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Scientometric Analysis of the Research Output of Biochemistry, Genetics and Molecular Biology of Gujarat University, Ahmedabad

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Abstract: This paper presents a scientometric analysis of research output of biochemistry, genetics and molecular biology from the Gujarat University, Ahmedabad. The research article was published during 1980-2018. However, the data was collected and indexed in Scopus were considered for the analysis included a total of 400 publications. Various scientometric indicators have been calculated to acquire an appropriate perception of the growth and current status of research output of Gujarat University, Ahmedabad. The paper also analysed the publication trend of Gujarat University. The other aspects that were identified in the paper were the most prolific authors, collaborative authorship patterns and trends, most preferred publications, etc.

Keywords: Gujarat University, scientometric analysis, research productivity, Biochemistry, Genetics, Molecular Biology.

Introduction: Biochemistry, genetics, and molecular biology are a narrow subject of the Biology where Biology is an extensive subject that provides knowledge of all forms of lifespan. That means Biology is the study of living things.

During the past few eras, the study of Biochemistry, genetics, and molecular biology has experienced immediate change and has had a significant impact on the way we live. These subjects covered a central position in modern biological research. The researchers in biochemistry use the combined technologies and ideas from genetics and molecular biology. Similarly, from molecular biology and genetics, Therefore, there is no clear link between these specific subjects.

Biochemistry is the soul of life sciences, has a flexible scope in the field of agriculture, pharmaceutical, medical sciences, etc. Now a day's modern biochemistry was called as physiological chemistry.

Molecular biology is the study of biology at macromolecules level (proteins and nucleic acids) and interactions between the various systems of a cell-like DNA, RNA, etc.

Genetics is another discipline of biology, which means the study of the genes with differences of organisms. It is the scientific study of the living organisms, how the genes are encoding within the cell, and how the genes are transmit from one generation to the next.

Gujarat University is one of the oldest universities in India, established in 1949 with various departments and schools. The Department of Zoology & Bio-Chemistry is coming under the school of sciences which offers postgraduate, M.Phil and PhD level degree programmes. The present study is an attempt to explore and analyse the Biochemistry, Genetics and Molecular Biology of Gujarat University, Ahmedabad.

Review of literature

Studies like the one by Bala and Gupta [1] research activities of India in Biochemistry, Genetics and Molecular Biology during 1998-2007 in national and global context and data collected from the Scopus database. Lee [2] studied the research performance of the Institute of Molecular and Cell Biology in Singapore during 1996-2000. Data gathering from official, and publicly available documents of the

National University of Singapore. Tianwei He [3], et al., studied research accomplishments in national and global context based on SCI of China in the field of molecular biology and biochemistry from the year 1999- 2002. Dwivedi [4] studied Banaras Hindu university research publications during 1989-2006. Total 16,556 records collected from the WoS and found exponential growth of publications is seen since 2005, Chemistry (2118) has maximum publications. Patra and Chand [5] collected the data from the different sources like Derwent Biotechnology Abstracts, NCBI, and WoS. They analysed Indian biotechnology research with following activities like research profile, authors activities, institutions wise distribution, state-wise distributions of Indian biotechnology research output.

Objectives:

The main objectives are to study the research output of Gujarat University, Ahmedabad in Biochemistry, Genetics and Molecular Biology of Gujarat University, Ahmedabad (1980-2018) based on publications output, as indexed in Scopus database. The study focuses on following areas:

1. Evaluate and quantitatively analyse the research publication trend of Gujarat University
2. To compare Gujarat University, Ahmedabad research performance in Biochemistry, Genetics and Molecular Biology with other state government universities of Gujarat.
3. Identify the most prolific authors
4. Identify the highly cited papers
5. To study the patterns of research collaboration
6. Identify most preferred journals/conference publications

Methodology and Source of the Data

The publication data of Gujarat University and other major state universities of Gujarat was retrieved from the Scopus, which is the most popular and single largest multidisciplinary bibliographical database that provides abstract and index of publications in the world. In data in biochemistry, genetics, and molecular biology published during 1980-2018 were considered for the study. The refined data was selected by searching for the institutional affiliation “Gujarat University - Ahmedabad” in the Scopus database and result was exported as CSV file format for further analysis. The final data consisted of 400 research publications by various authors from the Gujarat University, Ahmedabad during the last twenty years (1980-18)

Data Analysis:

To set the context for this study, initially, the publication data of major old and well-known government universities in Gujarat was considered (1980-18) as per the Table 1.

