names which have been associated with two different registry numbers. These are, however, only potential errors because of the ambiguity of some chemical names.

D. A special index of molecular formulas and associated registry numbers will be produced by the computer at set intervals. A random sampling will be made of those sets of compounds which have the same molecular formulas. A chemist will compare the structures and the nomenclature to identify any structures which represent the same compound but which may have been assigned a different registry number.

Temporary Methods for Error Detection. In order to ensure adequate error detection and control during the early stages of production, temporary checking procedures have been instituted. Once the system has functioned smoothly in full operation, these procedures will be phased out, though each time the system is modified some variant of these checks will be reinstituted.

A. A method which has been used to test both the algorithm and the computer programs is the reprocessing by the computer of structures already registered. The processing is accomplished by a computer program which converts each connection table in the master file back to an expanded form of the table of the type which is input to the computer. (Note that in the resulting expanded table the numbering of the atoms is generally different from the numbering of the atoms in the unique form of the connection table and is also generally different from the numbering assigned at the time the compound was initially input to the system.) The computer registration process is then rerun and the results are machine checked to be certain that the resulting master file is identical with the one before the regeneration. If the two files are not identical, an error has been detected in the programs and/or the algorithm. This check device is no longer useful on the present system, for essentially all of the errors which can be uncovered by this technique have already been corrected. However, later alterations or improvements in the algorithm and programs will be checked in the same manner.

B. A major problem during the early stages of production is the training of the clerks who prepare the connection tables and the chemists who draw the structural diagrams. In order to reduce the potential error caused by incomplete training, a rigorous editing of the output of both the chemists and clerks has been instituted. In the case of the chemist, this takes the form of a review by a senior chemist to ensure correspondence between the name and the structure. In the case of the clerks, a second clerk edits the completed connection tables for errors prior to keypunching. A random sampling and checking operation is a standard part of the structure-drawing operation.

In addition to supporting the generation of CBAC, the Registry System will also routinely register each of the new entries for the Index of Ring Systems which is part of the CA Subject Index.

A Computer-Based Source Inventory of *Chemical Abstracts**

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One of the control measures recently instituted by Chemical Abstracts Service was the development of a computer-based inventory of abstracts. This step was taken in order to gain better insight into and control of production operations. The benefits derived from the inventory, and the uses to which it can be put, are discussed in this paper.

In the publication of *Chemical Titles*, CT (over 80,000 titles in 1964), the bibliographic data for each of the cited papers is stored in computer form. These data include the title of the paper in English (translated wherever necessary), the authors, the title of the journal stored as a four-letter code with the volume number, page numbers, and, where necessary, the issue number corresponding to the paper. The four-letter journal codes, called Coden, are the same as those adopted by the American Society for Testing and Materials.

When the publication of CT started in 1961, the median prepublication period (the period between the issuance of a primary journal and the appearance of a corresponding abstract in CA) was well over 7 months. By the end of 1964 this time period had been reduced to 3.8 months. These figures show why CT was originally set up in parallel with the publication of *Chemical Abstracts* and why these operations were integrated toward the end of 1964. During the three intervening years, processes were overhauled

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to allow a single acquisition, selection, and assignment procedure for both CA and CT without slowing the production of CT.

Another project that relates to the Coden inventory is the abstractors payroll. CAS pays its abstractors by the line as printed in CA. Therefore, it is necessary to determine for each abstract the number of lines and to record this information along with the abstractor's name.

However, it was primarily the consideration of coverage problems, in context with CT and the abstractors payroll that led to the inventory project which is the basis of this paper. The Coden Based Inventory now includes the recording of the following information related to each abstract: (1) CA reference (volume, column number, page fraction), (2) primary document bibliographic data, (3) name of abstractor, (4) language of the paper, (5) length of the abstract.

By using established procedures, clerks can record Coden and other data for 700 to 800 CA abstracts per day. The coding clerks are assigned consistently to the same groupings of CA sections, so that they become acquainted with a restricted list of Coden. Thus, experienced coders can cover more than 50% of their work without making reference to Coden directories.

The above inventory information is transferred to computer tape. The information is then processed in the computer to produce the following reports: (A) density reports, (B) lists of journals by productivity, (C) lists of bibliographic citations arranged by primary journal, (D) lists of journal productivity according to sections of CA, (E) abstractors payroll, (F) list of abstracts prepared by fulltime employees in Columbus, and (G) library call slips.

The following sections discuss these reports in more detail.

Report A. As an editorial check, we find it useful to follow closely for each section the variation of page density of abstracts, that is, the number of abstracts per page. Variation in density relates the variation in the subject matter within each section. It also gauges the amount of editorial effort devoted to these sections.

