History and Development of Chemical Periodicals in the Field of Analytical Chemistry: 1877–1950[1]

Fletcher S. Boig
Department of Chemistry, Northeastern University, Boston, Massachusetts
Paul W. Howerton
Julius Hyman and Company, Denver, Colorado

AS A SEQUEL TO A PREVIOUS STUDY,[2] in which periodicals in the field of organic chemistry were analyzed, the authors decided to investigate periodicals in the field of analytical chemistry. The data were collected from the Analytical Section of *Chemical Abstracts* for the years 1950, 1949, 1948, 1947, 1937, 1927, and 1917; and from the Analytical Section of *Chemisches Zentralblatt* for the years 1907, 1897, 1887, and 1877. The data for the year 1907 were taken from the latter rather than from *Chemical Abstracts,* because the latter was then in its first year of publication.

Collection of Data

Since the manner of collecting the data, including a discussion of the advantages and disadvantages, has been explained in detail elsewhere,[2] a brief summary of the method used will suffice here. The data included the name of the periodical, years in which it was published, country of publication, language of each article abstracted, total number of periodicals, and total number of abstracts by country and by language. Abstracts of obituary notices and polemic discussions were omitted from the count.

Arrangement of Data

The data have been assembled in five tables and are also illustrated by graphs, which indicate the situation very clearly. Table 1 lists the most heavily abstracted journals, their years of publication, number of abstracts from each journal in each of the years studied and their relative importance from a quantitative viewpoint and also the total number of contributing journals and total number of abstracts for each of the years studied. Table 2 gives an analysis of the number of abstracts by country of publication; and Table 3, by language of publication. Table 4 gives a breakdown in percentage of all abstracts by country; and Table 5, in percentage of all abstracts by language. Graphical representation of the data is shown in Figs. 1–5, from which the relationships can be easily seen.

[1] Presented before the Chemical Literature Division of the American Chemical Society, Boston, Mass., April 1951.
[2] F. S. Boig, and P. W. Howerton. *Science,* **115**, 25 (1952).

Interpretation of the Data

Table 1 shows that, of the first 16 journals in the analytical chemistry field in 1950, only the German *Zeitschrift fur analytische Chemie* and the *Bulletin de la société chimique de France* were among the leaders (first and seventh, respectively) in 1877. In 1887 *Analyst* of England became an important journal and has continued as such to the present day. Five of the first 16 journals in 1950 are newcomers—four of them Russian, and one Dutch.

The leading journal at present is the American *Analytical Chemistry,* which started in 1929 as the *Analytical Edition* of *Industrial and Engineering Chemistry.* Its new name was adopted in January 1947, and the journal has been in first place since 1947, though it was temporarily in first place in 1917. Second place at the present time is occupied by the Russian *Zavodskaya Laboratoriya,* which started in 1935 and was the leading journal in 1937. Since 1937, however, it has been a consistent second to *Analytical Chemistry.* Other leading Russian periodicals in this field include *Zhurnal Analiticheskoi Khimii,* which was started in 1946 and has moved into third place since that time; *Izvestiya Akademii Nauk SSSR,* started in 1925, and now in fifteenth place; *Izvestiya Sektora Platiny i Drugikh Blagorodnykh Metallov,* started in 1923, and now in sixteenth place. At present, the fourth ranking journal is a newcomer, *Analytica Chimica Acta* of Holland, which was started in 1947 and is published in several languages, including English, French, and German. Its growth has been very rapid.

The leading periodicals published in England include the fifth place *Analyst,* which was started in 1876, *Nature,* and *Metallurgia.* At the turn of the century important places were held by the *Journal of the Society of Chemical Industry,* which was founded in 1882, and by *Chemical News,* which started in 1859 and ceased publication in 1932. The leading journals of France at the present time are the sixth place *Bulletin de la société chimique de France* and *Chimie analytique* (formerly *Annales chimie analytique*) in twelfth place. In previous years *Comptes rendus* was a prominent contributor. The leading journals printing articles in the analytical field in other countries

TABLE 1

NUMBER OF ABSTRACTS BY PERIODICALS
(1877 to 1907 inclusive, *Chemisches Zentralblatt*)
(1917 to 1950 inclusive, *Chemical Abstracts*)