Table 1: Publication productivity of major government universities of Gujarat in the area of Biochemistry, Genetics and Molecular Biology during 2009-2018

Name of the University	Establishment Year	Total Publications in Biochemistry, Genetics and Molecular Biology (as of November 2018)	During last twenty years (1980-2018)
The Maharaja Sayajirao University of Baroda	1949	1122	1024 (91.26%)
Gujarat University	1949	446	400 (87.44%)
Sardar Patel University	1955	443	421 (95.03%)
Veer Narmad South Gujarat University *	1966	115	115 (100%)
Saurashtra University	1967	344	341 (99.12%)

Maharaja Krishnakumarsinhji Bhavnagar University**	1978	68	68 (100%)
Hemchandracharya North Gujarat University #	1986	40	40 (100%)

* Data was available from 1983 onward ** 1986 onward # 2006 onward

Types of research Publications of Gujarat University during 1980-2018

The Fig.1 shows that there were total 400 publications count in biochemistry, genetics, and molecular biology of the Gujarat University, reveals that 377 (94.23%) journals articles, followed by reviews 10 (2.50%), book chapters 05 (1.25%), and other document types like Editorial, Letter, Note, Conference Paper, etc. 08 (2%).

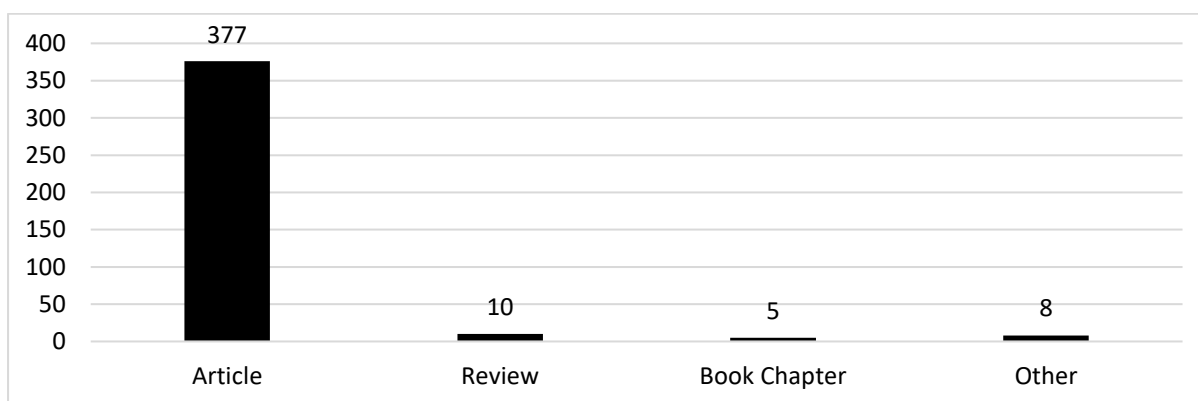


Figure 1. Gujarat University research output in biochemistry, genetics, and molecular biology during 1980-2018.