Report B. The productivity of a journal is of consequence from a straightforward business standpoint. Though complete coverage in CA is of primary concern, it is obvious that we cannot afford to acquire a journal at, for example, $100 per year if the journal productivity is perhaps only a single abstract for that interval. Thus, our program of monitoring secondary journals is aimed at assuring complete coverage of journals that include only an occasional chemistry paper. We carefully weight the productivity of the less productive journals to be sure that acquisition costs remain under control.

Report C. Completeness of coverage is a major problem in producing CA. We are concerned not only with the growth in individual subject areas, but also with the problems related to new journals, discontinued journals, and lost journals. (Unfortunately, whole volumes, whole issues, and individual papers sometimes go astray.)

The growth of many areas of chemistry is gauged by monitoring the other secondary journals that overlap CA coverage. (This monitoring program will be discussed in a later paper.) In addition we depend on a vigorous acquisition program as well as upon our 100 section editors and 3000 abstractors to ensure that new aspects of chemistry are not overlooked. In the past, "holes" in CA coverage have been difficult to locate. Despite continuous staff effort, problem areas continued to occur. Report C greatly simplifies the check for holes in coverage of established journals.

Report D. Coverage within each of the individual sections of CA is continually watched. In addition, each year we select several sections to investigate in depth. Here we review with the section editors those subdivisions which he feels deserve more attention. The primary journal sources for each subdivision are also investigated. We check the range of primary journals covered. Moreover, for journals covered in a given section, journal contents are compared with CA abstracts to see why all of the subject matter in the primary journal is not covered. In these deep reviews, report D is invaluable.

The coverage studies are also an important aid in predicting the growth of the literature. As the flow of material through the abstracting processes becomes more regular these predictions become more reliable.

Report E. The abstractors payroll has already been discussed. The payroll is produced on a quarterly basis.

Report F. The list of abstracts prepared by fulltime CAS staff becomes important as we enter into new services such as *Chemical-Biological Activities* that require "in-house" abstracting, and as the patterns of use of author abstracts change. This report is prepared for each volume of CA.

Report G. Certain areas of chemistry produce a great many index entries per abstract. For instance, papers dealing with chemical synthesis report a great many compounds. The corresponding sections of CA are indexed directly from the original journal article. In the very near future one of the products of the inventory will be the direct print-out of library call slips for those sections which have a high density of index entries per paper. This will permit the library to arrange the original journal material in a manner convenient for the indexing effort.

It is interesting to examine some of the figures which come out of the inventory. These figures are based on Volumes 56-61 inclusive (1962-1964 inclusive) and are compiled according to the following rules: (1) serial publications are included, (2) certain publications which are recurring but do not appear at regular intervals are included, (3) patents are *not* included, (4) also *not* included are nonperiodical publications such as proceedings or nonrecurring scientific meetinsg, (5) totals for a given serial include all material selected from supplemental issues as well as regularly scheduled issues of the journal, (6) whenever a journal undergoes a change in name during the period being studied all abstracts are included under the current name.

Using these rules, we have plotted the total number of journals *vs.* the percentage of abstracts they contributed to Volumes 56-61 of CA (see Figure 1). Table I also lists the most productive 1000 journals for this period. Note at the low end of the curve in Figure 1 that the first 250 journals produced 50% of the abstracts. The 1000 journals listed in Table I produced 75% of the abstracts. At the high end of the curve, the law of diminishing returns comes into play: a second 1000 journals increase the productivity only 10%, and a third 1000 add only 5% more. It is important to note again that

Table I. List of the Top 1000 Journals by Productivity in *Chemical Abstracts*, Volumes 56–61 Inclusive (1962–1964)

[list gives journal name with corresponding number of abstracts taken from journal; it does not include patents or nonperiodical publications such as proceedings of nonrecurring scientific meetings; it does include serial publications and recurring but not regular publications (revised May 20, 1965)]

