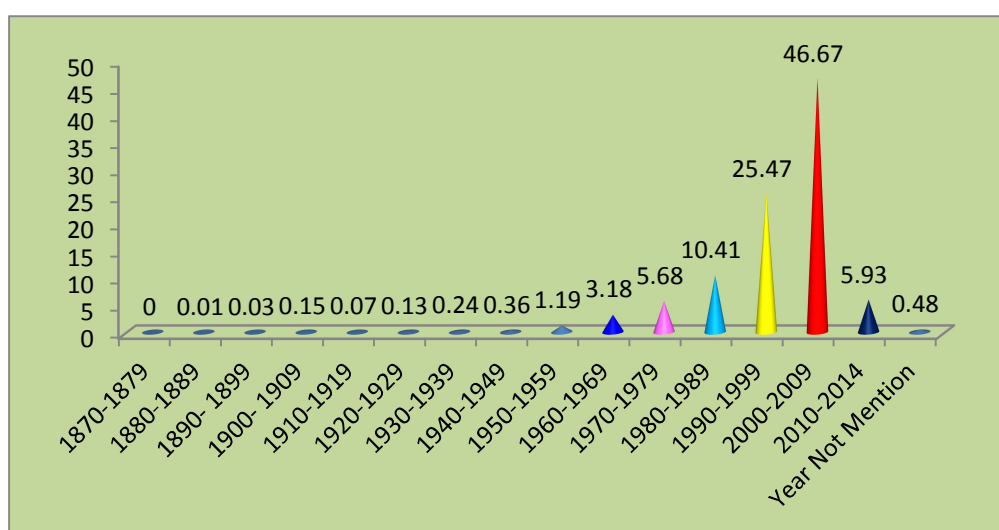
The period-wise distribution of citations was measured by number of year which elapsed between the publications of a cited document. The whole time span of the documents is used. It was divided into period groups; each group has 10 years duration. The total 10 volumes of The Indian journal of Chemistry were distributed in different chronological distribution of citations as shown in table No. 4 and figure No. 3

Table No. 4 Chronological Distribution of Citations

Sr. No	Year	Total Citations	Percentage
1	1870-1879	1	0.00
2	1880-1889	4	0.01
3	1890- 1899	10	0.03
4	1900- 1909	47	0.15
5	1910-1919	22	0.07
6	1920-1929	43	0.13
7	1930-1939	76	0.24

8	1940-1949	115	0.36
9	1950-1959	382	1.19
10	1960-1969	1025	3.18
11	1970-1979	1830	5.68
12	1980-1989	3354	10.41
13	1990-1999	8206	25.47
14	2000-2009	15036	46.67
15	2010-2014	1911	5.93
16	Year Not Mention	156	0.48
	Total	32218	100.00

Figure No.3 Chronological Distribution of Citations



The table No. 4 shows that the citations are divided into 10 periods of ten years each. The maximum number of citations are covered during the period of 2000-2009 accounting to 15036 (46.67%), followed by year 1990-1999 accounting to 8206 (25.47%), and in the period of 1980-1989 accounting to 3354 (10.41%) citations in term of chronological distribution of citations and least number of citations followed by the year 1870-1879, accounting to 01 respectively.

AUTHORSHIP PATTERN OF CITATIONS

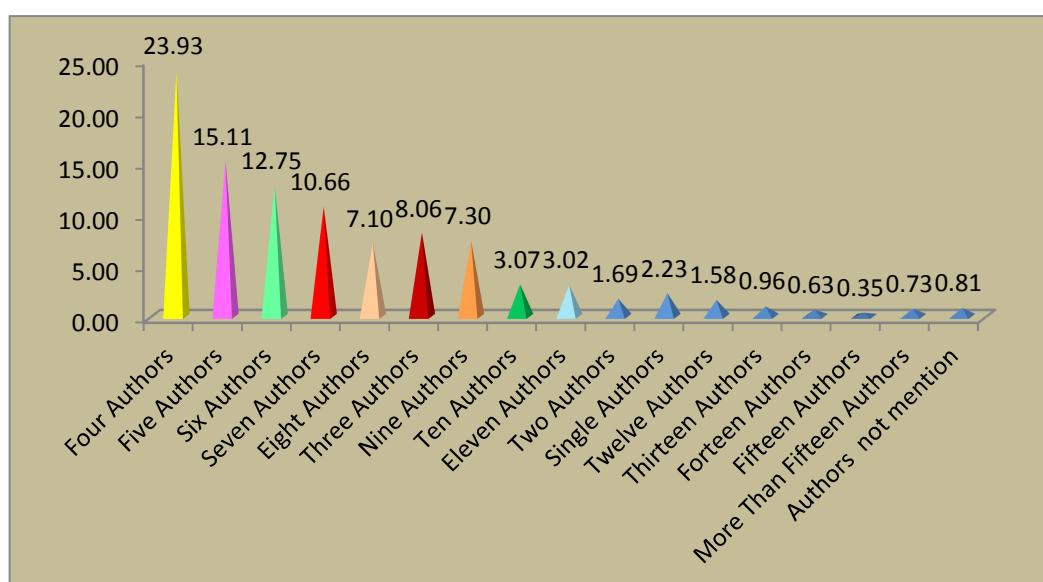
The characteristics of any subject literature include not only the basic publishing pattern but that of authors themselves so the authors were analyzed to determine the percentage of four, five, six and more than fifteen authors. In order to have a clear picture the result of analysis of authors are presented. The total numbers of 32218 citations in 10 volumes of Indian journal of Chemistry journal in the period 2005 to 2014 were written by single author, two authors, three authors, four authors, five authors, six authors, seven authors,

