

Mapping Of Geochemistry Research Productivity In India: A Scientometric Analysis

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Abstract

This paper attempts to highlight the growth and development of geochemistry research literature and make the quantitative and qualitative assessment by way of analyzing various features of research output based on web of science database. A total of 2603 publications were published during the period 1989-2020. The study reveals that, most of the researchers preferred to publish their research results in journals; as such 90.9.% of articles were published in journals, Further this study also identified to analyses coverage research growth, year-wise distribution, collaborating institutions, Geographical distribution of the literature, national level publications and patterns of research communication in most productive journals.

Keywords: Geochemistry, Scientometrics. Citation studies, Institutions.

1. Introduction

Scientometric analysis technique has emerged in the last few years and it fundamentally deals with the study of quantifying and analyzing science and technology and overall research performance. Scientometric researchers are exploring features of information processes in scientific research .An effect is made here to reveal the scientific output of the India in the subject category of Geochemistry as reflected in the Web of Science for the period of 1989-2020.

The main focus of the geochemistry is to the attention on the growth of literature, authorship pattern, journal coverage, institutions involved in active research etc. Citation studies are recognized as an indicator of influence of published work on the scientific community

2. Literature Review

Some of the earlier studies have been reviewed related to the objectives of the present study and presented below.

Karki, Garg and Sharma(2000)¹ have explored the activity and growth of organic chemistry research in India during 1971-1989 as reported in Chemical Abstracts database and observed that India's research effort in organic chemistry matches precisely with that of the world's average during 1971-1989. During the period of study, Indian organic chemists published 9244 papers i.e. about 2.6% of the world output in Chemistry. The change in emphasis for different sub-fields of organic chemistry is almost similar for India and the world. A bibliometric analysis of alkaloid chemistry research in India during 1979-1987 by Karki & Garg(1997)² reveals that the activity index of Indian alkaloid research increased significantly, reaching its peak in 1981 - 3.5% of the world output. Central Drug Research Institute was found to be the most productive lab in alkaloid research with about 16% of the total Indian research output. Guav(1986)³ has examined the quantitative studies on the emergence of organic chemistry research in India during 1907-1926 and scientometric assessment of Indian organic chemistry research during 1970s and 1980s, both based on Chemical Abstracts database were undertaken. The studies indicate that India has a long history of chemical investigations and that chemistry is the most popular discipline followed by mathematics and physics.

3. Objectives of the Study

The present study was undertaken with the following objectives

1. To examine the pattern of growth of the output of the Geochemistry research
2. To examine year-wise growth of publications and citations
3. To identify preferred sources wise distribution of geochemistry research output
4. To identify the Institutions wise research concentration
5. To find out the country wise distribution of publications

3.1 Methodology

Web of Science Database was used for retrieving data on Geochemistry for all years using the search term "Geochemistry" in topic field. The Geochemistry research literature retrieved from web of science database from 1989 to October 2020. Overall data retrieved by the researcher are 2603 records by analyzing the present study. The data has analyzed and classified into HistCite software.

4. ANALYSIS AND DISCUSSION

4.1 Growth of Publications

As indicated in the table- 1, authors contributed as many as 2603 publications during 1989-2020 in different scholarly journals. The highest number of research output 211(8.1%) was produced in the year 2019 followed by 164(6.3%) was produced in the year 2017. However there was a gradual growth of publications during 1989-2020. On considering the citation profile of

geochemistry researches it was observed 155 papers scored highest citation 2968 in the year 2013 followed by 103 papers scored next highest citation 2542 in the year of 2009