Journal	Country	1950		1949		1948		1947		1937		1927		1917		1907		1897		1887		1877	
		Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.
Analytical Chemistry (1947–)*	USA	1	277	1	233	1	151	1	129	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Industrial and Eng. Chem. (1909–46)	USA	—	—	—	—	—	—	—	—	2	116	3	35	1	34	—	—	—	—	—	—	—	—
Zavodskaya Laboratoriya (1935–)	Russia	2	183	2	204	2	69	2	63	1	167	—	—	—	—	—	—	—	—	—	—	—	—
Zhurnal Anal. Khimii (1946–)	Russia	3	90	3	109	—	9	18	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Analytica Chimica Acta (1947–)	Holland	4	85	4	98	3	47	28	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Analyst (1876–)	England	5	76	5	64	6	35	4	49	5	37	2	39	12	8	17	19	20	10	14	15	—	0
Bull. soc. chim. France (1858–)	France	6	33	17	15	10	23	6	21	15	15	20	8	—	1	12	26	9	24	11	18	7	13
Chem. Listy (1907–), Listy Chem. (1875–91)†	Czechoslovakia	7	32	—	1	—	0	—	0	—	7	—	4	—	0	—	0	—	0	19	9	—	0
Mikrochem. ver. Mikrochim. Acta (1914–)‡	Austria	8	31	11	18	8	26	8	19	6/7	67	19	9	—	0	—	—	—	—	—	—	—	—
Zeitschrift analyt. Chemie (1862–)	Germany	9	31	6	35	4	41	—	0	3	114	1	101	5	15	5	38	8	26	1	51	1	62
Anales (real.) soc. espan. fis. y quim. (1902–)§	Spain	10	25	10	19	5	39	5	26	—	7	—	3	17	6	—	0	—	—	—	—	—	—
Nature (1869–)	England	11	23	14	17	—	12	26	7	—	1	—	1	—	0	—	0	—	0	—	0	—	0
Chim. Anal. (1919–), Ann. chim. anal. (1893–1919)‖	France	12	21	7	28	7	32	10	18	—	—	17	10	7	12	3	52	—	3	—	—	—	—
J. Assoc. Off. Agr. Chem. (1918–)	USA	13	17	8	24	—	9	30	7	16	15	16	11	—	3	—	—	—	—	—	—	—	—
Metallurgia	England	14	17	13	17	9	25	15	11	—	2	—	0	—	0	—	—	—	—	—	—	—	—
Izvestiya Akad. Nauk (1925–)	Russia	15	16	—	2	—	10	—	0	—	0	—	0	—	—	—	—	—	—	—	—	—	—
Izvestiya Sektora Platiny . . . (1923–)	Russia	16	16	—	0	—	0	—	2	—	—	—	0	—	—	—	—	—	—	—	—	—	—
J. Chem. Soc. Japan (1880–)	Japan	—	6	—	8	—	4	3	61	12	17	—	1	—	0	—	0	—	0	—	0	—	—
Comptes rendus (1835–)	France	—	10	18	15	13	15	9	19	18	13	12	13	14	7	13	25	3	40	15	15	4	23
Chemist-Analyst (1912–)	USA	—	13	—	9	—	11	11	16	10	22	10	13	3	21	—	—	—	—	—	—	—	—
Angew. Chemie¶	Germany	—	10	—	12	—	3	—	1	8	25	8	17	20	5	8	34	4	40	6	34	—	—
J. Applied Chem. USSR (1928–)	Russia	—	0	—	9	—	0	—	14	4	83	—	—	—	—	—	—	—	—	—	—	—	—
J. Am. Chem. Soc. (1876–)	USA	—	8	—	5	15	14	—	8	9	23	9	15	2	27	2	79	2	54	—	4	—	0
J. Chem. Education (1924–)	USA	—	0	—	12	16	13	—	8	17	14	—	3	—	—	—	—	—	—	—	—	—	—
J. Soc. Chem. Ind. (1882–)	England	—	0	12	17	12	20	—	4	13	17	—	4	6	14	10	28	6	34	8	22	—	0
Chem. Zeitung (1877–)	Germany	—	1	—	1	—	0	—	0	—	—	5	29	4	18	1	103	1	54	2	47	—	0
Pharm. Zentralhalle (1860–)	Germany	—	5	—	2	—	0	—	0	—	3	—	2	—	0	11	27	—	14	3	43	8	13
Chem. News (1859–1932)	England	—	—	—	—	—	—	—	—	—	—	—	2	10	9	—	15	12	21	4	36	3	30
Chem. Berichte (1945–), Berichte (1867–1945)**	Germany	—	0	—	1	—	0	—	0	—	7	11	13	—	4	15	23	—	14	10	19	2	39
Total abstracts			1710		1569		1106		961		1412		730		320		1201		771		680		301
Total journals																							

