Lib. sc. 10; 1973; PAPER Y.

Colon Classification for Macro-Documents in Chemistry.

(Classification problems. 81) (Design series. 45).
(CC Ed 7 series. 3).

M A Gopinath, *Documentation Research and Training Centre, Indian Statistical Institute, Bangalore* 560003.

[Enumerates the objectives and the methodology for the revision of Colon Classification (CC) schedule for the classification of subjects going with E Chemistry. A revised schedule of CC for classification of subjects going with the Primary Basic Subjects E Chemistry and its Secondary Basic Subjects are presented with scope notes and working rules. An index to schedule, one hundred and thirty six examples of subjects classified according to the scheme, and an alphabetical index to these subjects are given.]

ABBREVIATIONS USED:

(BS)	= Basic Subject	(MM)	= Matter Method Isolates
(CC)	= Colon Classification	(MP)	= Matter Property Isolates
(CN)	= Class Number	(P)	= Personality Isolate
(E)	= Energy isolate	(SpC)	= Special Component
(IN)	= Isolate Number		

0 Introduction

This paper presents a schedule of Basic Subjects and the isolate ideas needed for classifying subjects going with the Primary Basic Subjects "E Chemistry". The schedule is a revised version of CC ed 6 (1960). This schedule is mainly intended for the classification of subjects embodied in the books. The basic structure of the design of this schedule was framed by the late S R Ranganathan. He was assisted by M A Gopinath, P Jayarajan. A Neelameghan and S Seetharama at different stages in the development of the schedule.

1 Objectives of Revision

The general objectives of the revision of the schedule are:

1 To bring the sequence of isolates enumerated in line with a generally accepted view of a majority of specialists;

2 To enumerate in the schedule as many of the isolates as may be adequate for the classification of macro-documents. The requirements of a classification for micro-documents such as articles in periodicals, was not specifically taken into account;

21 In enumerating the special isolates, to provide means for the interpolation of new isolates that may come up in future, without considerable disturbance to the sequence of isolates now enumerated, and to the (IN) now assigned;

3 To respect, as far as possible, the Law of Parsimony (4) in the Notational plane, without prejudice to the implementation of the findings in the idea plane; and this is achieved

1 By respecting the integrity of Class Numbers wherever such a procedure will not do violence to the findings of the Idea Plane, the purpose being to keep to a minimum the change of Class Numbers already assigned to documents according to Ed 6 of CC; and

2 To restrict the number of digits in an (IN) generally to less than four.

2 Methods Adopted for Improving the Facet Structure

21 Determination of Facet Structure

The work of improving the facet structure for the compound subjects going with Chemistry was done along the following lines:

1 With a view to modify the schedules, the literary warrant was checked, that is, an extensive study of current books was made. This pragmatic approach consisted in examining the kind of documents listed in the latest trade catalogues of publishers such as Academic Press, John Wiley & Sons, (Wiley-Interscience), McGraw-Hill Publishing Co, Prentice Hall Catalog, Holt, Rinehart, and Winston, the *British national bibliography*, *the Publishers' trade list annual*, and the *Cumulative book index*.

This investigation showed that several books could not be classified with the existing schedule, thereby confirming the view that the existing schedule was not sufficient for the purpose, and that it should be augmented by interpolating new isolates.

2 Utilisation of recent advances made in the General Theory of Library Classification—as for example, the clearer view of the concept of five fundamental categories, the application of the postulates and principles and the advances made in the development of versatile notational system especially the provision for interpolation and extrapolation of new Basic Subjects and isolates.

22 DOCUMENTS USED

The following were the documents used for information on the different concepts in the subject field Chemistry.

General

1 *Encyclopaedia Britannica.* 1965. 24V.

2 *McGraw-Hill encyclopaedia of science and technology.* 1971. 15V.

Chemistry

1 *International encyclopaedia of chemical science.* 1964. Princeton (New Jersey). D Van Nostrand Company, Inc.

2 IHDE (Aaron J). *Development of modern chemistry.* 1964.

3 ROSE (Arthur) and ROSE (Elizabeth). *Condensed chemical dictionary.* Ed 7. 1966.

3 Chemistry and its Subdivisions

30 SCOPE OF CHEMISTRY

Chemistry is a branch of natural sciences. It investigates the composition of all matter, and the transformations which the matter exhibits when subjected to energy change. To state it more specifically chemistry includes a study of the properties, composition, and structure of matter, the changes in structure and composition which matter undergoes, and the accompanying energy changes. Chemistry is one of the earliest disciplines to be recognised as Science. Chemical Engineering and Chemical Technology are subjects which are closely related to Chemistry. Physics, Biology, and Geology have interdisciplinary relationship with Chemistry.

31 CC SCHEDULE FOR CHEMICAL SCIENCES

In CC, the schedules for Chemistry and its allied subjects are represented as follows:

E*Z	Chemical sciences
E	Chemistry
EX	Chemical Engineering
F	Technology
FV	Foundry
FX	Welding

This paper presents schedules of isolate ideas for compound subjects going with Chemistry and its Secondary Basic Subjects. The schedules of isolates needed for classifying compound subjects going with EX Chemical Engineering and F Chemical Technology will be presented in later papers in this series.

32 CC SCHEDULE FOR CHEMISTRY

Chemistry is further subdivided as follows:

E	Chemistry
E–A	Systems in Chemistry *Note.— Division by* (CD). (*Illustrative*)
E–D	Alchemy
E1	General Chemistry
E2	Physical chemistry
E3	Analytical chemistry
E4	Synthetic chemistry

321 *General Chemistry*

'E1 General chemistry' covers a study of properties and energy changes in inorganic substances. Thus, General Chemistry covers topics in Inorganic Chemistry and Organic Chemistry. It also includes *in vitro* studies of biosubstances. The schedules presented in this paper are thoroughly revised in respect of enumeration of isolates. In the schedule for elements, there is provision for classifying collective treatment such as, Metals and Non-metals. The elements schedule is updated based on the latest developments in Chemistry. A list of special components for formation of compound isolates is given. Besides, the chemical symbol for each element, the atomic number, atomic weight and the class of material to which the particular element forms part of such as Transition Metals, Transuranium group, Non-metal, Metal, Actinium group are indicated. The schedule for Organic substance includes ring systems and their variations in details. Also provided is a list of special components. For representing this provides a facile device for constructing isolate numbers for organic compounds. The special component appears in the schedule with their indicator digit "=" (equals to) prefixed to each of them. The list of biosubstance is also enumerated in detail.

322 *Physical Chemistry*

'E2 Physical Chemistry' covers the energy and chemical changes of substances in different states of matter. A list of states of matter is given as (P) schedule for Physical Chemistry.

323 *Analytical Chemistry*

'E3 Analytical Chemistry' exclusively covers the study of various methods used in the Analysis of a Chemical Substance. The analysis of any specific substance is classified with the respective host subject. For example, the analysis of Gallium is placed in "General Chemistry, Gallium: Analysis". A list

of methods of analysis is enumerated as (P) isolates in the schedule for "E3 Analytical Chemistry".