Table-1: Year-wise Growth of Publications and Citations

S.No	Publication Year	Publications	%	TLCS	TGCS
1	1989	8	0.3	42	125
2	1990	12	0.5	80	152
3	1991	32	1.2	124	440
4	1992	22	0.8	138	543
5	1993	34	1.3	237	823
6	1994	36	1.4	250	586
7	1995	43	1.7	239	841
8	1996	48	1.8	200	795
9	1997	65	2.5	251	815
10	1998	50	1.9	282	939
11	1999	62	2.4	407	1632
12	2000	44	1.7	354	1773
13	2001	56	2.2	344	1545
14	2002	52	2.0	237	1746
15	2003	56	2.2	244	1369
16	2004	56	2.2	286	1536
17	2005	76	2.9	419	2294
18	2006	74	2.8	462	2391
19	2007	88	3.4	423	2033
20	2008	88	3.4	404	2371
21	2009	103	4.0	417	2542
22	2010	107	4.1	383	2326
23	2011	106	4.1	379	2180
24	2012	116	4.5	380	2500
25	2013	155	6.0	415	2968
26	2014	150	5.8	298	2062
27	2015	162	6.2	252	1923
28	2016	155	6.0	194	1630
29	2017	164	6.3	167	1321
30	2018	162	6.2	78	928
31	2019	211	8.1	24	579
32	2020	10	0.4	0	12
Total		2603	100		

4.2 Document wise of Publications

Table 2 presents the distribution of published literature according to source wise distribution. Out of the 2603 published papers, 2365(90.9%) were journal articles with 40846 Global Citation Scores followed by 73(2.8%) review, 60(2.3%) proceedings papers and other publications followed by other forms. That the highest number of publications journal articles indicates that involved enough in various research activities to disseminate their research findings through scholarly journals.

Table 2: Document wise of Publication

S.No	Document Type	Publications	%	TLCS	TGCS
1	Article	2365	90.9	7658	40846
2	Review	73	2.8	441	3278
3	Article; Proceedings Paper	60	2.3	260	1325
4	Editorial Material	38	1.5	21	65
5	Meeting Abstract	36	1.4	2	11
6	Discussion	14	0.5	1	8
7	Note	10	0.4	20	55
8	Letter	3	0.1	5	14
9	Article; Early Access	1	0.0	0	1
10	Article; Retracted Publication	1	0.0	0	18
11	News Item	1	0.0	0	0
12	Review; Book Chapter	1	0.0	2	100
Total		2603	100	8410	45721

4.3 Institution wise distribution of publications

The analysis noted that Indian Institute of Technology contributed the highest number of publications with 204 and received 4195 global citation scores followed by National Geophysical Research Institute with 180 publications and received 3114 global citation scores; Banaras Hindu University has 138 publications with 1905 global citation scores.

Table-3 Institution wise Distribution of Publications

S.No	Institution	Publications	%	TLCS	TGCS
1	Indian Institute of Technology	205	7.9	732	4195
2	National Geophysics Research Institute	180	6.9	741	3114
3	Banaras Hindu University	138	5.3	605	1905

4	Geol Survey India	125	4.8	335	1880
5	Wadia Institute of Himalayan Geology	114	4.4	421	1733
6	Jawaharlal Nehru University	104	4.0	712	3296
7	Physics Research Lab	102	3.9	389	2512
8	CSIR	92	3.5	240	1311
9	Anna University	84	3.2	223	1370
10	National Institute Oceanography	83	3.2	207	1614
11	Jadavpur University	69	2.7	162	811
12	University of Calcutta	64	2.5	154	929
13	University of Delhi	62	2.4	233	1396
14	Aligarh Muslim University	60	2.3	228	676
15	Univ Madras	56	2.2	158	1393
16	Indian School of Mines	52	2.0	137	876
17	Pondicherry Univ	50	1.9	124	560
18	China University of Geosciences	48	1.8	254	1066
19	University of Rajasthan	44	1.7	128	945
20	Annamalai University	41	1.6	137	1092
21	Goa University	39	1.5	65	422
22	Atom Minerals Directorate Explorat & Res	37	1.4	70	312
23	Punjab University	37	1.4	205	733
24	Bhabha Atom Research Centre	35	1.3	76	479
25	Univ Nacl Autonoma Mexico	33	1.3	114	1172
26	CSIR Natl Geophys Res Inst	32	1.2	83	436
27	Andhra University	30	1.2	123	590
28	Curtin University	29	1.1	77	672
29	Indian Inst Science	28	1.1	56	541
30	University of Adelaide	27	1.0	99	569

4.4 Country Wise Distribution of Publications

The study of Country wise distribution of a number of research output is an important factor in highlighting the research and development in any discipline of science. It is evidence from the table 4

Indian Geochemistry authors published their articles in the journals of 66 countries including India. It is noted that Indian rank is the first place (98.8%) in terms of the number of articles published in total. Next to India, USA ranks in second in order (5.6%) in published research articles in total. Next Germany ranks third in order (4.9%) in publishing geochemistry research articles respectively.