* *Analytical Chemistry* (1947) was previously known as *Industrial and Engineering Chemistry* (1909–47), *Analytical Edition.*
† *Chem. Listy* (1907–) may be a somewhat belated revision of *Listy Chem.*, published from 1875 to about 1891.
‡ *Mikrochemie* was combined with *Mikrochimica Acta* in 1937.
§ *Anales soc. espan. fis. y quim.* was changed about 1941 to *Anales real. soc. espan. fis. y quim.*
‖ *Annales chim. anal.* was changed in 1919 to *Chim. Anal.*
¶ *Angew. Chem.*, the present name, was formerly known as *Z. angew. Chem.* (1888–1932) and *Repertorium anal. Chem.* (1881–87).
** *Berichte* was changed in 1945 to *Chem. Berichte.*

TABLE 2

NUMBER OF ABSTRACTS BY COUNTRY

Country	1950		1949		1948		1947		1937		1927		1917		1907		1897		1887		1877	
	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.
United States	1	437	1	362	1	279	1	254	3	246	2	116	1	132	3	129	4	68	5	31	6	5
Russia	2	345	2	356	4	102	2	113	1	353	7	22	—	2	10	6	7	18	8	13	—	1
England	3	174	3	151	3	127	3	105	4	88	4	79	3	43	4	97	3	79	2	82	3	39
France	4	113	6	119	2	145	4	102	5	87	3	83	4	28	2	216	2	146	3	71	2	52
Germany	5	110	4	121	5	83	6	51	2	269	1	269	2	70	1	589	1	370	1	393	1	175
Holland	6	94	5	120	6	65	8	23	—	14	5	26	5	17	6	37	9	8	—	2	—	—
Czechoslovakia	7	60	13	20	12	18	—	3	9	24	12	7	—	—	9	6	—	3	7	13	—	—
Austria	8	51	9	32	9	38	12	20	6	74	9	17	—	3	7	23	6	31	6	29	4	16
Japan	9	50	12	23	8	48	5	73	7	40	11	12	—	3	—	1	—	—	—	—	—	—
Spain	10	46	7	57	7	56	7	45	—	10	17	4	7	6	—	—	—	—	—	—	—	—
Belgium	11	36	—	12	16	10	15	13	—	16	8	20	—	1	8	15	8	8	—	2	—	1
India	12	31	11	23	11	22	16	12	—	15	—	—	—	—	—	—	—	—	—	—	—	—
Italy	13	23	8	47	13	16	9	23	8	29	6	22	6	6	5	65	5	34	4	32	5	6
Argentina	14	20	10	30	10	24	14	14	—	9	13	6	—	—	—	—	—	—	—	—	—	—
Denmark	15	18	—	1	—	4	—	5	—	1	—	—	—	—	—	—	—	—	—	—	—	—
Canada	16	17	—	7	17	8	—	11	—	4	—	2	—	—	—	1	—	—	—	—	—	—
Sweden	17	12	15	14	14	14	10	21	—	9	15	5	—	2	—	—	—	—	—	1	—	1
Switzerland	18	10	14	19	15	14	11	21	—	15	10	14	—	2	11	5	—	3	9	7	—	1
Total (all countries)		1710		1569		1106		961		1412		730		320		1201		771		680		301