324 *Synthetic Chemistry*

'E4 Synthetic Chemistry' exclusively covers the study of various methods of synthesis. The synthesis of any specific substance is classified with the respective host subject. For example, 'Peptide Synthesis' is placed in "General Chemistry, Peptides: Synthesis". Methods of synthesis are deemed to be (P) isolates in the subjects going with "E4 Synthetic Chemistry".

325 *Matter Property Isolates*

A list of matter property isolates needed for classifying subjects going with the secondary (BS) of 'E Chemistry' is presented in the schedule of (1P1) isolates. In addition to this, the schedule of common Matter Property isolates (1) can also be used in classifying compound subjects going with Chemistry.

326 *Energy Isolates*

A list of Energy isolates needed for classifying subjects going with "E Chemistry" and Secondary (BS) is presented. In addition to this, the schedule of Common Energy isolates can also be used for classifying the compound subjects going with E Chemistry.

327 *Method Isolates*

A list of Method isolates needed for classifying subjects going with the secondary (BS) of E Chemistry, are listed in the Schedule of (P) isolates of "E3 Analytical Chemistry". The same schedule can be used as Second Round Matter Method isolates for the Energy Isolate 3 Analysis'.

328 *Consultation with Specialists*

Specialists from the Indian Institute of Science, Bangalore, and the Bangalore University, in the various disciplines in Chemistry and Chemical Sciences were consulted in demarcating the scope of the secondary (BS) of subjects. The schedules presented in this paper incorporates their suggestions.

4 Principles Used for Arrangement

The following principles for helpful sequence have been used in the determination of the sequence of secondary (BS) and the isolate ideas respectively.

Principle	Statement	Used in the Schedule of	Characteristics
Later in Development	If the subjects or ideas in a schedule have originated at different stages of development, they may be arranged in a parallel progressive development sequence except when any other overwhelming consideration rules it out.	Secondary (BS) of E Chemistry	Stages of development
Increasing Complexity	If the subjects or ideas in a schedule have different degrees of complexity they may be arranged parallel to the sequence of increasing complexity, except when any other overwhelming consideration rules it out.	Array of Order I Isolate ideas in (1P1) schedule of E1 General Chemistry	Degree of complexity
		Array of Order I isolate ideas in (1P1) schedule of E2 Physical Chemistry	Degree of Complexity
Increasing Quantity	If the subjects or isolates in a schedule admit of quantitative distinction they may be arranged according to their increasing quantity, if it is helpful.	Elements in each group in (1P1) isolates in the schedule of E1 General Chemistry	Atomic Number

Principle of	Statement	Used in the Schedule of	Characteristics
		Ring Systems in (1P1) isolates in the Schedule of E1 General Chemistry	Number of members in a ring
Canonical Sequence	If the subjects or isolates in a schedule are traditionally referred to in a specific sequence, although no underlying principle is discoverable, it will be convenient to conform to this traditional sequence	(1P1) Methods isolates in E3 Analytical Chemistry (1MP) Property isolates of E Chemistry (1E) Action isolates in E Chemistry.	
Alphabetical Sequence	When no other sequence of the isolates in a schedule is more helpful, they may be arranged alphabetically by their names current in international usage	9A Named Reactions in (1E) Schedule of E Chemistry	Name of Reaction

5 Notational System Used

The notational system of CC used for assigning numbers to the isolate ideas consists of a mixed base of

(a) 23 Roman small letters (a .... z, excluding i, l, and o);
(b) 10 Indo-Arabic numerals (0 .... 9);
(c) 26 Roman capital letters (A .... Z);
(d) Bracketed numbers; and
(e) The indicator digits ' . : ; ; - = + → in addition to the anteriorising digits * " ←

The digits z, 9, and Z have been used as Empty Digits. The digit 0 (zero) has been used as a rich digit. As far as possible,

originally assigned numbers to isolates are retained. Newly added isolates were accommodated using Roman small letters and Roman capitals. Compound isolates can be formed using the enumerated ones whenever needed. The digit-group *Z can be used whenever an agglomeration of enumerated isolates is needed.

6 Index to Schedule

Note.— 1 The terms enumerated in the schedules are listed in this index. However, terms denoting ideas the number for which are indicated to be derived by a device are not included.

2 The number from the schedule given against each index entry is preceded by an abbreviation for the name of the appropriate Fundamental category — for example, (1P1), (1MP1), (1 MM1), (1E) etc.

7 Schedule

E Chemistry

Secondary Basic Subjects

E1 General Chemistry
E2 Physical Chemistry
E3 Analytical Chemistry
E4 Synthetic Chemistry

E1 General Chemistry

Schedule of (P) Isolates
a *By Substance*
(a to d may be used only for collective treatment)
a1 *By State of matter*
a11 Solid
a15 Liquid
a152 Thin film
a18 Gas

a3 *By Weight*
a32 Light
a34 Heavy

a4 *By Strength*
a42 Low
a44 High
a46 Brittle

a5 *By Plasticity*
a51 Ductile
a52 Malleable
a55 Tough
a56 Rigid

a7 *By Hardness*
a71 Moh's scale for minerals
a711 Talc
a712 Gypsum
a713 Calc-spar
a714 Fluorspar
a715 Apatite
a716 Feldspar
a717 Quartz
a718 Topaz
a7191 Sapphire
a7192 Diamond

aE *By Thermal property*
aE1 *By Conductivity*
aE12 Low
aE14 High

aE4 *By Specific heat*
aE42 Low
aE44 High

aE5 *By Melting point*
aE52 Low
aE54 High (Refractory material

aE6 *By Boiling point*
aE62 Low
aE64 High

aG *By Electric property*
aG1 *By Conductivity*
aG12 Low
aG14 High
aG15 Semi-conductor
aG2 Dielectric
aG22 Low
aG24 High

aQ Radioactive
aS Labelled compound
aU Ion
aV Radical
aV2 Free radical
aX Trace element
aY Coordination compound
aY3 Chelate
b Metal
b1 Transition metals
b2 Ferrous metals
b22 Non-ferrous metals
b3 Noble
b4 Lanthanides
b5 Actinides
b6 Transuranic
b7 Non-transuranic
b8 Nuclear
c Metalloid
d Non-metal

I Inorganic Substance
Note.— Against the term denoting the element, the following items of information about the element are given in parenthesis:
1 The chemical symbol
2 The atomic number
3 The atomic weight
4 Nature of the element
Abbreviations used
A = Actinoid
L = Lanthanoid
M = Metal
M-A = Actinoid Metal

M-L = Lanthanoid Metal
M-N = Metalloid,
N = Non-metal

10 *Group* 0

100 Helium (He; 2; 4; N)
101 Neon (Ne; 10; 20; N)
102 Argon (Ar; 18; 40; N)
104 Krypton (Kr; 36; 84; N)
106 Xenon (Xe; 54; 131; N)
107 Radon (Rn; 86; 222; N)