U S AT ENERGY COMM	06100
NATURE	06034
DOKL AKAD NAUK SSSR	04653
COMPT REND	04319
J AM CHEM SOC	04317
J CHEM PHYS	04254
J ORG CHEM	03968
BIOCHIM BIOPHYS ACTA	03856
PHYS REV	03478
J CHEM SOC	03385
ZH OBSHCH KHIM	03226
KOGYO KAGAKU ZASSHI	02662
J PHYS CHEM	02564
ANAL CHEM	02417
ZH NEORGAN KHIM	02252
ZH EKSPERIM I TEOR FIZ	02183
BIOCHEM J	02154
J BIOL CHEM	02101
ZH FIZ KHIM	02047
PROC SOC EXP T L BIOL MED	01824
IZV AKAD NAUK SSSR SER KHIM	01737
FIZ TVERD TELA	01729
NUCL PHYS	01729
J APPL PHYS	01708
ACTA CHEM SCAND	01696
ZH PRIKL KHIM	01689
U S DEP COM, OFFICE TECH SERV, AD	01670
BULL CHEM SOC JAPAN	01530
BULL SOC CHIM FRANCE	01490
BOLL SOC ITAL BIOL SPER	01435
NATURWISSENSCHAFTEN	01392
CHEM IND (LONDON)	01360
CHEM BER	01358
CAN J CHEM	01350
NIPPON KAGAKU ZASSHI	01336
COLLECTION CZECH CHEM COMMUN	01317
J PHYS SOC JAPAN	01284
TETRAHEDRON LETTERS	01217
ARCH BIOCHEM BIOPHYS	01132
ACTA CRYST	01118
VYSOKOMOLEKUL SOEDIN	01113
SCIENCE	01091
BIOCHEM BIOPHYS RES COMMUN	01070
OPT I SPEKTROSKOPIYA	01066
PHYS LETTERS	01064
INORG CHEM	01051
COMPT REND SOC BIOL	01039
J POLYMER SCI, PT A	01037
AM J PHYSIOL	01017
ZAVODSK LAB	01000
J INORG NUCL CHEM	00998
ANGEW CHEM	00993
J CHROMATOG	00977
U S DEP COM, OFFICE TECH SERV, PB REPT	00957
J ELECTROCHEM SOC	00946
TRANS FARADAY SOC	00928
HELV CHIM ACTA	00917
PHYS REV LETTERS	00917
KRISTALLOGRAFIYA	00896
ZH ANALIT KHIM	00892
J PHARM SCI	00858
REV SCI INSTR	00857
YAKUGAKU ZASSHI	00852
BUNSEKI KAGAKU	00846
Z ANAL CHEM	00843
FIZ METAL I METALLOVED	00842
EXPERIENTIA	00838
J BACTERIOL	00835
IZV AKAD NAUK SSSR, SER FIZ	00828
NUOVO CIMENTO	00813
ARCH INTERN PHARMACODYN	00808
INDIAN J CHEM	00808
CHEM PHARM BULL (TOKYO)	00801
J PHYS CHEM SOLIDS	00801
TETRAHEDRON	00800
ENDOCRINOLOGY	00797
Z NATURFORSCH	00790
A I CH E (AM INST CHEM ENGRS) J	00788
TRANS AIME	00787
UKR KHIM ZH	00772
J NUTR	00769
Z NATURFORSCH	00749
Z ANORG ALLGEM CHEM	00741
Z PHYSIK	00728
PROC PHYS SOC (LONDON)	00726
ANN N Y ACAD SCI	00719
AT ENERG (USSR)	00703
PROC NAT ACAD SCI U S	00691
J CHEM EDUC	00680
J PHYS (PARIS)	00680
ROCZNIKI CHEM	00678
KHIM PROM	00656
MAKROMOL CHEM	00654
J INDIAN CHEM SOC	00653
BIOCHEMISTRY	00637
ANN CHEM	00622
PROC CHEM SOC	00617
IZV VYSSHYKH UCHEBN ZAVEDENII, KHIM I KHIM TEKHNOL	00616
REV CHIM (BUCHAREST)	00614
ANAL CHIM ACTA	00610
ARZNEIMITTEL-FORSCH	00610
NIPPON NOGEI KAGAKU KAISHI	00604
J MED CHEM	00600
CAN J BIOCHEM	00598
MIKROCHIM ICHNOANAL ACTA	00593
MONATSH CHEM	00593
IZV VYSSHIKH UCHEBN ZAVEDENII, CHERNAYA MET	00592
TALANTA	00592
U S, BUR MINES, REPT INVEST	00592
SPECTROCHIM ACTA	00570
Z CHEM	00569
J POLYMER SCI, PT B	00567
KLIN WOCHSCHR	00566
BIOCHEM PHARMACOL	00562
UKR FIZ ZH	00562
J PHARMACOL EXP THERAP	00556
FEDERAL REGISTER	00547
EXP CELL RES	00528
PHIL MAG	00525
ACTA MET	00524
GAZZ CHIM ITAL	00522
CLIN CHIM ACTA	00519
J BIOCHEM (TOKYO)	00518
J CHEM ENG DATA	00518