TABLE 3

NUMBER OF ABSTRACTS BY LANGUAGE

Language	1950		1949		1948		1947		1937		1927		1917		1907		1897		1887		1877	
	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.	Position	No.
English	1	751	1	624	1	491	1	420	1	407	2	214	1	179	2	231	3	147	2	113	3	45
Russian	2	345	2	356	4	102	3	109	2	344	6	17	8	2	6	6	5	18	6	5	—	—
French	3	183	4	175	2	175	2	141	4	126	3	103	3	29	3	231	2	154	3	78	2	53
German	4	182	3	178	3	137	4	80	3	342	1	302	2	75	1	623	1	409	1	440	1	193
Spanish	5	76	5	90	5	83	6	62	6	33	7	16	6	6	—	—	—	—	—	—	—	—
Japanese	6	48	7	20	6	47	5	67	5	34	9	6	7	3	—	1	—	—	—	—	—	—
Czech	7	47	12	9	10	9	—	2	8	17	8	7	—	—	—	—	—	—	5	11	—	—
Italian	8	24	6	47	7	16	7	23	7	29	5	22	5	6	4	65	4	34	4	32	4	6
Dutch	9	20	8	14	8	15	10	8	10	10	4	26	4	17	5	37	6	8	—	—	—	—
Portuguese	10	11	13	9	11	7	8	20	14	6	14	2	10	1	—	—	—	—	—	—	—	—
Jugoslav (Croatian)	11	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Swedish	12	5	9	13	9	13	9	16	12	7	10	5	9	2	—	—	—	—	—	1	—	1
Danish	13	3	—	—	12	3	—	2	—	1	—	—	—	—	—	—	—	—	—	—	—	—
Hungarian	14	3	11	11	13	3	11	6	9	15	—	—	—	—	—	—	—	—	—	—	—	—
Bulgarian	15	2	—	—	—	—	—	—	17	3	—	—	—	—	—	—	—	—	—	—	—	—
Polish	17	0	10	12	14	3	—	—	11	7	13	2	—	—	—	—	—	—	—	—	—	—
Total (all languages)		1710		1569		1106		961		1412		730		320		1201		771		680		301

TABLE 4

PERCENTAGE OF ABSTRACTS BY COUNTRY

Country	1950		1949		1948		1947		1937		1927		1917		1907		1897		1887		1877	
	Position	%	Position	%	Position	%	Position	%	Position	%	Position	%	Position	%	Position	%	Position	%	Position	%	Position	%
United States	1	25.6	1	23.1	1	25.4	1	26.4	3	17.4	2	15.9	1	41.2	3	10.9	4	8.8	5	4.7	6	1.7
Russia	2	20.2	2	22.7	4	9.3	2	11.8	1	25.1	7	3.0	—	0.6	10	0.5	7	2.3	8	1.9	—	0.3
England	3	10.2	3	9.6	3	11.5	3	11.0	4	6.2	4	10.8	3	13.5	4	7.9	3	10.3	2	12.1	3	13.0
France	4	6.5	6	7.6	2	13.1	4	10.6	5	6.2	3	11.4	4	8.8	2	18.0	2	18.9	3	10.4	2	17.3
Germany	5	6.4	4	7.7	5	7.5	6	5.3	2	19.1	1	36.8	2	21.9	1	49.1	1	48.0	1	57.8	1	58.2
Holland	6	5.5	5	7.6	6	5.9	8	2.4	—	1.0	5	3.6	5	5.3	6	3.1	9	1.0	11	0.3	—	—
Czechoslovakia	7	3.5	13	1.3	12	1.6	—	0.3	9	1.7	12	1.0	9	0.9	9	0.5	10	0.4	7	1.9	—	—
Austria	8	3.0	9	2.0	9	3.4	12	2.1	6	5.2	9	2.3	—	—	7	1.9	6	4.0	6	4.3	4	5.3
Japan	9	2.9	12	1.5	8	4.4	5	7.6	7	2.8	11	1.6	10	0.9	—	—	—	—	—	—	—	—
Spain	10	2.6	7	3.6	7	5.1	7	4.7	—	0.7	—	0.6	7	1.9	—	—	—	—	—	—	—	—
Belgium	11	2.1	—	0.8	—	0.9	—	1.3	11	1.1	8	2.7	—	0.3	8	1.3	8	1.0	10	0.3	—	0.3
India	12	1.8	11	1.5	11	2.0	—	1.2	13	1.0	—	—	—	—	—	—	—	—	—	—	—	—
Italy	13	1.4	8	3.0	13	1.5	9	2.4	8	2.1	6	3.0	6	1.9	5	5.4	5	4.4	4	4.7	5	2.0
Argentina	14	1.2	10	1.9	10	2.2	14	1.4	—	0.6	—	0.9	—	—	—	—	—	—	—	—	—	—
Switzerland	18	0.6	—	1.2	—	1.3	11	2.2	14	1.0	10	1.9	—	0.6	11	0.4	11	0.4	9	1.0	—	0.3