11 *Group* 1
110 Hydrogen (H; 1; 1; N)
111 Lithium (Li; 3; 7; M)
112 Sodium (Na; 11; 23; M)
113 Potassium (K; 19; 39; M)
114 *Ammonia* (NH_3)
115 Copper (Cu; 29; 64; M)
116 Rubidium (Rb; 37; 85; M)
117 Silver (Ag; 47; 108; M)
118 Cesium (Cs; 55; 133; M)
11A Dyspriosium (Dy; 66; 163; M-L)
11B Holmium (Ho; 67; 165; M-L)
11C Gold (Au; 79; 197; M)
11D Francium (Fr; 87; 223; M)

12 *Group* 2
120 Beryllium (Be; 4; 9; M)
121 Magnesium (Mg; 12; 24; M)
122 Calcium (Ca; 20; 40; M)
123 Zinc (Zn; 30; 65; M)
124 Strontium (Sr; 38; 88; M)
125 Cadmium (Cd; 48; 112; M)
126 Barium (Ba; 56; 137; M)
127 Erbium (Er; 68; 167; M-L)
128 Thulium (Tm; 69; 169; M-L)
12A Mercury (Hg; 80; 201; M)
12B Radium (Ra; 88; 226; M)

13 *Group* 3
130 Boron (B; 5; 11; M-N)
131 Aluminium (Al; 13; 27; M)
132 Soandium (SC; 21; 45; M)
133 Gallium (Ga; 31; 70; M)
134 Yttrium (Y; 39; 89; M)
135 Indium (In; 49; 115; M)
136 Lanthanum (La; 57; 139; M)
137 Ytterbium (Yb; 70; 173; M-L)
138 Lutecium (Lu; 71; 175; M-L)
13A Thallium (Tl; 81; 204; M)
13B Actinium (Ac; 89; 227; M)
13C Promethium (Pm; 61; 145; M-L)

14 *Group* 4
140 Carbon (C; 6; 12; N)
141 Silicon (Si; 14; 28; M-N)
142 Titanium (Ti; 22; 48; M)
143 Germanium (Ge; 32; 73; M)
144 Zirconium (Zr; 40; 91; M)
145 Tin (Sn; 50; 119; M)
146 Cerium (Ce; 58; 140; M-L)
147 Praseodymium (Pr; 59; 141; M-L)
148 Hafnium (Hf; 72; 179; M)
14A Lead (Pb; 82; 297; M)
14B Thorium (Th; 90; 232; M-A)

15 *Group* 5
150 Nitrogen (N; 7; 141; N)
151 Phosphorus (P; 15; 31; N)
152 Vanadium (V; 23; 51; M)
153 Arsenic (As; 33; 75; M-N)
154 Nibium (Nb; 41; 93; M)
155 Antimony (Sb; 51; 122; M-N)
156 Neodymium (Nd; 60; 144; M-L)
157 Tantalum (Ta; 73; 181; M)
158 Bismuth (Bi; 83; 209; N)
15A Protactinium (Pa; 91; 231; M-A)

16 *Group* 6
160 Oxygen (O; 8; 16; N)
161 Sulphur (S; 16; 32; N)
162 Chromium (Cr; 24; 52; M)
163 Selenium (Se; 34; 79; N)
164 Molybdenum (Mo; 42; 96; M)
165 Tellurium (Te; 52; 128; M-N)
166 Samarium (Sm; 62; 150; M-L)
167 Europium (Eu; 63; 152; M-L)
168 Tungsten (W; 74; 184; M)
16A Polonium (Po; 84; 210; N)
16B Uranium (U; 92; 238; M-A)
16C Neptunium (Np; 93; 237; M-A)
16D Plutonium (Pu; 94; 244; M-A)
16E Americum (Am; 95; 243; M-A)
16F Curium (Cm; 96; 248; M-A)
16G Berkelium (Bk; 97; 247; M-A)

16H Californium (Cf; 98; 251; M–A)
16J Einstenium (Es; 99; 254; M–A)
16K Fermium (Fm; 100; 253; M–A)
16L Mendelevium (Md; 101; 256; M–A)
16M Nobelim (No; 102; 253; M–A)
16P Kurchatovium (Ku; 104; 257; M–A)

17 *Group* 7
170 Fluorine (F; 9; 19; N)
171 Chlorine (Cl; 17; 35; N)
172 Manganese (Mn;251; 55; M)
173 Bromine (Br; 35; 80; N)
174 Technetium (Tc; 43; 99; M)
175 Iodine (I; 53; 127; N)
176 Gadolinium (Gd; 64; 157; M–L)
177 Terbium (Tb; 65; 159; M–L)
178 Rhenium (Re; 75; 186; M)
17A Astatine (At; 85; 210; N)

18 *Group* 8
181 Steel
182 Iron (Fe; 26; 56; M)
183 Nickel (Ni; 28; 59; M)
184 Cobalt (Co; 29; 59; M)
185 Ruthenium (Ru; 44; 101; M)
186 Rhodium (Rh; 54; 103; M)
187 Palladium (Pd; 46; 106; M)
188 Osmium (Os; 76; 190; M)
18A Iridium (Ir; 77; 192; M)
18B Platinum (Pt; 78; 195; M)

Special Components to form Compound Isolates with the (IN) "a" to "18B"

=B Alloy
=D Isotope
=E Isolaar (Isobar)

2 *Basic Oxide*
Divisions by combining full element number (*See* Rules 0e and 112)
(*Illustrative*)
24A2 Lead oxide (Yellow)
24A4 Lead dioxide
2823 Ferric oxide
2828 Ferrate oxide

27 *Binary*
Division by full element numbers
(*See* Rules 0c and 1127)
(*Illustrative*)

27101–612 Hydrogen sulphide

3 *Acid*
Divisions by combining full element number
(*See* Rules 0c and 113)

(*Illustrative*)

3614 Sulphurous acid
3616 Sulphuric acid

4 *Salt*
Divisions by combining full element number, basic component being the first component
(*See* Rule 114)

(*Illustrative*)

4232–616 Zinc sulphite
4232–618 Zinc sulphate

5 *Organic substance*
51 *Aliphatic compound* (Acyclic)
51Z *Saturated hydrocarbon*
52 *Paraffin* (*Alkane*)
521 Methane
522 Ethane
523 Propane
524 Butane
525 Pentane
526 Hexane
527 nth homologue

52Z *Unsaturated hydrocarbon*
53 Olefine (Alkene)
532 Ethylene
533 Propylene
534 Butylene. Butene
538 nth homologue