RADIOKHIMIYA	00518
TSVETN METAL	00518
PHYS STATUS SOLIDI	00511
ACTA ENDOCRINOL	00509
J ECON ENTOMOL	00508
KINETIKA I KATALIZ	00506
J AM OIL CHEMISTS SOC	00505
J CHIM PHYS	00495
ANN CHIM (ROME)	00494
J ASSOC OFFIC AGR CHEMISTS	00494
J CLIN INVEST	00493
ANALYST	00492
IZV AKAD NAUK SSSR, MET I GORN DELO	00486
ACTA CHIM ACAD SCI HUNG	00483
J AM CERAM SOC	00483
J PRAKT CHEM	00478
BIOKHIMIYA	00474
PHARMAZIE	00474
ZH STRUKT KHIM	00474
GEOKHIMIYA	00470
CURRENT SCI (INDIA)	00468
J APPL POLYMER SCI	00467
NEFTEKHIMIYA	00466
Z PHYSIOL CHEM	00462
BULL ACAD POLON SCI, SER SCI CHIM	00456
J PHARM PHARMACOL	00455
FARMAKOL I TOKSIKOL	00448
PLASTICHESKIE MASSY	00447
AUSTRALIAN J CHEM	00443
AM MINERALOGIST	00440
ANAL BIOCHEM	00438
REC TRAV CHIM	00438
J LAB CLIN MED	00437
Z PHYSIK CHEM (FRANKFURT)	00424
CHEM PRUMYSL	00419
J AGR FOOD CHEM	00413
KOLLOIDN ZH	00413
PRZEMYSL CHEM	00413
CHEM ANAL (WARSAW)	00410
PROC ROY SOC (LONDON), SER A	00410
BITAMIN (VITAMINS)	00403
BER BUNSENGES PHYSIK CHEM	00396
TR PO KHIM I KHIM TEKHNOL	00393
ZH VSES KHIM OBSHCHESTVA IM D I MENDELEEVA	00387
MAGY KEM FOLYOIRAT	00384
VOPR MED KHIM	00383
CANCER RES	00382
J CLIN ENDOCRINOL METAB	00381
VESTN MOSK UNIV, SER II, KHIM	00381
J MOL BIOL	00380
DOPOVIDI AKAD NAUK UKR RSR	00376
COMPT REND ACAD BULGARE SCI	00372
J DAIRY SCI	00371
TEXTILE RES J	00371
PLANT PHYSIOL	00369
CZECH J PHYS	00368
NUCL INSTR METHODS	00365
SEMANA MED (BUENOS AIRES)	00361
AGR BIOL CHEM (TOKYO)	00359
CAN J PHYS	00359
NIPPON DOJO-HIRYOGAKU ZASSHI	00357
IZV VYSSHIKH UCHEBN ZAVEDENII, TSVETN MET	00356
STAL	00354
J APPL CHEM (LONDON)	00353
TAPPI	00353
DOKL AKAD NAUK UZ SSR	00350
J POLYMER SCI, PT C	00350
ARCH PHARM	00346
BYUL EKSPERIM BIOL I MED	00346
J GEN MICROBIOL	00344
KOLLOID-Z	00344
STUDII CERCETARI CHIM	00344
U S, GEOL SURV, PROFESS PAPERS	00339
KHIM I TEKHNOL TOPLIVA I MASEL	00337
PROGR THEORET PHYS (KYOTO)	00335
J IMMUNOL	00333
LIFE SCI	00333
J SCI FOOD AGR	00331
CHEM-INGR-TECH	00330
Z PHYSIK CHEM (LEIPZIG)	00329
CHEM ENG NEWS	00328
ACTA BIOL MED GER	00327
J PHYSIOL (LONDON)	00324
SOIL SCI SOC AM PROC	00321
BRIT J PHARMACOL	00319
ECON GEOL	00317
CHEM TECH (BERLIN)	00316
GEOCHIM COSMOCHIM ACTA	00316
INDIAN J TECHNOL	00316
PHYSICA	00316
RADIATION RES	00313
J IRON STEEL INST (LONDON)	00312
ANTIBIOTIKI	00311
CHIM IND (MILAN)	00310
J GEOPHYS RES	00310
METALLOVED I TERM OBRABOTKA METAL	00308
BIOCHEM Z	00305
J AM MED ASSOC	00301
J NUCL MATER	00300
PHYSIOL PLANTARUM	00300
UKR BIOKHIM ZH	00300
Z METALLK	00300
BULL SOC CHIM BIOL	00299
FETTE, SEIFEN, ANSTRICHMITTEL	00299
NIPPON KINZOKU GAKKAISHI	00298
CHEM LISTY	00297
ARCH EISENHUETTENW	00294
ELECTROCHIM ACTA	00294
J HISTOCHEM CYTOCHEM	00294
CHEMIST-ANALYST	00293
PROC AM SOC HORT SCI	00291
BULL SOC CHIM BELGES	00290
J OPT SOC AM	00290
IND ENG CHEM	00288
PROC INTERN CONGR HEMATOL	00288
J EXP MED	00287
MED EXPTL	00287