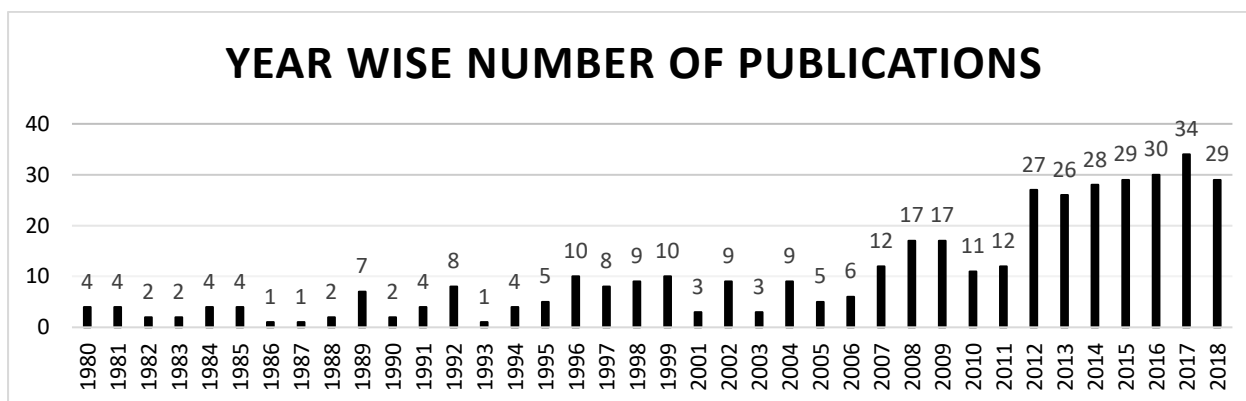


Figure 2. Year wise number of publications in biochemistry, genetics, and molecular biology of Gujarat University during 1980-2018.

Year wise number of publications in biochemistry, genetics, and molecular biology

Now a day most of the academic institutions including universities in India are now emphasising on research activities and encouraging researchers to publish more and more. The fig. 2 shows that there has been a balanced growth in research publications in biochemistry, genetics, and molecular biology of the Gujarat University during the last ten years, i.e. 1980-2018. The results also show that the overall publication growth frequencies of the number of publications from 2013 to 2017 are increase and in rest of the other years, there has been a slowly up-down growth in number of publications over the earlier years, where approximately annual percentage growth rate is 5.49.

Most Prolific Authors

The collected data from the Scopus on Gujarat University, Ahmedabad research publications during the last 20 years from 1980 to 2018 reveals that in total, 650 unique authors (out of 1589 authors) contributed to the publishing of the 400 publications. The data were sorted by the number of research publications and by with the ranking of top 25 authors in descending order was compiled.

Table 2 shows that the list of top 22 authors of Gujarat University, Ahmedabad who had published more than 10 papers. The list was topped by P. S. Shrivastav with 86 papers, followed by M. Sanyal with 66 papers, N. J. Chinoy with 40 papers, R. J. Verma with 32 papers, S. K. Menon with 24 papers, and so on. Here mentioned that these 22 authors contributed more than 90% of the research papers published from 1980 to 2018. However, it was remarkable to note that the listing of these 22 most research productive authors, when ranked on the basis of average citations per paper (ACPP), would differ V. K. Jain substantially leads the top with 1st rank in ACPP (28.77), followed by Y. K. Agarwal (23.62), S. K. Menon (18.63), and so on.

Table 2: Most prolific authors as per the total number of papers from the Gujarat University, Ahmedabad during the last ten years (1980-2018)

Sr.No.	Names	Total Papers (TP)	Total Citations (TC)	Avg. Citation Per Paper (ACPP)	Rank as per ACPP
1	Shrivastav P. S.	86	1038	12.07	5
2	Sanyal M.	66	603	9.14	9
3	Chinoy N. J.	40	641	16.03	4
4	Verma R. J.	32	286	8.94	10
5	Rao M. V.	26	218	8.38	11
6	Menon S. K.	24	447	18.63	3
7	Agrawal Y. K.	21	496	23.62	2
8	Chikhalia K. H.	20	135	6.75	13
9	Jasrai Y.T.	18	106	5.89	16
10	Shah P. A.	18	48	2.67	19
11	Pandya H. A.	17	107	6.29	14
12	Patel D. P.	17	97	5.71	17
13	Yadav M.	15	149	9.93	8
14	Saraf M.	14	50	3.57	18
15	Shah V. C.	14	23	1.64	21
16	Singhal P.	14	145	10.36	7
17	Jain V. K.	13	374	28.77	1
18	Dave S. R.	12	71	5.92	15
19	Kumar S. P.	12	89	7.42	12
20	Patel S.	12	17	1.42	22
21	Sharma P.	11	115	10.45	6
22	Rawal R.	10	22	2.20	20

Authorship Pattern

Collaboration or association between the authors play a significant role in research output, and Lancaster [6] had in his research found that ‘the main factor in research productivity is more

collaboration in research and more collaborative authorship.’ Most of the bibliometric studies have shown that over time collaboration in authorship is gaining popularity and more research output are being published in collaboration rather than through individual efforts. To further explore this aspect of authorship patterns in this study during the investigated time period, the data was divided into two-time blocks, i.e. first nineteen years (1980-1998) and second nineteen years (1999-2018). The CAI (co-authorship index) has been developed by *Garg & Padhi [7]*, was intended for the 4 major groups of the different type of patterns in authorship, i.e. single author collaboration, double authors collaboration, multi-authors (i.e. 3 and 4) collaboration and mega authors (5 and above) collaborations.