54 *Di-olefine*
541 Allene
544 Butadiene
545 Isoprene

55 *Acetylene series* (*Alkyne*)
551 Acetylene
558 nth homologue

56	Alicyclic (Monocyclic)
560Z	Saturated
563	Cyclopropane
564	Cyclobutane
568	nth homologue
569Z	Unsaturated
56B	Cyclobutene
56C	Cyclobutadiene
56E	Cyclopentene
56G	Cyclopentadiene
58	*Carbohydrate*
581	*Monosaccharide*
5812	Diose
5813	Triose
5814	Tetrose
5815	Pentose
5816	Hexose
58163	Glucose
58165	Sorbose
581Z	*Oligosaccharide*
582	*Disaccharide*
5821	Sucrose
5822	Maltose
5823	Lactose
583	*Trisaccharide*
587	*Polysaccharide*
5875	Pentosan
5876	Hexosan
58761	Cellulose
58762	Dextrin
58768	Starch
588	*Compound carbohydrates*
5881	Uronide
5882	Gum
5883	Hemicellulose
5885	Pectin
5888	Glucoside (Glycoside)
6	*Aromatic compound*
61	Benzenoid
610Z	Saturated side chain
611	Benzene
612	Toluene
614	Ethylbenzene
618Z	Unsaturated side chain
6191	Styrene
6195	Alkylbenzene
619A	Polyphenyl
619H	Stilbene
62	*Polynuclear*
621	Indene
622	Naphthalene
623	Azulene
625	Anthracene
628	Phenanthrene
63	Bridged hydrocarbon
64	Spiro hydrocarbon
65	Hydrocarbon ring assembly
66	Cyclic hydrocarbon with side chain
68	*Terpene hydrocarbon*
680Z	By Isoprene structure
681	Hemi
682	Mono
683	Sesquiterpene
683Z	By Isoprene unit
684	Diterpene
686	Triterpene
688	Tetraterpene
688Z	Polyterpene
68AZ	By Number of rings
68B	Monocyclic
68C	Bicyclic
68F	Acyclic
7	*Heterocyclic compound*
73	3-membered ring
731	With one hetero atom
7311	Oxiran
7312	Thiiran
7313	Aziridine
732	With two hetero atoms
7321	Oxetan
7322	Thietan
7323	Azetidine
74	4-membered ring
741	Rings two O atoms
742	Rings two S atoms
743	Rings two N atoms
744	Rings containing one N and one O atoms
75	*5-membered ring with N*
751	Pyrroles and hydropyrroles
7511	Pyrrole
7512	Pyrroline
7513	Pyrrolidine
752	Indoles and hydroindoles
7521	Indole
7522	Indoline
7523	Indolinone
7524	Tetrahydroindole
753	Iso-indoles and iso-indoline

755	Benzo indole
756	Carbazole
76	*5-membered ring with O as hetero atom*
761	Monocyclic furans and hydrofurans
7611	Furan
7612	Dihydrofuran
7614	Tetrahydrofuran
762	Coumarone and Benzofuran
7621	Benzofuran
7623	Coumarane
763	Iso-benzofuran
765	Dibenzofuran
77	*5-membered ring with S as hetero atom*
771	Monocyclic thiophenes and hydrothiophenes
7711	Thiophene
7712	Dihydrothiophene
7714	Tetrahydrothiophene
772	Thionaphthene
774	Dibenzothiophene
776	Selenophene
777	Tellurophene
78	*5-membered ring with two hetero atoms*
781	Pyrazole group
7811	Pyrazole
7812	Pyrazoline
7813	Pyrazolidine
7814	Imidazole
782	Iminazole group
7821	Iminazole
7822	Iminazoline
7823	Iminazolidine
7824	Benziminazole
783	Dioxole group
7831	Dioxole
7835	Dithiole
784	Isoxazole group
7841	Isoxazole
7842	Isoxazoline
7843	Isoxazolidine
785	Oxazole group
7851	Oxazole
7852	Oxazoline
7853	Oxazolidine
786	Iso-thiazole Group
7865	Benzisothiozole
787	Thiozole group
7871	Thiozole
7872	Thiozoline
7873	Thiozolidine
7874	Penicillin
7875	Benzothiazole
7876	Selanazole
793	*5-membered ring with 3 hetero atoms*
7931	Triazole
7932	Oxadiazole
7933	Thiadiazole
7934	Dioxazole
7936	Oxathiazole
794	*5-membered ring with 4 hetero atoms*
7941	Tetrazone
7943	Thiazone
7944	Dithiadiazole
7B	*6-membered ring with N as hetero atoms*
7B1	Pyridine group
7B11	Pyridine
7B12	Dihydropyridine
7B14	Tetrahydropyridine (Diperideine)
7B17	Hexahydropyridine
7B18	Dipiperidyls
7B2	Quinolines and isoquinolines
7B21	Quinoline
7B23	Isoquinoline
7B4	Acridine
7B5	Phenanthridine
7B6	Benzoquinoline and benzo-isoquinoline
7B81	Benacridine
7B85	Benzophernanthridine
7C	*6-membered ring with O as hetero atom*
7C1	Pyran
7C12	Pyronol
7C13	Pyrone
7C14	Dihydropyran
7C18	Tetrahydropyran
7C3	Chromen

7C31	Anthrocyamine and anthocyanide
7C32	Coumarin
7C33	Chromones
7C35	Fluorene
7C36	Benezochromen
7C4	Chroman
7C41	Tocopherol
7C43	Catechine and other tannins
7C44	Flavanone
7C5	Isobenzopyran
7C52	Isocoumarin
7C53	Isochroman
7C6	Xanthen
7D	*6-membered ring with S as hetero atom*
7D1	Thiapyran
7D2	Thiachroman
7D3	Dibenzothiapyran
7E	Brazilin and haematoxylin
7E1	Brazilin
7E2	Haematoxylin
7F	*Two fused 5 or 6-membered heterocyclic ring each of one hetero atoms*
7F1	Two hetero rings fused to an aromatic system
7F11	Pyranoquinoline
7F13	Phenanthroline
7F15	Dipyridonaphthalene
7G	*Compounds with two hetero rings fused through adjacent carbon atom*
7G1	Furanoquinoline
7G2	Pyranoquinoline
7G3	Pyrolopyridine
7G5	Naphthopyridine
7H	*Fused hetero system with a N atom common to two rings*
7H1	Pyrrocoline
7H2	Puridocoline
7H3	Julolidine
7H4	Lilolidine
7K	*Bridged ring compounds*
7K1	With N common to two rings
7K12	Quinuclidine
7K2	Bicyclic system with a N bridge
7K25	Novtropane
7L	*Dyes and pigments*
7L1	Cyanine
7L12	Azacyanine
7L13	Neocyanine
7L14	Merocyanine
7L16	Oxanol dye
7L17	Styryl dye
7L2	Indigo group
7L3	Byrrole pigment
7L4	Monocyclic pigment
7L44	Porphin
7L46	Haemoglobin
7L5	Reduced pigment
7L51	Chlorophyll
7L52	Cyanocobalamin
7L5	Azaporphin
7L7	Benzoporphin
7M	*Compounds with unusual hetero atoms*
7M4	5-membered ring with one hetero atom
7M47	Halogen compound
7M4P	Phosphorous compound
7M4SB	Antimony compound
7M5	5-membered ring with more than one hetero atom
7M52	P and O or N
7M53	As and O
7M54	As and S
7M6	6-membered ring with more than one hetero atom
7M61	Si with O, S, or N compounds
7M62	P with O, or N compounds
7M64	Sb and O compounds
7M7	7-membered and larger rings
7M73	Si and Sn compounds
7N	*6-membered ring with two hetero atoms*
7N1	Diazine
7N2	Pyridazine
7N23	Cinnoline