eight authors, nine authors, ten authors, eleven authors, twelve authors, thirteen authors, fourteen authors, fifteen authors and more than fifteen authors are shown in the table No.5 and figure No. 4

Table No.5 Authorship Pattern of Citations

Sr. No	Number of Authors	Citations	Percentage
1	Four Authors	7711	23.93
2	Five Authors	4867	15.11
3	Six Authors	4109	12.75
4	Seven Authors	3435	10.66
5	Eight Authors	2287	7.10
6	Three Authors	2598	8.06
7	Nine Authors	2352	7.30
8	Ten Authors	989	3.07
9	Eleven Authors	974	3.02
10	Two Authors	543	1.69
11	Single Authors	720	2.23
12	Twelve Authors	510	1.58
13	Thirteen Authors	309	0.96
14	Fourteen Authors	203	0.63
15	Fifteen Authors	236	0.35
16	More Than Fifteen Authors	114	0.73
17	Authors not mention	261	0.81
	Total	32218	100.00

Figure No.4 Authorship Pattern of Citations



The characteristics of any subject literature include not only the basic publishing pattern but that of authors themselves so the authors were analyzed to determine the percentage of single author, two authors, three

authors, four authors, five authors, six authors, seven authors, eight authors, nine authors, ten authors, eleven authors, twelve authors, thirteen authors, fourteen authors, fifteen authors and more than fifteen authors and authors are not mentioned in some citations. In order to have a clear picture the result of analysis of authors are presented. The table no. 5 and figure no. 4 indicates that out of total number of 32218 citations 7711 (23.93%) are by four authors, followed by 4867 (15.11%) citations by five authors, 4109 (12.75%) citations have six authors. The finding also shows that the least citations are by more than fifteen authors i.e. 114 (0.73%) citations respectively.

RANKING OF AUTHORS

The authors who are highly cited in documents, those documents are most important to keep in the library. The purpose of author ranking is essential for the librarian as well as researchers. The rank lists of cited authors are taken from 32218 citations from various from of cited documents. The authors were grouped into different ranks, according to their frequency occurrence in the total citations. The author ranking is shown in table No. 6

Table No.6 Ranking of Authors

Sr.No	Author Name	Citations	Rank	Percentage
1	Sheldrick G M	658	1	0.43
2	Vogel A I	638	2	0.41
3	Parr R G	598	3	0.39
4	Gutman I	522	4	0.34
5	Srinivasan B R	484	5	0.31
6	Singh A	460	6	0.30
7	Bakhshi A K	356	7	0.23
8	Singh A K	345	8	0.22
9	Goyal R N	332	9	0.22
10	Nakamoto K	322	10	0.21
11	Less than 322 Authors	146594		94.99
12	Authors not mention	3021		1.96
13	Total Cited Authors	154330		100.00

The author who is most preferred by researchers, that documents are most important to keep in the library. The purpose of author ranking is essential to librarians as well as researchers. The top ten authors have been considered in the above table. “Sheldrick G M” scores the top position with 658 (0.43 %) citations; second rank goes to “Vogel A I” with 638 (0.41 %) citations, followed by “Parr R G” with 598 (0.39 %) citations respectively.

RANKING OF PUBLISHERS

The publishers are the most important in finding the information source where it is surely available. The researcher of Indian Journal of Chemistry (Volume-A) used various forms of information sources which are published by various kinds of publishers. The ranking of publishers is arranged on the basis of the number of times it was referred.