TABLE 5

PERCENTAGE OF ABSTRACTS BY LANGUAGE

Language	1950		1949		1948		1947		1937		1927		1917		1907		1897		1887		1877	
	Position	%	Position	%	Position	%	Position	%	Position	%	Position	%	Position	%	Position	%	Position	%	Position	%	Position	%
English	1	44.1	1	39.8	1	44.5	1	43.8	1	28.8	2	29.3	1	56.0	2	19.2	3	19.1	2	16.6	3	14.9
Russian	2	20.2	2	22.7	4	9.3	3	11.3	2	24.4	6	2.3	—	0.6	6	0.5	5	2.3	6	0.7	—	—
French	3	10.7	4	11.2	2	15.9	2	14.7	4	8.9	3	14.1	3	9.1	3	19.2	2	20.0	3	11.5	2	17.6
German	4	10.7	3	11.4	3	12.4	4	8.4	3	24.2	1	41.4	2	23.4	1	51.9	1	53.1	1	64.7	1	64.1
Spanish	5	4.3	5	5.7	5	7.5	6	6.5	6	2.3	7	2.2	6	1.9	—	—	—	—	—	—	—	—
Japanese	6	2.8	7	1.3	6	4.3	5	7.0	5	2.4	9	0.8	7	0.9	8	0.1	—	—	—	—	—	—
Czech	7	2.8	—	0.6	10	0.8	—	0.2	8	1.2	8	1.0	—	—	—	—	—	—	5	1.6	—	—
Italian	8	1.4	6	3.0	7	1.5	7	2.4	7	2.1	5	3.0	5	1.9	4	5.4	4	4.4	4	4.7	4	2.0
Dutch	9	1.2	8	0.9	8	1.4	10	0.8	10	0.8	4	3.6	4	5.3	5	3.1	6	1.0	—	—	—	—
Portuguese	10	0.8	—	0.6	11	0.7	8	2.1	14	0.5	14	0.3	—	0.3	—	—	—	—	—	—	—	—
Jugoslav (Croatian)	11	0.3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Swedish	12	0.3	9	0.8	9	1.2	9	1.7	12	0.5	10	0.7	—	0.6	—	—	—	—	7	0.1	5	0.3
Danish	13	0.2	—	—	—	0.3	—	0.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hungarian	14	0.2	—	0.7	—	0.3	11	0.6	9	1.2	—	—	—	—	—	—	—	—	—	—	—	—

are: the Czech *Chemicke Listy,* the Austrian *Mikrochemie vereinigt mit Mikrochimica Acta,* and the Spanish *Anales de fiscia y química.* Some of the more important journals in the late years of the nineteenth century included the German *Repertorium analytische Chemie* (now *Angewandte Chemie*); the American *Journal of the American Chemical Society,* which printed articles dealing with analytical chemistry before the *Analytical Edition* of *Industrial and Engineering Chemistry* was published; the German *Chemiker-Zeitung* and *Pharmazeutische Zentralhalle,* and particularly the German *Zeitschrift fur analytische Chemie,* which was formerly the world leader and is today the leading German periodical serving the field of analytical chemistry.

Examination of the figures in Table 1 indicates that there is about 42 per cent more publication in this field than in 1907 (using *Zentralblatt* figures for 1907), and the number of publication media has about doubled in that time. The year 1917 was very unproductive because of World War I, and there was a corresponding decrease in 1947 because of World War II.

Table 1 shows the 16 leading periodicals (as of 1950) in order. The twelve additional journals listed, beginning with the *Journal of the Chemical Society of Japan,* have enjoyed a measure of importance at some time in the past; an outstanding example is *Chemiker-Zeitung* of Germany, which has had only two articles abstracted in the past five years, but was the world leader in this field in 1907 and 1897, and was second in 1887.