Table 3 clearly indicates that in following both blocks, i.e. 1980-1998 & 1999-2018, the research trend in authorship was in favour of moving away from single author papers to multi and mega authors papers, which shows a good development in research as well in collaboration.

Table 3: Collaboration in authorship pattern

Authorship patterns	No. of contributions 1980-1998 (CAI)	No. of contributions 1999-2018 (CAI)
Single Author	7 (350%)	3 (37.5%)
Double Authors	38 (51.63%)	54 (73.36%)
Multi Authors (3-4)	27 (75%)	153 (106.25%)
Mega Authors (5 & above)	8 (33.89%)	110 (116.52%)

Table 4: Authorship pattern

Years	Authors																Total
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16 and above	
2018	0	4	1	12	6	2	3	0	1	0	0	0	0	0	0	0	29
2017	0	3	7	4	10	6	1	3	0	0	0	0	0	0	0	0	34
2016	1	1	5	9	5	6	1	1	0	0	0	0	0	1	0	0	30
2015	0	6	10	8	1	3	0	0	0	0	0	0	0	0	0	1	29
2014	0	9	9	8	4	1	0	0	0	0	0	0	0	0	0	0	31
2013	0	7	5	9	2	3	0	0	0	0	0	0	0	0	0	0	26
2012	0	4	2	5	7	5	1	1	0	0	0	1	0	0	0	1	27
2011	0	1	2	4	2	2	0	1	0	0	0	0	0	0	0	0	12
2010	0	2	4	1	1	2	0	1	0	0	0	0	0	0	0	0	11
2009	0	1	8	3	1	2	1	1	0	0	0	0	0	0	0	0	17
2008	0	0	6	6	4	0	0	1	0	0	0	0	0	0	0	0	17
2007	0	2	3	3	2	1	0	0	0	0	1	0	0	0	0	0	12
2006	0	1	2	0	2	0	0	0	1	0	0	0	0	0	0	0	6
2005	0	0	2	1	1	0	1	0	0	0	0	0	0	0	0	0	5
2004	1	3	4	0	1	0	0	0	0	0	0	0	0	0	0	0	9
2003	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	3
2002	0	2	5	1	1	0	0	0	0	0	0	0	0	0	0	0	9
2001	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	3
2000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	0	5	2	1	0	0	0	0	1	0	0	1	0	0	0	0	10
1998	0	1	4	1	0	0	0	0	1	0	0	0	0	0	0	0	7

1997	1	3	1	2	0	1	0	0	0	0	0	0	0	0	0	0	8
1996	0	6	3	0	0	1	0	0	0	0	0	0	0	0	0	0	10
1995	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
1994	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	4
1993	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1992	0	0	2	3	2	1	0	0	0	0	0	0	0	0	0	0	8
1991	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	4
1990	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
1989	3	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	7
1988	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
1987	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1986	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1985	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4
1984	0	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	4
1983	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
1982	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	2
1981	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
1980	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	4

Highly Cited Papers

The research impact plays an important role to evaluate of any research and calculating the citations is one of the important standards used in calculating the impact of the research. Citations are indications of progressive acknowledgement to the published work of researcher (s) as well the journal itself. The features of remarkably cited papers from the Gujrat University, Ahmedabad during the last ten years in the subject of Biochemistry, Genetics and Molecular Biology was evaluated in **Appendix 1**. Based on research output in this area, 25 papers were recognized as the highly cited. These papers received 30 or higher citations during 1980-2018 from the Gujrat University, Ahmedabad.

These 25 research papers together received 1410 citations with an average of 56.04 citations per paper out of total 400 research papers. Only nine papers had received 50, and above citation per paper and out of these nine papers, eight appeared as a journal article, and one as a conference paper.