Table 4: Country wise Distribution of published Articles

S.No	Country	No. of Articles	Percent	TLCS	TGCS
1	India	2572	98.8	8182	44789
2	USA	147	5.6	597	3936
3	Germany	127	4.9	579	3368
4	Peoples R China	103	4.0	389	2178
5	Japan	96	3.7	506	2730
6	UK	95	3.6	346	2636
7	Australia	77	3.0	272	2200
8	Canada	60	2.3	363	1623
9	France	51	2.0	460	3124
10	Mexico	46	1.8	139	1415
11	Brazil	42	1.6	113	829
12	Italy	36	1.4	124	750
13	South Africa	36	1.4	78	667
14	Malaysia	29	1.1	65	605
15	South Korea	27	1.0	53	850
16	Sweden	25	1.0	66	920
17	Russia	24	0.9	72	348
18	Taiwan	22	0.8	36	325
19	Iran	13	0.5	2	157
20	Finland	12	0.5	18	106
21	Norway	12	0.5	44	614
22	Spain	12	0.5	12	440
23	Austria	11	0.4	38	356
24	Denmark	9	0.3	68	302
25	Saudi Arabia	9	0.3	10	106
26	Netherlands	8	0.3	4	288
27	Unknown	8	0.3	58	229
28	Switzerland	7	0.3	2	56
29	Belgium	6	0.2	48	443
30	Czech Republic	6	0.2	8	167

4.5 Keyword wise distribution of publications

Publications convey precisely the thought contents of the papers. The potency of information concentrated on the titles of the papers is more than the rest of the section of the papers. Therefore, if a word occurs more frequently than expected it to occur, then it reflects the emphasis given by the authors about the research field of their interest. The below mentioned table explains what are the find key word and how many times it is used. “India” is used 1496 times, Geochemistry in 819 times and “Implications” in 305 times. A total word count 4568.

Table- 5 Keyword Frequency in the Publications

S.No	Keyword	Records	Percent	TLCS	TGCS
1	India	1496	57.5	5698	28133
2	Geochemistry	819	31.5	3553	14181
3	Implications	305	11.7	1192	5550
4	Basin	276	10.6	846	4200
5	Craton	257	9.9	1505	4946
6	Sediments	246	9.5	764	5048
7	Central	235	9.0	892	3575
8	Geochemical	234	9.0	801	3715
9	Southern	227	8.7	1155	5136
10	Eastern	224	8.6	1035	4155
11	Groundwater	203	7.8	450	4377
12	District	196	7.5	481	2481
13	Indian	190	7.3	727	3472
14	Western	189	7.3	668	3237
15	Rocks	185	7.1	824	2767
16	Belt	184	7.1	852	2798
17	River	154	5.9	606	3962
18	Dharwar	143	5.5	935	3202
19	Evidence	139	5.3	638	2466
20	South	139	5.3	470	2474

Major Findings:

1. The finding of the publications of geochemistry research output brings out the highest percentage of papers were published 2019, 2017 constituting 8.1% and 6.3% respectively. The study reveals all these 2603 publications have 70518 cited references it shows that there is a healthy trend in citing reference is found among the Scientists belongs to Geochemistry.
2. Out of the 2603 published papers, 2365(90.9%) were journal articles with 40846 Global Citation Scores.
3. The analysis noted that Indian Institute of Technology contributed the highest number of publications with 204 and received 4195 global citation scores followed by National Geophysical Research Institute with 180 publications and received 3114 global citation scores.

4. The findings of country wise analysis examine the following facts. The India top the list in using number cowards in the literature in Geochemistry the USA country the second and the Germany has third position respectively.
5. The findings of high frequency keywords were “INDIA” is topped with 1496 publications with the Global Citation Score of 28133; next “GEOCHEMISTRY” has with the Global Citation Score of 14181 respectively.

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