Table No.7 Ranking of Publishers

Sr. No	Name of Publishers	Citation	Rank	Percentage
1	Academic Press	185	1	0.57
2	Wiley	163	2	0.51
3	John Wiley & Sons	128	3	0.40
4	Elsevier	113	4	0.35
5	University of Gottingen	99	5	0.31
6	Gaussian Inc	89	6	0.28
7	Marcel & Dekker Inc	80	7	0.25
8	Plenum Press	80	7	0.25
9	Wiley-Interscience Publication	78	8	0.24
10	Pergamon Press	76	9	0.24
11	Less than 76Times Publishers	1736		5.39
12	Publishers Not Mentioned	29391		91.23
	Total	32218		100.00

Table No. 7 shows the top ten ranking of publishers. The publisher “Academic Press.” scores the top position with 185 (0.57%) citations, second rank goes to “Wiley” With 163 (0.51%) citations, followed by “John Wiley & Sons” with 128(0.40%) citations respectively.

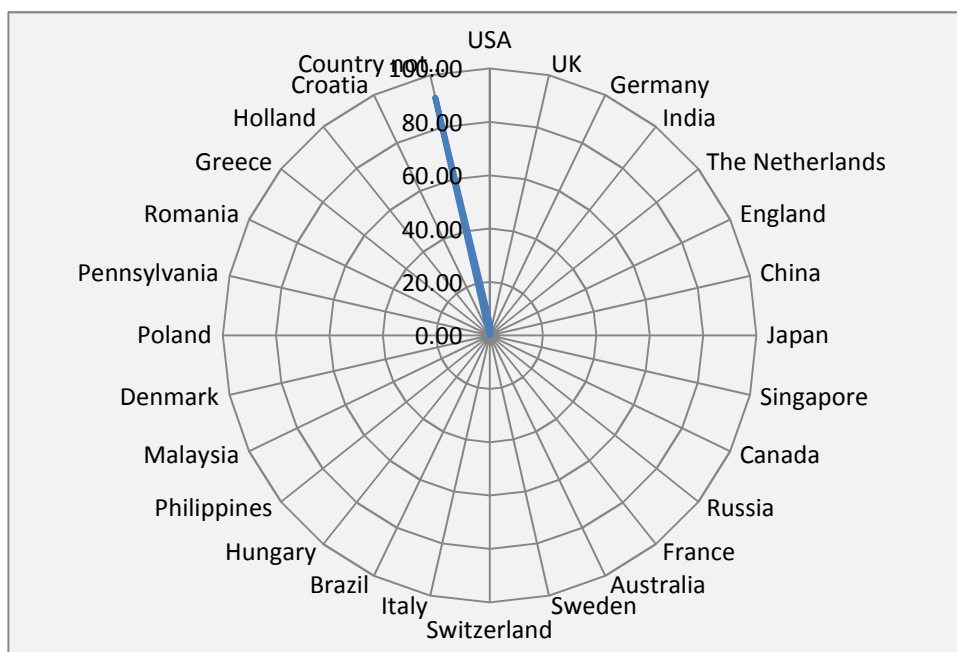
GEOGRAPHICAL DISTRIBUTION OF CITATIONS

The total number of 32218 cited documents in 120 issues in 10 volumes are distributed in different a geographical area which is shown in Table No. 8 and figure No. 5 Geographical distribution of citations provides information of the ranking of countries active in the particular subject field and their relative contributions.

Table No. 8 Geographical Distribution of Citations

Sr. No.	Country	Citations	Rank	Percentage
1	USA	1517	1	4.71
2	UK	486	2	1.51
3	Germany	275	3	0.85
4	India	241	4	0.75

5	The Netherlands	54	5	0.17
6	England	42	6	0.13
7	China	24	7	0.07
8	Japan	22	8	0.07
9	Singapore	21	9	0.07
10	Canada	16	10	0.05
11	Russia	15	11	0.05
12	France	11	12	0.03
13	Australia	16	13	0.05
14	Sweden	12	14	0.04
15	Switzerland	10	15	0.03
16	Italy	9	16	0.03
17	Brazil	8	17	0.02
18	Hungary	7	18	0.02
19	Philippines	6	19	0.02
20	Malaysia	6	19	0.02
21	Denmark	5	20	0.02
22	Poland	5	20	0.02
23	Pennsylvania	4	21	0.01
24	Romania	4	21	0.01
25	Greece	4	21	0.01
26	Holland	4	21	0.01
27	Croatia	4	21	0.01
28	Country not mention	29390	*	91.22
	Total	32218		100.00