Analysis of Table 2, revealing the relative importance of publication by countries through the years, indicates the rapid growth of publication in the United States—from sixth place in 1877 to first in 1950. The United States took the lead from Germany in 1917, lost it to Germany in 1927, to both Germany and Russia in 1937, then took over the lead in 1947 and has held it since. Russia has now taken a strong second position, following a brief period of leadership in 1937. England, now third, has been a steady third or fourth since 1877. France has always been one of the first five, but has fallen off somewhat from its former position of 1877 to 1907, when it was second to Germany. Germany was the leading publisher until 1917, when it fell to second place; it took the lead again by 1927, but in 1937 began a decline. Holland's new international journal, *Analytica Chimica Acta,* is rapidly assuming importance, and it has made Holland a leading contributor to the literature. Italy was in fifth place in the 1877 to 1907 period but declined to thirteenth place in 1950. Austria also shows a comparable decline in publication figures.

Table 3, showing the number of abstracts by language, indicates that German was the most important language until the first world war, at which time it lost the lead to English. However, German led once more by 1927, only to lose first place again to English by 1937. English has been the most important language ever since. Russian, now second, has become the *leading foreign language.* French has usually been second or third, except in 1937 and 1949, when it was in fourth place. Spanish is now fifth and is followed in order by Japanese, Czech, Italian (fourth in 1877), Dutch, and Portuguese.

Contributions by country and by language have

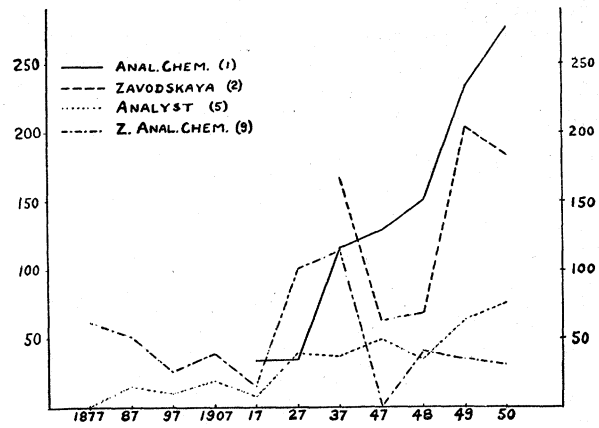

FIG. 1. Abstracts by journal.

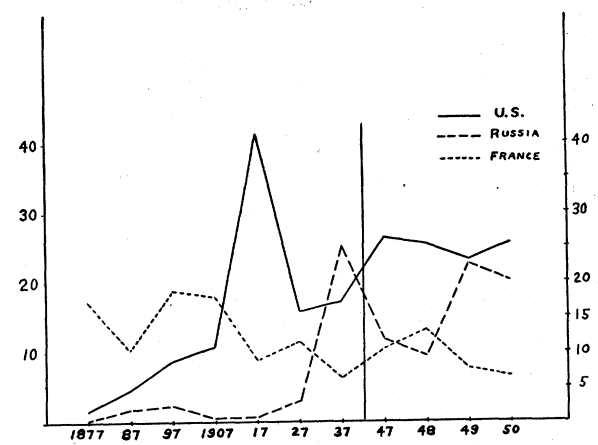

FIG. 2. Percentage by country.

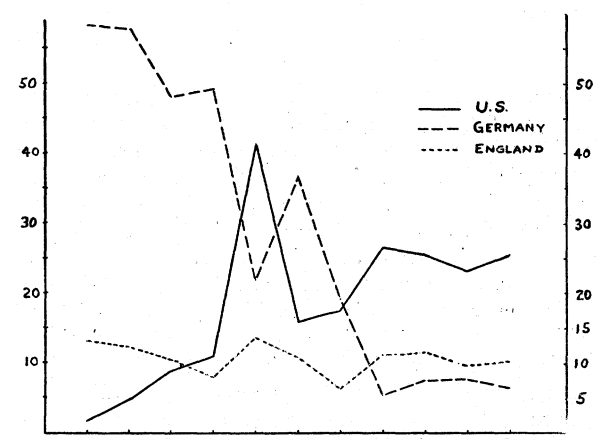

FIG. 3. Percentage by country.