Table I (*Continued*).

METAB, CLIN EXPTL	00287
J NEUROCHEM	00286
SEIKAGAKU	00285
DOKL AKAD NAUK BELORUSSK SSR	00283
DECHEMA MONOGRAPH	00282
HUA HSUEH TUNG PAO	00280
POCHVOVEDENIE	00279
AZERB KHIM ZH	00278
MED PROM SSSR	00275
MOL PHYS	00275
NUCL SCI ENG	00273
J ELECTROANAL CHEM	00270
CHEM ENG SCI	00269
GIGIENA I SANIT	00269
KOBUNSHI KAGAKU	00269
RADIOBIOLOGIYA	00269
J LIPID RES	00268
REV FRANC ETUDES CLIN BIOL	00268
J MOL SPECTR	00267
MASLOB-ZHIR PROM	00267
JOURNAL OF FOOD SCIENCE	00266
LAB DELO	00266
J INVEST DERMATOL	00265
SCAND J CLIN LAB INVEST	00265
IZV VYSSHIKH UCHEBN ZAVEDENII, FIZ	00262
IZV AKAD NAUK ARM SSR, KHIM NAUK	00261
CHEM ZVESTI	00260
AM J PATHOL	00257
NUKLEONIKA	00256
PURE APPL CHEM	00254
FIZIOL RAST	00253
LAKOKRASOCHNYE MATERIALY I IKH PRIMENENIE	00253
YUKI GOSEI KAGAKU KYOKAI SHI	00253
PRIBORY I TEKHN EKSPERIM	00251
VIROLOGY	00246
FREIBERGER FORSCHUNGSH, A	00245
KAUCHUK I REZINA	00245
NEFTEPERERABOTKA I NEFTEKHIM NAUCHN-TEKHN SB	00245
ARKIV FYSIK	00243
CHEM ENG	00243
MIKROBIOLOGIYA	00243
SOIL SCIENCE	00243
J WATER POLLUTION CONTROL FEDERATION	00241
AM DYESTUFF REPT	00240
UZBEKSK KHIM ZH	00240
ZH TEKHN FIZ	00240
ANALES REAL SOC ESPAN FIS QUIM (MADRID), SER B	00239
METALL	00238
INTERN J APPL RADIATION ISOTOPES	00237
IZV SIBIRSK OTD AKAD NAUK SSSR, SER KHIM NAUK	00236
J COLLOID SCI	00235
GAS- WASSERFACH	00233
VESTN LENINGR UNIV, SER FIZ I KHIM	00233
J SCI INSTR	00232
MATER PROTECT	00231
CHIMIA (AARAU)	00230
COMM ENERGIE AT (FRANCE), RAPPT	00230
FARMATSEVT ZH (KIEV)	00230
LANCET	00230
LATVIJAS PSR ZINATNU AKAD VESTIS, KIM SER	00229
J LESS-COMMON METALS	00228
ARKIV KEMI	00227
COMP BIOCHEM PHYSIOL	00227
TR MOSK KHIM-TEKHNOL INST	00227
APPL PHYS LETTERS	00226
BRIT J APPL PHYS	00226
J INST METALS	00226
FARMACO, (PAVIA), ED PRAT	00225
LITEINOE PROIZV	00225
PROTIDES BIOL FLUIDS, PROC COLLOQ	00225
RIC SCI, REND, SEZ A	00223
FOOD TECHNOL	00222
ADVAN CHEM SER	00221
NATL ACAD SCI-NATL RES COUNCIL, PUBL	00221
J ENDOCRINOL	00219
Z LEBENSM-UNTERSUCH FORSCH	00218
CLIN CHEM	00216
HUA HSUEH HSUEH PAO	00216
ARCH EXP PATHOL PHARMAKOL	00215
MINERVA MED	00214
ANN INST PASTEUR	00213
CHEM ENG PROGR	00212
ANN PHARM FRANC	00211
INTERN J RADIATION BIOL	00211
CAN J MICROBIOL	00210
J CELL BIOL	00210
ZAP VSES MINERALOG OBSHCHESTVA	00210
J APPL PHYSIOL	00209
STEROIDS	00209
DOKL, MOSK SEL/SKOKHOZ AKAD	00208
JAPAN J APPL PHYS	00208
KHIM VOLOKNA	00208
METAL PROGR	00207
REV ROUMANIE CHIM	00207
ACTA PHYSIOL SCAND	00206
NEW ENGL J MED	00206
BIOFIZIKA	00205
INZH-FIZ ZH, AKAD NAUK BELORUSSK SSR	00204
IZV VYSSHIKH UCHEBN ZAVEDENII, PISHCHEVAYA TECHNOL	00204
JADERNA ENERGIE	00204
MET SOC CONF	00204
STEKLO I KERAM	00204
ACTA, UNIO INTERN CONTRA CANCRUM	00203
ACTA BIOCHIM POLON	00202
VOPR PITANIYA	00202
CORROSION	00201
AM SOC METALS, TRANS QUART	00200
MELLIAND TEXTILBER	00199
ACTA PATHOL MICROBIOL SCAND	00198
FASERFORSCH TEXTILTECH	00198
J ANTIBIOTICS (TOKYO), SER A	00198
ACTA MED SCAND	00197
BRIT CHEM ENG	00197
CAN J PHYSIOL PHARMACOL	00197
NAGOYA KOGYO GIJUTSU SHIKENSHO HOKOKU	00197
SVENSK PAPPERSTID	00197
DEUT MED WOCHSCHR	00196
FIZ PROBL SPEKTROSKOPII, AKAD NAUK SSSR, MATERIALY SOVESHCH	00196
INDIAN J PHYS	00196
ATTI ACCAD NAZL LINCEI, REND, CLASSE SCI FIS, MAT NAT	00195