7N28	Phthalazine
7N3	Pyrimidine
7N4	Pyrazine
7N44	Quinoxaline
7N45	Phenazine
7N5	Oxazine
7N51	Monocyclic
7N6	Thiazine
7N61	Homocyclic
7N62	Benzothiazine
7N63	Phenothiazine
7N7	Dioxane
7P	*Dyes from phenazine etc and S dyes*
7P1	Phenazine dyes
7P3	Phenothiazine dyes
7P6	Sulphur dyes
7Q	*6-membered rings with more than 2 hetero atoms*
7Q1	Triazine
7Q2	Dioxazines and Dithiazenes
7Q3	Trioxane and trithion
7Q4	Tetrazine
7Q5	Pentazine
7R3	7-membered ring
7R4	8-membered ring
7S	*Purines and related ring system*
7S1	Purine
7S12	Hydroxy purine
7S13	Halazonopurine
7S14	Mercaptopurine
7S15	Amino purine
7S2	Thiazolopyrimidine
7S23	Pyrazolopyrimidine
7T1	Nucleoside
7T2	Nucleotide
7T3	Nucleic acid
7TA	Pteridine
7TB	Alloxizine
7TC	Vitamin B12
7TD	Vitamin B1
7V	*Alkaloid*
7V11	Pyrrolidine
7V12	Puridine and Piperidinee
7V13	Purrolizidine
7V14	Tropane
7V14A	Atropine
7V14H	Hyoscyamine
7V14S	Scopolamine
7V21	Quinoline
7V211	Echinopsine
7V212	Chincona
7V213	Acridine
7V3	Isoquinoline
7V41	Lupinane
7V43	Cystisine
7V46	Iminazole
7V47	Quinazoline
7V	Diterpene and steroid group
7V51	Diterpene
7V52	Steroid
7V61	Morphine
7V62	Codeine
7V63	Neoprine
7V64	Thebain
7V66	Oripavine
7V67	Sinomenine
7V68	Hasabenomine
7V7	Indole
7V8	Erythrina group
7V82	Lactonic
7V86	Aromatic
	(For collective treatment only)
7VB	Polymer
7VB5	High polymers
7VJ	Vegetable
7VK	Animal
8	*Bio substance*
81Z	*Amino acid, Peptide and Protein*
82	*Amino acid*
821	Mono-carboxylic monoamino acid
8211	Glycine
8212	Alpha alamine
8214	Serine
8215	Valine
8216	Thiocomine
8217	Cysteine
8218	Leucine
821C	Methiomine

821E Phenyl alamine
821G Tyrosine
821J Tryptophan
822 Polyamino acid
8271 Ormithine
8273 Lycine
8275 Arginene
8277 Cystine
828 Heterocyclic amino acid
8281 Proline
8283 Hydroxy proline
8285 Histilene

83 *Fatty acid*
831 Tartaric acid
833 Citric acid
834 Malic acid
835 Lactic acid
83B Formic acid
83C Acetic
83E Stearic
83F Oleic
83H Benzoic
83K Succinic

84 *Peptide*
842 Di-peptide
843 Tripeptide
848 Poly-peptide

85 *Protein*
851 Simple

8512 Albumin
8513 Globulin
8517 Histone
8518 Collagen
853 Conjugated
8531 Haemoglobin
8533 Erythrochromin
8535 Nucleo protein

855 Derived protein
8552 Denatured
8555 Hydrolytic
(85J and 85K are for collective treatment only)
85J Vegetable protein
85K Animal protein
85M *Enzyme*
85M1 Oxidising
85M2 Hydrolysing
85M3 Phosphorylising
85M4 Transferring
85M5 Isomerising
85M6 Splitting

86 *Hormone*
861 Steroidal
8612 Androgen
8613 Corticoid
8615 Estrogen
8616 Progesterone

862 Non-steroidal
863 Phenol derivative
8631 Epinephrine
8632 Norepinephrine
8635 Thyroxine
8636 Tri-iodo thyronine

864 Protein hormone
8641 Anterior pituitary hormone (APH)
8643 Gonadothropin
8645 Thyroglobulin
865 Peptide hormone
8653 Insulin
8655 ACTH
8656 Vasopression
8657 Oxytocin
8658 Sectretin

87 *Vitamin* (For collective treatment only)

88 *Lipid*

8L *Antibiotics* (For collective treatment only)

Special components for compound isolates to go with ''5'' to ''8'' and their subdivisions

=b Metallic compound (Collective)
=d Non-metallic compound (Collective)
=12A Mercury compound
=14A Lead compound
=150 *Nitrogen compound*
=150J Amino
=15031 Azo
=1505 Diazo
=1507 Nitro
=15071 Nitroso
=150A Cyano group
=150B Cyanide
=150C Isonitrile (Isocyanide)
=150D Urea
=150F Guanidine
=150H Amidine
=150J Urethane

=150K	Carbonyl halide
=150P	Cyanamide
=150S	Nitride
=151	Phosphorus compound
=161	Sulphur compound
=17	*Halogen derivative*
=170	Fluoride
=171	Chloride
=173	Bromide
=175	Iodide
=177	Perchloryl Groups
=5	*Hydroxyl*
=51	Alcohol
=512	Glycol
=52	Ether
=53	Epoxide
=54	Peroxide
=5Z	*Aldehyde and ketone*
=6A	Aldehyde
=6B	Ketone
=7B	Ester
=7C	Hydride
=7E	Anhydride
=7G	Hemiacetal
=7H	Acetal
=7J	Cynohydrin
=7K	Ketene
=7M	Oxime
=7N	Hydroxylamine
=7P	Hydroxamate
=7Q	Hydrazone
=7S	Semi-carazone
=7T	Hydrazine

E2 Physical Chemistry

Schedule of (P) state of matter isolates

OZ	*By state of matter*
11	Solid
14	Crystal
15	Liquid
17	Film (surfaces)
18	Gas
2	Solution
22	Unsaturated
23	Saturated
24	Supersaturated
2A	Buffer solution
2B	Hypotonic
2C	Isotonic
2D	Hypertonic
2E	Chemical
2G	Normal
2J	Gas-liquid
31	Solute
32	Non-solute
4	Solvent
44	Non-aqueous solvent
45	Aqueous solvent
461	Non-ionizing solvent
462	Ionizing solvent
5	Colloid
53	Dispersed phase
54	Dispersion phase
61	Emulsion
64	Molten salt

E3 Analytical Chemistry

Schedules of (1P1) Method isolates

OZ	By Method
1	Physical
11	Centrifugal
12	Counter current
15	Fluid method
152	Static
153	Dynamic
17	Mass spectrometry
2	*Chromatography*
23	Absorption
231	Column
232	Thin layer
25	Partition
251	Paper
252	Gas
253	Gas liquid
27	Ion exchange
4	*Thermal*
41	Thermometric
44	Differential thermal analysis
5	*Radiation*
511	Microscopy
5116	Electron microscopy
514	Turbidimetry
5141	Nephelometry
52	Photometry
525	Spectrophotometry
526	Flame spectrophotometry
527	Colorimetry
53	Refractometry
54	Polarimetry
55	Spectrometry
552	Ultraviolet spectrometry
553	X-ray spectrometry
554	Gamma-ray spectrometry