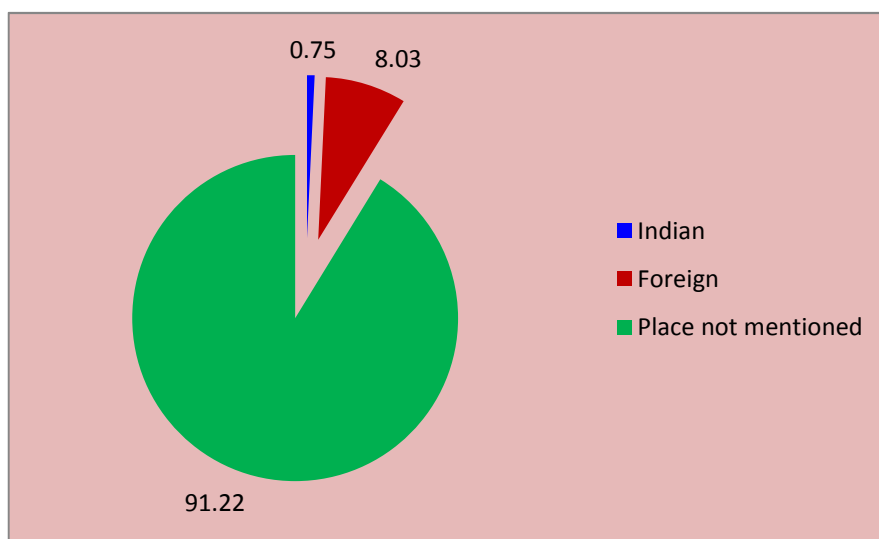
Figure No. 5 Geographical Distribution of Citations

The table No.8 and figure No. 5 shows the Geographical analysis of citations provide information of the range of countries active in field and their relative contribution. It was found that in the present study in all there were 27 countries involved in the research activity during the period which gives the ranking of more Geographical distribution of citations. USA topped the rank with 1517 (4.71%) Citations, second rank goes to UK with 486 (1.51%) citations, third rank goes to Germany with 275 (0.85%) citations, forth rank goes to India with 241 (0.75%) citations and some of the citations have not given the country of publications that is 29390 (91.22%).

USE OF INDIAN AND FOREIGN LITERATURE

Table No.9 Use of Indian and Foreign Literature

Sr. No.	Geographical Area	Citations	Percentage
1	Indian	241	0.75
2	Foreign	2587	8.03
3	Place not mentioned	29390	91.22
	Total	32218	100.00

Figure No.6 Use of Indian and Foreign Literature

The table No. 9 and figure No. 6 show the geographical distribution of Indian and Foreign countries coverage. Out of 32218 citations, Indian citations are 241 (0.75%) and remaining 2587(8.03%) citations are foreign citations whereas in 29390 (91.22%) citations place is not mentioned.

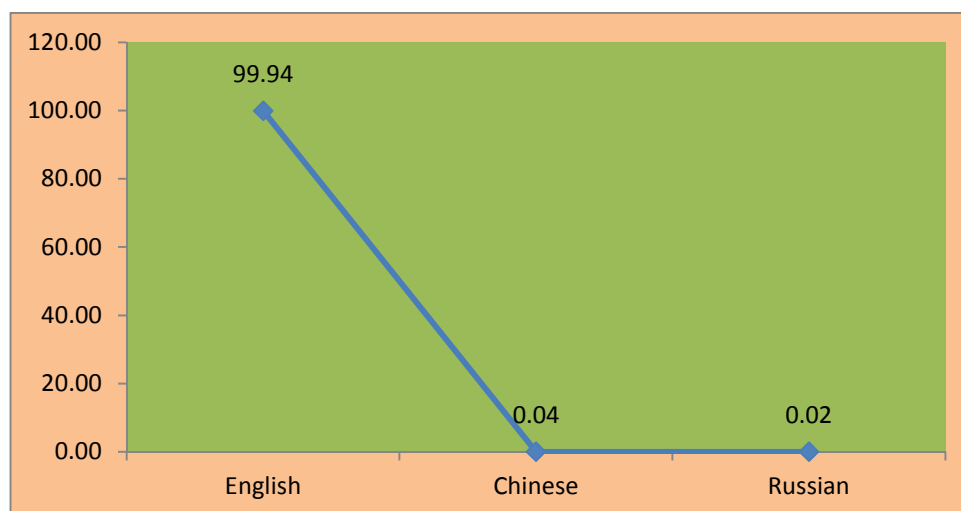
LANGUAGE WISE DISTRIBUTION OF CITATION

The total number of 32218 citations of 10 volumes of Indian Journal of Chemistry volume-A was distributed among 3 different languages as shown in table No. 10 and figure No. 7