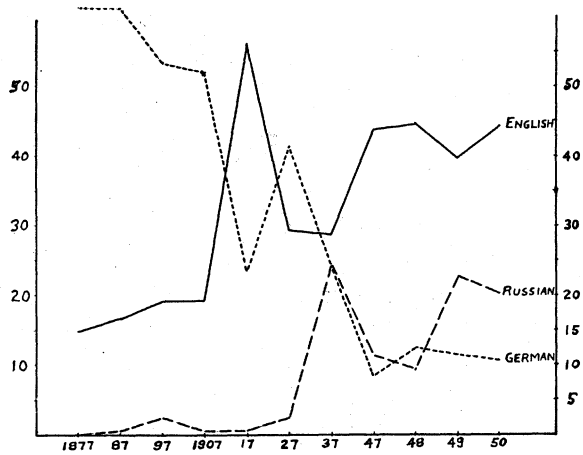

FIG. 4. Percentage by language.

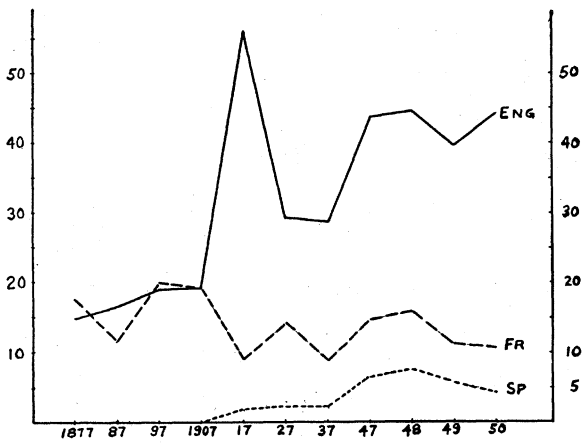

FIG. 5. Percentage by language.

also been investigated from the standpoint of percentage of total publication. These figures are given in Table 4, which shows percentage of all abstracts by country, and in Table 5, which gives percentage of all abstracts by language. These figures have also been interpreted by means of graphs, which reveal clearly the changes in importance since 1877.

In Fig. 3, the most striking feature is the decline of Germany as a publisher of scientific articles in the field of analytical chemistry. On the other hand, there has been a steady increase in importance of contributions from the United States and, since 1927 from Russia, whereas France shows a gradual decline (Fig. 2).

Figs. 4 and 5 show conclusively the decline of German as a language of science and the corresponding increase in the importance of English. It is particularly interesting to note that for each decrease in the one, there is a corresponding increase in the other. In 1950, 44 per cent of all analytical chemistry articles abstracted were in the English language, although in 1917 this figure was 56 per cent, because of the decrease in German publication during the first world war. Russian shows a tremendous increase in importance since 1927—*one article in every five* in this field being published in the Russian language. The French language has suffered a gradual decrease in importance.

CONCLUSIONS

From the data collected, the ten leading journals in the field of analytical chemistry at the present time (from a quantitative standpoint) are, in order: *Analytical Chemistry* (U. S., 1929), *Zavodskaya Laboratoriya* (1935) and the *Zhurnal Analiticheskoi Khimii* (1946) of Russia, *Analytica Chimica Acta* (1947) of Holland, *Analyst* (1876) of England, *Bulletin de la société chimique de France* (1858), *Chemicke Listy* (1907) of Czechoslovakia, *Mikrochemie vereinigt mit Mikrochimica Acta* (1914) of Austria, *Zeitschrift fur analytische Chemie* (1862) of Germany, and *Anales de física y química* (1902) of Spain.

An analysis of countries contributing to the literature of analytical chemistry shows that the leading five countries in order are now the United States, Russia, England, France, and Germany. In 1877 the order was Germany, France, England, Austria, and Italy. The United States was sixth at this time; in 1897 it was fourth; in 1917, first, but third in 1937; and by 1947 it had reached first place and has remained there. The languages of publication in order of importance are now English, Russian, French, German, and Spanish. In 1877 the order was German, French, English, and Italian.

Graphical representation, with percentage of total abstracts by country and by language plotted against years, reveals that about 1947 the United States took over the lead from Germany in total publication, and by 1937 the English language had replaced German as the leading language in this field.

Investigation of total publication in all fields of chemistry[3] reveals that world publication fell off from 1913 to 1918 during the first world war, increased until the peak year of 1938, and then rapidly declined during the period of the second world war from 1938 to 1945. Since 1945 there has been a steady increase in volume.

[3] E. J. Crane. *Chem. Eng. News*, **27**, 529 (1949).