555 Raman spectrometry
556 Infra-red spectrometry

55E Emission spectrometry
55H Absorption spectrometry
55M Atomic absorption spectrometry

56 Phosphorimetry
57 Fluorimetry

6 *Electrical method*
61 Conductometry
62 Potentiometry
63 Amperometry (Coulometry)

7 *Magnetic method*
71 Magnetic susceptibility
73 Electron para magnetic resonance (EPR)
77 Nuclear magnetic resonance (NMR)

B *Radiometry*
B1 Radioactivation
B4 Tracer
B5 Isotopic dilution
B6 Neutron activation

E *Chemical method*
E2 Oxidation reduction (Redox)
E21 Chlorometry
E23 Bromometry
E25 Iodometry
E5 Complexation (Coordination)

F *Instrumental*
G *Biological*
G2 Microbiological
G5 Bioassay
H Non-destructive
M Volumetry
M1 Direct
M2 Indirect
N Gravimetry
Q Qualitative
R Quantitative
S Spot
T Micro
U Semimicro
V Macro

Schedule of (1MMt1) *Material isolates*

00Z *By material used for analysis*

01 Reagent
011 Inorganic
015 Organic
01Z *Indicator*
021 Internal
025 External
03 Adsorption
04 Neutralisation
05 Achromatic
06 Fluorescent
07 Precipitant
08 Complexing agent
0C Test paper

E4 **Synthetic Chemistry**

Schedule of (1P1) isolates
Note.— Isolates same as those enumerated in the Schedule of (1E) isolates.

(*Illustrative*)
8 Reaction
811 Oxidation
821 Acylation
82P Phosphorylation
8F Chelation
9F Friedel-Crafts Reaction
9G Grignard Reaction

Schedules Common for the Secondary (BS) of E Chemistry.

Schedule of (1MP1) *Property isolates*

0Z *By Property*
101 Additive property
102 Constitutive property
106 Colligative property
11 Atomic weight
12 Molecular weight
16 Atomic number

16Z *Stereochemistry*
17 Molecular structure
171 Rearrangement
173 Intermolecular force

186Z *Polymorphism*
187 Allotropy
1871 Monotropic
1873 Dynamic
1875 Enantiomorphic

188 *Isomerism*

1882	Tautomerism
1885	Metamerism
18A	By Structure
18B	Electronic
18J	Polyhedral
18K	Condensed polyhedral
18L	Electron-deficient
1A	*PH*
1A2	Alkalinity
1A3	Acidity
1A7	Neutral
21	*Chemical combination and action*
211	Law of chemical combination
213	Chemical kinetics
2131	Combustion. Flame
2133	Phase rule (Phase equilibrium)
2136	Ionisation
2137	Unimolecular reactions
214	Chemical affinity
2143	Chemical equilibrium
217	Spin theory
22	*Valence*
220Z	Bond strength
221	Ionic bond
222	Covalent bond
2221	Configuration
2222	Conformation
2223	Polar
2225	Coordinate
225	Metallic bond
226	Hydrogen bond
22A	Special theories
22N3	Crystal field theory
22N5	Ligand field theory
227	Van der vaal's forces
231	Elasticity
232	Viscosity
2321	Viscoelasticity
24	Transport phenomenon
25	Surface tension
27	Osmosis
31	Solubility
33	Volatility
34	Vapour pressure
36	Miscibility
42	Amalgamatic
43	Adsorption
47	Absorption
471	Occlusion
474	Adhesion
4B	Thermochemistry
4D	Chemical Thermodynamics
5	*Photochemical property*
51	Optical activity
54	Photosensitivity
55	Luminiscence
551	Fluorescence
552	Phosphorescence
56	Photoelectric
6	*Electrochemical property*
61	Electrolytic
7	Magnetochemical property
	Schedule of (1E)
	Action isolates
OZ	*By Action*
4	Preparation
5	Separation
7	Purification
8	*Reaction*
81	*Oxidation and reduction*
811	Oxidation
815	Reduction
816	Hydration and de-hydration
82	*Addition. Conjugation*
821	Acylation
822	Alkylation
8221	Acetylation
823	Methylation
8231	Transmethylation
8235	Demethylation
824	Esterification
825	Hydrolysis
826	Halogenation and dehalogenation
828	Amination and deamination
82P	Phosphorylation
82S	Sulphonation
83	*Substitution*
833	Nucleophilic
835	Electrophilic
838	Retrogressive
84	*Degradation*
842	Decylisation
843	Ring contraction
844	Decarboxylation
845	Depolymerisation
85	*Condensation*
851	Carboxylation
854	Cyclisation (Cycloaddition)
855	Ring expansion

8B	*Polymerisation*	8E	Binding
8B11	Mass	8F	Chelation
8B15	Bulk	8H	Catalysis
8B2	Addition		
8B21	Simple	9A	*Named reactions*
8B22	Copolymerisation		*Division by (AD)*
		9F	Friedel-Crafts reaction
8B32	Solution	9G	Grignard reaction
8B36	Emulsion		
8B38	Gaseous		Schedule of (2MMI)
8B5	Condensation		Isolates for the (IE) 3
8B6	Aromatic		Analysis only
8B7	Hetero		
			Divisions same as (IP)
8C	Isomerisation		Isolates of E3 Analytical
8C1	Cis-trans		Chemistry
8C2	Tautomerisation		*(Illustrative)*
	Keto-enol isomerisation		
8C5	Optical	2	Chromatography
8C6	Double-bound shift	44	Differential thermal analysis
8C8	Molecular rearrangement	555	Raman spectral analysis

Rules

0 *Definition*

0b *Element Number*

The term 'Element Number' denotes the group of digits following the initial digit "1" in the (IP1) Substance Isolate Number for "E1 General Chemistry". For example,

41 Silicon
50 Nitrogen
6B Uranium

0c *Full Element Number*

The term 'Full Element Number' denotes the Element Number followed by its Valency Number. The valency of some of the elements changes for compound to compound.

For example: The valency of iron, if Ferrous Oxide (FeO), is 2; but in Ferric Oxide (Fe_2O_3), it is 3.

112 *Basic Oxide, Hydroxyl*

The number of a Basic Oxide or Hydroxyl should consist successively of the digits "2" and of the appropriate Full Element Number. For convenience in classification, the treatment for a Basic Oxide and its Corresponding Hydroxyl is made the same. So, the (CN) for a Basic Oxide and its Hydroxyl will be the same. For example,

2124 Sodium monoxide. Sodium hydroxide

1125 *Amphoteric Oxide*

The Isolate Number for an Amphoteric Oxide should be constructed as for "2 Basic Oxide". For example,

2313 Aluminium hydroxide
2553 Antimony trioxide

1127 *Binery Compound*

The (IN) "27" is used for a Binary, other than water, which is neither Hydroxyl nor Acid nor Salt. Water is regarded as the Hydroxyl of Hydrogen

in the construction of its substance number. The number of a binary should consist successively of the digit-pair "27", the appropriate Element Number for the first constituent element and of the appropriate Full Element Number for the second constituent Element. For example,

271062 Hydrogen Sulphide

113 *Acidic Oxide, Acid*

The number of an Acidic Oxide or Acid should consist successively of the digits "3" and of the appropriate Full Element Number. For convenience in classification, the treatment for an Acidic Oxide and its corresponding Acid is made the same. So the (CN) for an Acidic Oxide and its Acid will be the same. For example,

3614 Sulphur dioxide. Sulphurous acid
3616 Sulphur trioxide. Sulphuric acid

1135 *Neutral Oxide*

The Isolate Number for a Neutral Oxide should be constructed as for "3 Acidic Oxide".