The authors of these papers are affiliated to 25 from the Gujarat Universities and affiliated colleges, 1 from the CSIR, 5 from the Private research laboratories in India, 3 from the Medical colleges, and rest from the others National and International organizations. All of these papers were published in 23 international journals and 1 in conference papers with 10 papers published in Elsevier, 05 in International Society for Fluoride Research (ISFR), 02 in Royal Society of Chemistry, 02 in Academic Journals (AJ), 05 with other international journals and remaining 1 paper in Indian Journal of Experimental Biology published by NISCAIR. Table 5 clearly indicate that the country India get the highest citation 3843 with an average of 9.83%, but when ranked on the basis of an average article per citations country Germany leads the top with 1st rank in AAC (69%), followed by Czech Republic (42%).

Table 5: Total Citations per Country

Sr. No.	Country	Total Citations	Average Article Citations (AAC)
1	India	3843	9.83
2	Germany	138	69

3	Czech Republic	42	42
4	USA	8	1.6

Most Preferred journals

The data gathered for the research study specified that from the 400 research outputs of the authors from the Gujarat University, Ahmedabad from the year 1980 to 2018, 94% of them (377) were research papers published in 135 National and International journals. Among these 135 journals, 'Fluoride' was the most preferred journal with 28 papers, followed by *Journal of Chromatography B: Analytical Technologies in the Biomedical and Life Sciences* (21), *Biomedical Chromatography* (20), *Medical Science Research* (15), *Journal of Pharmaceutical and Biomedical Analysis* (14) and so on.

Table 6 shows that the list of top 19 Journals, Where the number of articles published more than 5. It indicates the resulting list of journals, ranked by the number of research articles published by the authors from the Gujarat University, Ahmedabad. It may be noted that the journals in the areas of Biochemistry, Genetics and Molecular Biology dominate the list and journals related to the subject of Bio-Medical Technology seem to be very popular among the Gujarat University authors. It is also indicating that the most productive research areas at the University.

Table 6: Most preferred journals by authors from the Gujarat University, Ahmedabad during 1980 to 2018 for publishing their research article.

Sr. No.	Name of the Journals	Publisher	Country of origin	Number of Articles
1	Fluoride	International Society for Fluoride Research (ISFR)	New Zealand	28
2	Journal of Chromatography B: Analytical Technologies in the Biomedical and Life Sciences	Elsevier	United States of America	21
3	Biomedical Chromatography	John Wiley & Sons	United States of America	20
4	Medical Science Research	Elsevier	United States of America	15
5	Journal of Pharmaceutical and Biomedical Analysis	Elsevier	United States of America	14
6	Indian Journal of Experimental Biology	NISCAIR	India	12
7	Bioanalysis	Future Science	United Kingdom	11
8	Journal of Pharmaceutical Analysis	Elsevier	United States of America	11
9	Research Journal of Biotechnology	World Research Journals Group	India	10
10	Analyst	Royal Society of Chemistry	United Kingdom	9
11	Biocatalysis and Agricultural Biotechnology	Elsevier	United States of America	8
12	Asian Journal of Microbiology Biotechnology and Environmental Sciences	EM International	India	7

13	Bollettino Chimico Farmaceutico	Societa Editoriale Farmaceutica	Italy	7
14	Reactive and Functional Polymers	Elsevier	United States of America	7
15	International Journal of Pharma and Bio Sciences	International Journal of Pharma and Bio Sciences	India	6
16	Journal of Biomolecular Structure and Dynamics	Taylor and Francis	United Kingdom	6
17	Analytical Letters	Taylor and Francis	United Kingdom	5
18	Annales De Genetique	Elsevier	United States of America	5
19	Tetrahedron Letters	Elsevier	United States of America	5

Most Productive Countries (of corresponding authors)

The collected data for the research study specified that determined the country of the first and the corresponding author of each of the articles, estimating the comparative contribution of each country. Means it plays as a higher role in research or a higher degree of the research participation and leadership. Table 7 shows that most of the corresponding authors for their research is from India with the MCP of 13.