Table No. 10 Language Wise Distribution of Citation

Sr. No.	Language	Citations	Rank	Percentage
1	English	32200	1	99.94
2	Chinese	12	2	0.04
3	Russian	6	3	0.02
	Total	32218		100.00

Figure No. 7 Language Wise Distribution of Citation



It was seen that the citations appeared in Multilanguage .The table shows that 32200 (99.94%) documents were cited in English language. 12 documents were cited in Chinese language while remaining 6 (0.02%) documents were cited in Russian language.

RANKING OF CITED JOURNAL

The ranking list of cited journals are as serials assists libraries and researchers to select the serials of maximum utility in relation to their coverage of new and important literature in a particular subject area. The table No. 11 Shows the top ten ranking list of cited journals.

Table No. 11 Ranking of the Cited Journals

Sr.No	Name of Journals	Citations	Rank	Percentage
1	Indian Journal of Chemistry	1424	1	5.00
2	J Am Coll Nutr	1359	2	4.77
3	Inorganic Chemistry	703	3	2.47
4	Chem Sci Rev	531	4	1.86
5	J Phys Chem	531	4	1.86
6	J Chem Phys A	478	5	1.68
7	J Petroleum Sci Eng	391	6	1.37
8	Applied Catalysis A: General	370	7	1.30
9	Ani Chem Soc	367	8	1.29
10	Polym Rev	365	9	1.28
	Less Than 365 Journals	21975		77.12
	Total cited Journals	28494		100.00

The rank list of journals is essentially a practical tool designed to help the librarian and research scientist to select the journals of maximum utility in relation to their coverage of new and important literature in particular subject area. The journals are most preferred publication used by the researcher in their study. The journals which top ten have been considered in the above table. “Indian Journal of Chemistry.” scores the top position with 1424 (5.00%) citations; second rank goes to “J Am Coll Nutr” with 1359(4.77 %) citations, followed by “Inorganic Chemistry.” with 703 (2.47%) citations respectively.

RANKING OF BOOKS

As books are the most reliable medium for communications and spread of knowledge. The researchers used books as source of studies. Out of 32218 citations, 2503 citations are book citations. The top ten ranking of the particular books are arranged on the basis of the number of times it was referred.

Table No. 12. Ranking of the Cited Books

Sr. No.	Book Title	Citation	Rank	percentage
1	Infrared and Raman Spectra of Inorganic and Coordination Compounds	73	1	2.92
2	GAUSSIAN	69	2	2.76
3	Inorganic Electronic Spectroscopy	55	3	2.20
4	Advanced Inorganic Chemistry	50	4	2.00
5	Purification of Laboratory Chemicals	38	5	1.52
6	Spectrometric Identification of Organic Compounds	34	6	1.36
7	Comprehensive Coordination Chemistry	30	7	1.20
8	Density Functional Theory of Atoms and Molecules	27	8	1.08
9	Rev C.01	26	9	1.04
10	SHELXL-97, Program for the Refinement of Crystal Structure	26	9	1.04
11	Less Than 26 Books Cited	2075		82.90
	Total Cited Books	2503		100

Table No. 12 shows the ranking of popular books in Indian Journal of Chemistry (volume-A). The books which have been cited five and more than five times have been given in the table. The book “Infrared and Raman Spectra of Inorganic and Coordination Compounds” scores the top position with 73 (2.92%) citations; second rank goes to

“GAUSSIAN” with 69 (2.76%) citations, followed by “Inorganic Electronic Spectroscopy” with 55 (2.20%) citations respectively.

Conclusion:-

Journals are the major form of document; maximum numbers of citations are p-citations, maximum numbers of citations are covered during the period of 2000-2009, multi author citations are maximum compared to single, in author ranking

Sheldrick G M scores the top position, In ranking of publishers Academic Press. scores the top position compared to others, Geographical distribution of citations country USA scored the top position, language wise distribution shows that the English is an predominant language, in journal ranking Indian Journal of Chemistry Scores the top position compared to other journals, in book ranking Infrared and Raman spectra of inorganic and coordination compounds scores the top position compared to other books.

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