For example,

114 *Salt*

The Number of a Salt should consist successively of the digits "4" the appropriate Element Number of the first constituent element, and of the appropriate Full Element Number of the second constituent Element.

For example,

423616 Zinc Sulphite
423618 Zinc Sulphate
423711 Zinc Chloride

11A *Special Component*

At the end of the Schedule of (1P1) "1 Inorganic Substance", few Special Components are given.

11B *Alloy*

The Special Component Number "B" can be divided by the Metal which forms the major Component in the Alloy of a particular Metal. The (IN) for the Alloy thus got can be further divided by the Metal which forms the next major Component. This should be connected to the major Component (IN) by a "Hyphen".

For example,

b=B Alloys (General)
115=B Copper Alloy
115=B123 Brass (Zinc alloy of copper)
115=B145 Bronze (Tin alloy of copper)
115=B165-131 Aluminium bronze

11D *Isotope*

The Special Component Number "D" can be divided to get the (IN) for a Specific Isotope.

For example,

a=D Isotopes (General)
184=D Isotopes of Cobalt
184=D1 Cobalt 57
184=D2 Cobalt 58
184=D4 Cobalt 60

E2 Physical Chemistry

E21 The scope of physical chemistry confines to the matter and energy changes in general.

E22 Books dealing with the study of states of matter in general, or properties of substance in general are placed in "E2 Physical Chemistry". *For Example*,

E2;5 Physical chemistry; Optical activity
E2,2 Physical chemistry, Solution

E23 Books dealing with energy changes of a specific substance are placed along with other studies of the substance in E1 General Chemistry for example,

E1,58;16Z General chemistry, Carbohydrates; Stereochemistry
E1,61;4B General chemistry, Transition metal complexes; Thermochemistry

E3 Analytical Chemistry

E31 The scope of Analytical Chemistry confines to the study of methods of analysis in general.

E32 Books dealing with the study of methods of analysis in general are placed in "E3 Analytical Chemistry". *For example*,

E3,B1 Analytical chemistry, Radioactive analysis
E3, E5 Analytical chemistry, Complexation

E33 Books dealing with the analysis of specific substances is placed along with other studies of the substance in "E1 General Chemistry". For example,

E1,120:3 General chemistry, Beryllium: Analysis
E1,130:3 General chemistry, Boron: Analysis

E4 Synthetic Chemistry

E41 The scope of synthetic chemistry confines to the study of methods of synthesis in general.

E42 Books dealing with the study of methods of synthesis in general are placed in "E4 Synthetic chemistry". For example,

E4,816 Synthetic chemistry, Hydration
E4,8H Synthetic chemistry Catalysis

E43 Books dealing with the synthesis of specific substance is placed along with other studies of the substance in "E1 General Chemistry". For example

E1,d:9G General chemistry, Non-metals: Grignard reactions
E1,84:4 General chemistry, Peptides; Synthesis

Examples

ALPHABETICAL INDEX TO SUBJECTS

Note.—This is an alphabetical index to the subjects of the documents placed in "Sec 82 Classified Part". The alphabetical index has been prepared according to the latest version of Chain Procedure.

Activation analysis
Analytical chemistry, Radio activation analysis 127

Adhesion
General chemistry, High polymers; Adhesion 82

Adsorption
Physical chemistry; Adsorption *biased to* Synthetic chemistry; Catalysis 97

General chemistry, Aromatic compound; Photochemical properties 72
General chemistry; Aromatic compound: Sulphonation, Mechanistic aspects 71

Beryllium
General chemistry, Beryllium: Analysis 18

Boron
General chemistry, Boron 19
General chemistry, Boron: Analysis 20

Calculation
Chemistry: Calculation *application of* Mathematics 2

Carbohydrates
General chemistry, Carbohydrates: Spectrochemistry 69

Carbon
General chemistry, Carbon: Analysis; Nuclear Magnetic resonance spectra 24

Catalysis
Physical chemistry; Adsorption *biased to* Synthetic chemistry; Catalysis 97
Synthetic chemistry, Catalysis-Heterogenous 135
Synthetic chemistry, Catalysis; Investigation 133
Synthetic chemistry, Catalysis — Metals 134

Chelate compounds
General chemistry, Metal chelate compounds 72

Chemical kinetics
General chemistry, Organic substance: Analysis; Chemical kinetics 48
General chemistry, Sulphuric acid: Chemical kinetics 46
Physical chemistry; Chemical kinetics 91
Physical chemistry; Chemical kinetics Spin theory 112
Physical chemistry; Chemical kinetics — Unimolecular reactions 111
Physical chemistry, Gas; Chemical kinetics 107

Chemical thermodynamics
General chemistry, Organic substance; Chemical thermodynamics 55
Physical chemistry; Chemical thermodynamics 98

Chemistry 1

Chromatography
Analytical chemistry, Gas chromatography 121–122
Analytical chemistry, Thin-layer chromatography 120

Cobalt
General chemistry, Cobalt: Analysis 37

Colloid
Physical chemistry, Colloid 116

Colorimetric method
General chemistry, Metal-Trace element: Determination; Colorimetric method 11
General chemistry, Non-metal: Analysis; Colorimetric method 15

Complexation
Analytical chemistry, Complexation 128

Configuration
General chemistry, Metal complexes; Configuration 41

Conformation
Physical chemistry; Conformation 94

Coordination compound
General chemistry, Coordination compound: Photochemistry 10

Cycloaddition reaction
General chemistry, Heterocyclic compound; Cycloaddition reaction 76