Table 7: Most Productive Countries (of corresponding authors)

Sr. No.	Country	Articles	Frequency	SCP	MCP	MCP Ratio
1	India	392	0.97995	378	13	0.0332
2	USA	5	0.01253	0	5	1
3	Germany	2	0.00501	0	2	1
4	Czech Republic	1	0.00251	0	1	1

SCP: Single Country Publications | MCP: Multiple Country Publications

Conclusion:

The present study provides an overview of growth and development of research output in the field of Biochemistry, Genetics and Molecular Biology from the Gujarat University, Ahmedabad from 1980-2018 although the publications count from the year 2012-2017 in national and international journal show increasing trend with qualitative publishing. The present study also analysis that the research productivity of Gujarat University in mentioned field shows that there are 400 papers from 1980 to 2018 and BHU [8] produced 608 research papers in 2017-18 8, The growth and development of research output in the field of Biochemistry, Genetics and Molecular Biology from the Gujarat University, Ahmedabad seems to be far behind in terms of the number of research publications. The top 5 most prolific authors together in Biochemistry, Genetics and Molecular Biology contributed 250 papers out of 400, with an average of 62% papers per author. These authors had an average of 8 citations per paper.

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Appendix 1: Highly Cited Papers (1980-2018)

Sr. No.	Authors	Title	Source title	Publisher	Year	Doc Type	TC	TC per Year	Affiliations
1	Jain V.K., Handa A., Sait S.S., Shrivastav P., Agrawal Y.K.	Pre-concentration, separation and trace determination of lanthanum(III), cerium(III), thorium(IV) and uranium(VI) on polymer supported o-vanillinsemicarbazone	Analytica Chimica Acta	Elsevier	2001	Article	187	11	Dept. of Chemistry, School of Sciences, Gujarat University, Ahmedabad
2	Radhakrishna U., Bornholdt D., Scott H.S., Patel U.C., Rossier C., Engel H., Bottani A., Chandal D., Blouin J.-L., Solanki J.V., Grzeschik K.-H., Antonarakis S.E.	The phenotypic spectrum of GLI3 morphopathies includes autosomal dominant preaxial polydactyly type-IV and postaxial polydactyly type-A/B; no phenotype prediction from the position of GLI3 mutations	American Journal of Human Genetics	University of Chicago Press	1999	Article	119	6.26	Div. of Medical Genetics, University of Geneva Medical School, Germany; University Hospital, Geneva, Germany; Institute of Human Genetics, Philipps University, Germany; Veterinary College, Gujarat Agriculture University, Anand; Dept of Zoology, Gujarat University, Ahmedabad; Div. de Génét. Méd., Centre Médical Universitaire, Switzerland
3	Jain V.K., Handa A., Pandya R., Shrivastav P., Agrawal Y.K.	Polymer supported calix[4]arene-semicarbazone derivative for separation and preconcentration of La(III), Ce(III), Th(IV) and U(VI)	Reactive and Functional Polymers	Elsevier	2002	Article	88	5.5	Dept. Chemistry, Gujarat University, Ahmedabad
4	Dharani Aiyer P.V.	Effect of C:N ratio on alpha amylase production by Bacillus licheniformis SPT 27	African Journal of Biotechnology	Academic Journals (AJ)	2004	Article	76	5.43	S.P.T. Arts and Science College, Gujarat University, Godhra
5	Patel S.S., Shah R.S., Goyal R.K.	Antihyperglycemic, antihyperlipidemic and antioxidant effects of Dihar, a polyherbal ayurvedic formulation in streptozotocin induced diabetic rats	Indian Journal of Experimental Biology	NISCAIR	2009	Article	74	8.22	Dept of Pharmacology, L.M. College of Pharmacy, Gujarat University, Ahmedabad; M. S. University of Baroda, Vadodara
6	Chinoy N.J., Memon M.R.	Beneficial effects of some vitamins and calcium on fluoride and aluminium toxicity on gastrocnemius muscle and liver of male mice	Fluoride	International Society for Fluoride Research (ISFR)	2001	Article	74	4.35	Dept. of Zoology, Gujarat University, Ahmedabad