IND ENG CHEM, PROD RES DEVELOP	00195
KAGAKU NO RYOIKI	00195
SUOMEN KEMISTILEHTI	00195
COLLOQ INTERN CENTRE NAT RECH SCI (PARIS)	00194
PROC INTERN PHARMACOL MEETING	00194
REPT PROGR APPL CHEM	00194
INDIAN J PURE APPL PHYS	00193
PHYTOPATHOLOGY	00193
POROSHKOVAYA MET, AKAD NAUK UKR SSR	00193
APPL SPECTR	00192
KOKS I KHIM	00192
MONATSBER DEUT AKAD WISS BERLIN	00192
ZHUR NAUCH I PRIKLAD FOT I KINEMATOGRAFII	00192
GIDROLIZN I LESOKHIM PROM	00191
IND ENG CHEM, FUNDAMENTALS	00191
BOLL CHIM FARM	00189
BULL SOC FRANC MINERAL CRIST	00189
SB TR TSENTR NAUCHN-ISSLED INST CHERNOI MET	00189
TITAN I EGO SPLAVY, AKAD NAUK SSSR, INST MET	00189
ACTA PHYS POLON	00188
ANN BIOL CLIN (PARIS)»	00187
IND ENG CHEM, PROCESS DESIGN DEVELOP	00186
CAN J BOTANY	00185
STUDII CERCETARI FIZ	00185
DOKL AKAD NAUK AZERB SSR	00184
PROC ROY SOC MED	00184
SOOBSHCH AKAD NAUK GRUZ	00183
CEREAL CHEM	00181
K/O HSUEH T/UNG PAO	00179
THERAPIE	00179
Z ANGEW PHYS	00179
MEM SCI REV MET	00178
POLYMER	00178
LATVIJAS PSR ZINATNU AKAD VESTIS	00177
CAN J CHEM ENG	00176
CIRC RES	00176
J INSECT PHYSIOL	00176
APPL MICROBIOL	00174
BRENNSTOFF-CHEM	00172
BUMAZH PROM	00172
REV MOD PHYS	00172
AM J CLIN NUTR	00171
ANN INTERNAL MED	00171
CHIM ANAL (PARIS)	00171
MICROCHEM J	00171
PROC INDIAN ACAD SCI, SECT A	00171
SYMP COMBUST	00170
TOXICOL APPL PHARMACOL	00170
GEOL I GEOFIZ, AKAD NAUK SSSR, SIBIRSK OTD	00169
PHARM ACTA HELV	00169
Z KRIST	00169
ARCH INTERN PHYSIOL BIOCHIM	00167
HUTNICKE LISTY	00167
J CATALYSIS	00166
HELV PHYS ACTA	00164
MAGY KEM LAPJA	00164
USP KHIM	00164
ACTA PHYS ACAD SCI HUNG	00163
ANESTHESIOLOGY	00163
MOD PLASTICS	00163
PAPIER	00163
PROC NAT ACAD SCI, INDIA, SEC A	00163
ARCH MIKROBIOL	00162
ASTROPHYS J	00162
J AM WATER WORKS ASSOC	00162
Z PFLANZENERNAEHR DUENG BODENK	00162
FARMACIA (BUCHAREST)	00161
NAHRUNG	00161
ARCH ENVIRON HEALTH	00160
AT ENERGY RES ESTAB (GT BRIT), REPT	00160
AM PERFUMER COSMET	00159
GYOGYSZERESZET	00159
OIL GAS J	00159
PHYTOCHEMISTRY	00159
AGRON J	00158
ERDOEL KOHLE	00158
J PATHOL BACTERIOL	00158
KAGAKU (KYOTO)	00158
TR INST GORYUCH ISKOP, AKAD NAUK SSSR	00158
CESK CASOPIS FYS	00157
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IZV FIZ-KHIM NAUCHN-ISSLED INST PRI IRKUTSKOM GOS UNIV	00066
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INFORM QUIM ANAL (MADRID)	00065
J PROTOZOOL	00065
JUZEN IGAKUKAI ZASSHI	00065
LISTY CUKROVAR	00065
NUKLEONIK	00065
POLISH ACAD SCI. INST NUCL RES. REP	00065
RADIOISOTOPES (TOKYO)	00065
S AFRICAN J AGR SCI	00065
SB TR. GOS NAUCHN-ISSLED INST GIDROLIZN I SUL/FITNO-SPIRT PROM	00065
TR VSES NAUCHN-ISSLED INST SINTETICH I NATURAL/N DUSHISTYKH VESHCHESTV	00065
VOPR VIRUSOL	00065
CARBON	00064
CESK PEDIAT	00064
FUNTAI OYOBI FUNMATSUYAKIN	00064
IZV AKAD NAUK AZERB SSR. SER BIUL I MED NAUK	00064
J INDIAN MED ASSOC	00064
KOHASZ LAPOK	00064
NATL CANCER INST MONOGRAPH	00064
NAUCHN SOOBSHCH. INST GORN DELA. AKAD NAUK SSSR	00064
PHARM J	00064
PUBL ASTRON SOC PACIFIC	00064
STUDII CERCETARI FIZIOL	00064
TR INST PRIKL KHIM I ELEKTROKHIM. AKAD NAUK GRUZ SSR	00064
TR VSES NAUCHN-ISSLED KINOFOTOINST	00064
BIOCHEM PREP	00063
CHEMOTHERAPIA	00063
CLIN SCI	00063
DEUT TEXTILTECH	00063
J INST FUEL	00063
METALLOBERFLAECHE	00063
SCI REPT RES INST. TOHOKU UNIV. SER A	00063