General chemistry
General chemistry, Aromatic compound; Photochemical properties 72
•General chemistry, Aromatic compound: Sulphonation; Mechanistic aspects 71
General chemistry, Beryllium: Analysis 18
General chemistry, Boron 19
General chemistry, Boron: Analysis 20
General chemistry, Carbohydrates; Stereo-chemistry 69
General chemistry, Carbon: Analysis; Nuclear magnetic resonance spectra 24
General chemistry, Cobalt: Analysis 37
General chemistry, Coordination compound: Photochemistry 10
General chemistry, Cyclobutadiene 67
General chemistry, Fluoropolymers 81
General chemistry, Free radical 8
General chemistry, Free radical: Substitution reaction 9
General chemistry, Fluorine: Analysis 34
General chemistry, Fluorine: Analysis; Nuclear magnetic spectra "Report 1951 to 1967 35
General chemistry, Furopyroles 78
General chemistry, Gallium: Analysis 21
General chemistry, Hafnium: Analysis 27
General chemistry, Heterocyclic compound 74–75
General chemistry, Heterocyclic compound: Cycloaddition reaction 76
General chemistry, Heterocyclic compound-Inorganic substance 77
General chemistry, Heterocyclic compound-Seven membered ring 79
General chemistry, High polymers: Adhesion 82
General chemistry: Investigation 5
General chemistry, Iron group metallocenes 68
General chemistry, Labelled compound: Analysis; Infra-red spectroscopy 7
General chemistry, Lanthanide halides 42
General chemistry, Metal chelate compounds 12
General chemistry, Metal complexes: Configuration 41
General chemistry, Metal-Trace element: Determination; Colorimetric method 11
General chemistry, Molybdenum: Analysis 32
General chemistry, Mono and Sesquiterpene 73
General chemistry, Nickel: Analysis 36
General chemistry, Non-metal: Analysis; Colorimetric method 15
General chemistry, Non-metal: Grignard reactions 16
General chemistry, Niobium: Analysis 29
General chemistry, Organic substance 47
General chemistry, Organic substance-Amino compounds 60
General chemistry, Organic substance: Analysis; Volumetric method-Direct 51
General chemistry, Organic substance: Analysis; Volumetric method-Indirect 52
General chemistry, Organic substance: Chemical thermodynamics 55
General chemistry, Organic substance=Cyano group 61
General chemistry, Organic substance=Ether; Ionic linkage 65
General chemistry, Organic substance=Germanium compounds 57
General chemistry, Organic substance=Halogen compounds; Intermolecular interactions 64
General chemistry, Steroid: Analysis; Infra-red absorption spectroscopy "Atlas 85
General Chemistry, Organic substance=Isocyanide complexes of metals 62

Indirect volumetric method
General chemistry, Organic substance: Analysis; Volumetric method — Indirect 52
Infra-red absorption spectra
General chemistry, Steroid: Analysis; Infra-red spectra "Atlas 85
Infra-red spectroscopy
Analytical chemistry, Infra-red spectroscopy 125
General chemistry, Labelled compound: Analysis; Infra-red spectroscopy 7
Inorganic substance
General chemistry, Heterocyclic compound — Inorganic substance 77
Insoluble monolayer
Physical chemistry, Gas-Liquid interface, Insoluble monolayer 113
Intermolecular interaction
General chemistry, Organic substance=Halogen compound: Intermolecular interaction 64
Synthetic chemistry, Hydration; Intermolecular interactions 132
Investigation
General chemistry: Investigation 5
Synthetic chemistry: Catalysis: Investigation 133
Ionic linkage
General chemistry, Organic substance=Ether; Ionic linkage 65
Ionization
Physical chemistry, Ionizing solvent 114
Iron group metallocenes
General chemistry, Iron group metallocenes=Isocyanide complex of metal 62

Karl Fischer reagent
General chemistry, Water: Analysis; Quantitative method; Karl Fischer reagent 40

Labelled compound
General chemistry, Labelled compound: Analysis: Infra-red spectroscopy 7
Lanthanide halides
General chemistry, Lanthanide halides 42
Lead compound
General chemistry, Organic substance=Lead compound 59
Ligand Field theory
Physical chemistry; Ligand Field Theory 95
Liquid
Physical chemistry, Liquid; Stereochemistry 104

Magnetic method
Analytical chemistry, Magnetic method — Nuclear magnetic resonance spectroscopy 126
Magneto chemical property
Physical chemistry; Magnetochemical property 100–101
Mathematics
Chemistry: Calculation *application of* Mathematics 2
Mechanistic aspects
General chemistry, Aromatic compound: Sulphonation; Mechanistic aspects 71
Metal
General chemistry, Organic substance=Isocyanole complexes of metal 62
Synthetic chemistry, Catalysis=Metal 134

82 CLASSIFIED PART

E Chemistry

1 N71 DICKSON (T R). Introduction to chemistry. 1971.

E:b2&eB CHEMISTRY; CALCULATION, *application of* MATHEMATICS

2 N71 BENSON (S W). Chemical calculations: An introduction to the use of mathematics in chemistry. Ed 3. 1971.

E:f3 CHEMISTRY: EXPERIMENT

3 N71 DICKSON (T R) and HEALY (J T). Laboratory experiments for an introduction to chemistry. 1971.

E1 General chemistry

4 N71 SLABAUGH (W H) and PARSONS (T D). General chemistry. Ed 2. 1971.

E1:f GENERAL CHEMISTRY: INVESTIGATION

5 N63 SORUM (C H). How to solve general chemistry problems. Ed 3. 1963.

E1,aG15;6 GENERAL CHEMISTRY, SEMICONDUCTOR; ELECTROCHEMICAL PROPERTIES

6 N62 HOLMES (P J), *Ed.* Electrochemistry of semiconductors. 1962.

E1,aS:3;555 GENERAL CHEMISTRY, LABELLED COMPOUND: ANALYSIS: INFRA-RED SPECTROMETRY

7 N71 PINCHAS (S) and LAULICHT (I). Infra-red spectra of labelled compounds. 1971.

E1,aV2 GENERAL CHEMISTRY, FREE RADICAL

8 N60 BASS (Arnold M) and BROIDA (H P), *Ed.* Formation and trapping of free radicals. 1960.

E1,aV2:83 GENERAL CHEMISTRY, FREE RADICAL: SUBSTITUTION REACTION

9 N71 INGOLD (K U) and ROBERTS (B P). Free-radical substitution reactions: Biomolecular homolytic substitution (SH^2 reactions at saturated multivalent atoms). 1971.

E1,aY;5 GENERAL CHEMISTRY, COORDINATION COMPOUNDS; PHOTOCHEMISTRY

10 N70 BALZANT (V) and CARASSITI (V). Photochemistry of coordination compounds. 1970.

E1,b–aX:b1;527 GENERAL CHEMISTRY, METALS-TRACE ELEMENT: DETERMINATION; CALORIMETRIC METHOD

11 N59 SANDELL (E B). Colorimetric determination of traces of metals. Ed 3. 1959.

E1,b–aY3 GENERAL CHEMISTRY, METAL CHELATE COMPOUNDS

12 N52 MARTELL (Arthur) and CALVIN (Melvin). Chemistry of the metal chelate compounds. 1952.

E1,b1;4B GENERAL CHEMISTRY, TRANSITION METAL COMPLEXES: THERMOCHEMISTRY

13 N70 ASHCROFT (S J) and MORTIMER (C T). Thermochemistry of transition metal complexes. 1970.

E1,b6 GENERAL CHEMISTRY, TRANSURANIUM ELEMENTS

14 N51 SEABORG (Glenn T). Man-made transuranium elements. 1951.

E1,d:3;527 GENERAL CHEMISTRY, NON-METALS: ANALYSIS; COLORIMETRY METHOD

15 N58 BOLTZ (D F). Colorimetric determination of non-metals. 1958.

E1,d;9G GENERAL CHEMISTRY, NON-METALS; GRIGNARD REACTIONS

16 N54 KHARASCH (M) and RINMUTH (O). Grignard reactions of non-metallic substances. 1954.

E1,113:3 GENERAL CHEMISTRY, POTASSIUM: ANALYSIS

17 N71 KORENMAN (I M). Analytical chemistry of Potassium. 1971.

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