7	Acharya P.B., Acharya D.K., Modi H.A.	Optimization for cellulase production by <i>Aspergillus niger</i> using saw dust as substrate	African Journal of Biotechnology	Academic Journals (AJ)	2008	Article	56	5.6	Dept. of Microbiology, Biogas Research Centre, Gujarat Vidyapith, Gandhinagar; Dept. of Life Science, Gujarat University, Ahmedabad
8	Chinoy N.J., Sharma M., Michael M.	Beneficial effects of ascorbic acid and calcium on reversal of fluoride toxicity in male rats	Fluoride - Quarterly Reports	International Society for Fluoride Research (ISFR)	1993	Conference Paper	53	2.12	Dept. of Zoology, Gujarat University, Ahmedabad
9	Trivedi M.H., Verma R.J., Chinoy N.J., Patel R.S., Sathawara N.G.	Effect of high fluoride water on intelligence of school children in India	Fluoride	International Society for Fluoride Research (ISFR)	2007	Article	51	4.64	Dept. of Zoology, Gujarat University, Ahmedabad; Department of Education, Gujarat University, Ahmedabad; National Institute for Occupational Health, Ahmedabad
10	Kevadiya B.D., Patel T.A., Jhala D.D., Thumbar R.P., Brahmhatt H., Pandya M.P., Rajkumar S., Jena P.K., Joshi G.V., Gadhia P.K., Tripathi C.B., Bajaj H.C.	Layered inorganic nanocomposites: A promising carrier for 5-fluorouracil (5-FU)	European Journal of Pharmaceutics and Biopharmaceutics	Elsevier	2012	Article	48	8	Council of Scientific and Industrial Research (CSIR), Bhavnagar; Dept. of Zoology, Gujarat University, Ahmedabad; Dept. of Biosciences, Veer Narmad South Gujarat University, Surat; Institute of Science, Nirma University, Ahmedabad; Dept of Pharmacology, Government Medical College, Bhavnagar
11	Jain D.S., Sanyal M., Subbaiah G., Pande U.C., Shrivastav P.	Rapid and sensitive method for the determination of sertraline in human plasma using liquid chromatography-tandem mass spectrometry (LC-MS/MS)	Journal of Chromatography B: Analytical Technologies in the Biomedical and Life Sciences	Elsevier	2005	Article	47	3.62	Dept. of Chemistry, Gujarat University, Ahmedabad; Analytical Development Laboratory, Research Center, Torrent Pharmaceutical Limited, Gandhinagar; Dept. of Chemistry, St. Xavier's College, Ahmedabad
12	Patel B.N., Sharma N., Sanyal M., Shrivastav P.S.	An accurate, rapid and sensitive determination of tramadol and its active metabolite O-desmethyltramadol in human plasma by LC-MS/MS	Journal of Pharmaceutical and Biomedical Analysis	Elsevier	2009	Article	46	5.11	Dept. of Chemistry, Gujarat University, Ahmedabad; Analytical Laboratory, BA Research India Ltd., Ahmedabad; Dept. of Chemistry, St. Xavier's College, Ahmedabad
13	Mistri H.N., Jangid A.G., Pudage A., Gomes N., Sanyal M., Shrivastav P.	High throughput LC-MS/MS method for simultaneous quantification of lamivudine, stavudine and nevirapine in human plasma	Journal of Chromatography B: Analytical Technologies in the Biomedical and Life Sciences	Elsevier	2007	Article	45	4.09	Dept. of Chemistry, Gujarat University, Ahmedabad; Accutest Research Laboratory, Ahmedabad; Dept. of Chemistry, St. Xavier's College, Ahmedabad