these figures are based on the limits cited above and apply to the three-year period inventoried. During this period, no volume of CA contained abstracts from more than 5500 journals as described by our ground rules. Thus, 4500 or more journals in the List of Periodicals do not produce on a semiannual basis; they may be marginal journals or annual volumes.

It is interesting to compare the top ten journals in this list with the top ten reported by Brown in his ACRL Monograph in 1965 (see Tables II and III).

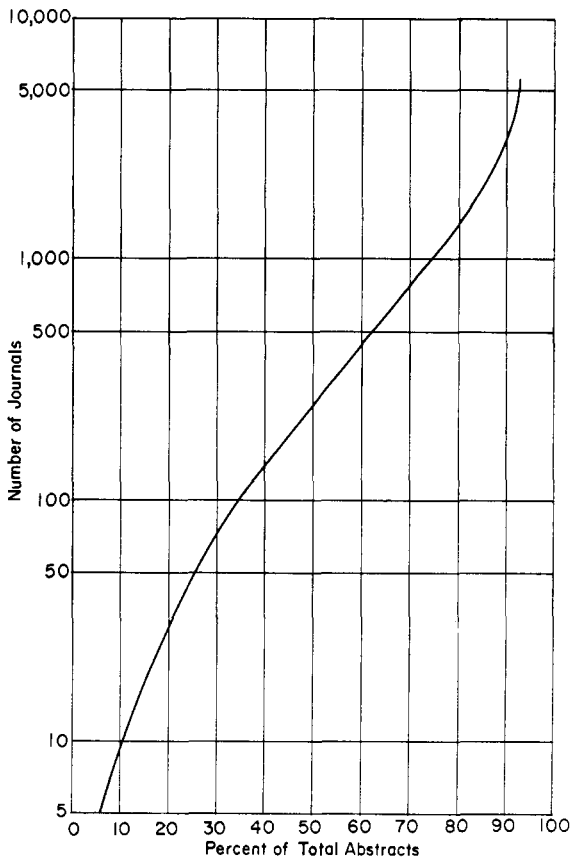

Figure 1. Journal productivity in *Chemical Abstracts* 1962–1964 (number of journals required to produce x% of total abstracts).

Seven of the top ten journals in 1954 retained their position among the top ten in 1962–1964. Of the three that did not maintain their position, two were in the top fifteen. On the other hand, of the three journals that reached the top ten during 1962–1964, none was higher than twenty-sixth in 1954.