14	Trivedi U.V., Menon S.K., Agrawal Y.K.	Polymer supported calix[6]arene hydroxamic acid, a novel chelating resin	Reactive and Functional Polymers	Elsevier	2002	Article	44	2.75	Dept. Chemistry, Gujarat University, Ahmedabad
15	Michael M., Barot V.V., Chinoy N.J.	Investigations of soft tissue functions in fluorotic individuals of north Gujarat	Fluoride	International Society for Fluoride Research (ISFR)	1996	Article	43	1.95	Dept. of Zoology, Gujarat University, Ahmedabad
16	Strunecka A., Patocka J., Blaylock R.L., Chinoy N.J.	Fluoride interactions: From molecules to disease	Current Signal Transduction Therapy	Bentham Science	2007	Article	42	3.82	Dept. of Physiology and Developmental Physiology, Charles University in Prague, Czech Republic; Dept. of Radiology and Toxicology, University of South Bohemia, Czech Republic; Dept. of Biology, Belhaven College, USA; Dept. of Zoology, Gujarat University, Ahmedabad
17	Dave S.R., Kaur H., Menon S.K.	Selective solid-phase extraction of rare earth elements by the chemically modified Amberlite XAD-4 resin with azacrown ether	Reactive and Functional Polymers	Elsevier	2010	Article	40	5	Dept. Chemistry, Gujarat University, Ahmedabad
18	Shah N.G., Trivedi T.I., Tankshali R.A., Goswami J.A., Shah J.S., Jetly D.H., Kobawala T.P., Patel K.C., Shukla S.N., Shah P.M., Verma R.J.	Molecular alterations in oral carcinogenesis: Significant risk predictors in malignant transformation and tumor progression	International Journal of Biological Markers	Sage	2007	Article	40	3.64	Division of Molecular Endocrinology, Gujarat Cancer and Research Institute, Ahmedabad; Department of Surgery, Gujarat Cancer and Research Institute, Ahmedabad; Dept. of Oral Diagnosis and Radiology, Government Dental College, Ahmedabad; Dept. of Pathology, Gujarat Cancer and Research Institute, Ahmedabad; Dept. of Research and Education, Gujarat Cancer and Research Institute, Ahmedabad; Gujarat Cancer and Research Institute, Ahmedabad; Dept. of Zoology, Gujarat University, Ahmedabad
19	Chinoy N.J., Sequeira E.	Fluoride induced biochemical changes in reproductive organs of male mice	Fluoride - Quarterly Reports	International Society for Fluoride Research (ISFR)	1989	Article	38	1.31	Dept. of Chemistry, Gujarat University, Ahmedabad; Analytical Laboratory, BA Research India Ltd., Ahmedabad; Dept. of Chemistry, St. Xaviers' College, Ahmedabad
20	Patel B.N., Sharma N., Sanyal M., Shrivastav P.S.	Liquid chromatography tandem mass spectrometry assay for the simultaneous determination of venlafaxine and O-desmethylvenlafaxine in human plasma and its application to a bioequivalence study	Journal of Pharmaceutical and Biomedical Analysis	Elsevier	2008	Article	37	3.7	Dept. of Chemistry, Gujarat University, Ahmedabad; Analytical Laboratory, BA Research India Ltd., Ahmedabad; Dept. of Chemistry, St. Xaviers' College, Ahmedabad

21	Patel R.V., Kumari P., Rajani D.P., Pannecouque C., De Clercq E., Chikhalia K.H.	Antimicrobial, anti-TB, anticancer and anti-HIV evaluation of new s-triazine-based heterocycles	Future Medicinal Chemistry	Future Medicine	2012	Article	36	6	Dept. of Applied Chemistry, SVNIT, Surat; Microcare Laboratory, Surat; Rega Institute for Medical Research, Belgium; Dept. of Chemistry, Gujarat University, Ahmedabad
22	Johnson V., Singh M., Saini V.S., Adhikari D.K., Sista V., Yadav N.K.	Bioemulsifier production by an oleaginous yeast Rhodotorulaglutinis IIP-30	Biotechnology Letters	Springer	1992	Article	33	1.27	Dept. of Microbiology, Gujarat University, Ahemadabad; Applied Biology Lab., Research Centre, IPCL, Vadodara, ; Indian Institute of Petroleum, Dehradun
23	Pandya A., Sutariya P.G., Menon S.K.	A non enzymatic glucose biosensor based on an ultrasensitive calix[4]arene functionalized boronic acid gold nanoprobe for sensing in human blood serum	Analyst	Royal Society of Chemistry	2013	Article	31	6.2	Dept. of Chemistry, Gujarat University, Ahmedabad
24	Sutariya P.G., Modi N.R., Pandya A., Joshi B.K., Joshi K.V., Menon S.K.	An ICT based "turn on/off" quinoline armed calix[4]arene fluoroionophore: Its sensing efficiency towards fluoride from waste water and Zn ²⁺ from blood serum	Analyst	Royal Society of Chemistry	2012	Article	31	5.17	Dept. of Chemistry, Gujarat University, Ahmedabad
25	Yadav M., Upadhyay V., Singhal P., Goswami S., Shrivastav P.S.	Stability evaluation and sensitive determination of antiviral drug, valacyclovir and its metabolite acyclovir in human plasma by a rapid liquid chromatography-tandem mass spectrometry method	Journal of Chromatography B: Analytical Technologies in the Biomedical and Life Sciences	Elsevier	2009	Article	31	3.44	Bioanalytical Research Department, Veeda Clinical Research, Ahmedabad; Dept. of Chemistry, Gujarat University, Ahmedabad