A final word about Coden. One major disadvantage of Coden is the lack of redundancy. This limits the use of Coden in a publication such as CA, for a small error (say an incorrect letter) in a Coden entry may make

Table II. Top Ten Sources of CA Abstracts, 1962–1964

Journal	This study[a]	Brown's study[b]
U. S. At. Energy Comm.	1	29
Nature	2	7
Dokl. Akad. Nauk SSSR	3	5
Compt. Rend.	4	3
J. Am. Chem. Soc.	5	1
J. Chem. Phys.	6	6
J. Org. Chem.	7	34
Biochim. Biophys. Acta	8	26
Phys. Rev.	9	2
J. Chem. Soc.	10	4

[a] *Chemical Abstracts*, Vol. 56–61, 1962–1964. [b] C. H. Brown, "Scientific Serials," ACRL Monograph 16, Association of College and Reference Libraries, Chicago, Ill., 1956, pp. 50–53; *Chemical Abstracts*, Vol. 48, 1954.

Table III. Top Ten Sources of CA Abstracts, 1954

Journal	Brown's study[c]	This study[d]
J. Am. Chem. Soc.	1	5
Phys. Rev.	2	9
Compt. Rend.	3	4
J. Chem. Soc.	4	10
Dokl. Akad. Nauk SSSR	5	3
J. Chem. Phys.	6	6
Nature	7	2
Boll. Soc. Ital. Biol. Sper.	8	30
J. Chem. Soc. Japan, Ind. Chem. Sect.	9	12
Anal. Chem.	10	14

[c] *Chemical Abstracts*, Vol. 48, 1954; see footnote *b*, Table II. [d] *Chemical Abstracts*, Vol. 56–61, 1962–1964.

it impossible for the user to identify the source. For example, even with a one-letter error, *J. An. Chem. Soc.* will be recognized as *J. Am. Chem. Soc.*; however, JADS, again with a wrong letter, will not always be recognized as JACS, for it could easily be a wrong rendering of JABS. In order to retain some redundancy, Chemical Abstracts Service is now investigating the possibility of using a 10-letter code.

In summary, what was started as a small segment of a computer-based chemical-information system has now become an important managerial tool for the Chemical Abstracts Service.

Converting Foreign Language Chart Legends

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In preparing translations of foreign technical literature, the conversion of foreign-language figures into English presents problems beyond the mere translating of the text itself. The ideal treatment of figures should be to convert them into a form just as graphic and readable as the original, with all the legends, symbols, and notations in their proper place—but in English. Furthermore, it should be possible to make multiple copies of these as required.

In the case of simple graphs, it might be enough merely to supply a translation of the main caption and the abscissa and ordinate designations along with the original figure; but complex graphs with many legends and notations in the figure itself would require supplying an extensive glossary and would make the figure difficult for the reader to interpret. Hence there is the necessity for an improved method, with the use of a duplicating machine, in which the English legends supplied by the translator are written on small strips of paper by the typist and pasted on a copy of the original; from this "doctored" plate any number of other copies are made. Furthermore, the method has to be such that a typist unfamiliar with the language and the science involved, using only the written instructions of a translator who might be unavailable for consultation, could transform the original figure into an exact English equivalent.

First of all, of course, the translator must not fail to supply all the information needed, which means translating absolutely all the foreign-language notations in the figures—translating almost literally everything except the numbers and some international symbols and letters. The *form* in which the translator supplies this may vary. For example, in translating Figure 1a, two figures from a German metallurgy text, the translator, after giving the main caption, might write, "Abscissa: melt output of the cupola furnace (nominal yield). Ordinate, far left: permissible dust output in kg./metric ton of iron. Ordinate, next right: degree of dust removal (etc.). Legend on curve: operating hours of the cupola installations (etc.)." Or, the translator might draw a rough copy of the diagram and write in the translated legends in their place. Or he might letter these clearly on a transparent overlay placed over the figure (this method proved particularly useful for geological maps with a multitude of place names). The exact form is not important so long as all the information is there and the instructions to the typist are carefully distinguished from the text itself.

Now the typist makes a first copy of the original figure on the duplicating machine and touches this up wherever the printing from the original is unclear. The translated legends are written finely on small strips of white paper cut in a size and shape to fit the original legends. Sometimes the lower or upper ends of words like p, d, h, and g have to be shortened. The strips are pasted in their proper places on the first copy. They should cover the original legends fully but not cover any line, curve, symbol, or figure, not even partially. No symbol or expression, however small, should be omitted; for example, the notations kg/t and t/h are left untouched. Figure 1b shows the foreign-language legends blanked out; Figure 1c shows the result of pasting. It is seen that the copies are approximately as sharp as the original. These copies are then cut out and pasted onto the typed translation in spaces left for this purpose above the typed main captions of the figures.

This method is applicable not only to graphs but also to line drawings, such as diagrams of apparatus of flow charts.

Tables of figures also require special treatment. Firstly, the translator should draw the outlines of the table in skeleton form and write on their proper place the complete

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