MARTINDALE THE EXTRA PHARMACO-POEIA

TWENTY-SEVENTH EDITION

MARTINDALE

The Extra Pharmacopoeia

Twenty-eighth Edition

Edited by James E. F. Reynolds

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Preface

Ninety-nine years have passed since William Martindale produced the first edition of the Extra Pharmacopoeia—now better known as 'Martindale'. It was his aim and it is still our aim to provide a concise summary of the properties, actions, and uses of drugs and medicines for the practising pharmacist and medical practitioner. However, over these years his 'little book' has so grown that now it covers most of the drugs in clinical use throughout the world.

The quantity of information about drugs continues to increase and there seems to have been no reduction in the number of new drugs released during the preparation of the 28th edition. Martindale has increased in content by about 25%, but by rearranging the typographical layout and careful selection of paper we have managed to produce this edition within a single volume.

All the material in this edition has been revised and much of it rewritten. While we have always been very careful to ensure that our dosage information is accurate, increased effort has been made during this revision to provide guidance on the administration of drugs to infants, children, pregnant women, the elderly, and patients with hepatic or renal impairment. There are often differing views on the actions and uses of drugs and as a further development we have tried to provide comprehensive details of those controversies that are still not resolved. We have also attempted to include more detailed information on the mode of action of each drug. Since Martindale is widely used throughout the world, we have included very many more proprietary names from most parts of the world.

The last 5 years has seen a more cautious approach in the management of diseases both in terms of total patient care and in controlling or monitoring drug therapy. Advances have been made in the treatment of Gram-negative, anaerobic, and viral infections. Better responses and more prolonged remissions are being achieved in cancer therapy. Organ transplants carry less risk of rejection while hypertension and cardiovascular disorders should be more easily managed as should parenteral nutrition and diabetes mellitus. Genetic engineering which is already yielding insulin and interferons holds great promise for the development and production of biological materials.

We have rearranged some of the monographs in this edition. This has led to new chapters entitled Anthelmintics and Schistosomicides; Electrolytes; Metoclopramide and some other Anti-emetics; Metronidazole and some other Antiprotozoal Agents; and Sodium Cromoglycate and related Anti-allergic Agents. A few chapters have been renamed, and new titles include Antidepressants; Antihypertensives; and Idoxuridine and some other Antiviral Agents. We have added more than 900 monographs to this edition. Many of these are for drugs still under investigation. We have deleted 97 monographs.

Martindale is based on published information and has no official status; it is not a book of standards. Inclusion of a substance or a preparation is not to be considered as a recommendation for use, indeed some monographs are included by virtue of the substances' toxicity. While every effort has been made to check all the material in Martindale, the publisher cannot accept any responsibility for errors or omissions.

A major development in this edition has been the use made of computer techniques to organise the contents for printing and for retrieval from computerised information systems where our information will be held in a databank known as Martindale Online. The only indication of this development to the reader of the book is the inclusion of a Martindale Identity Number in each monograph. However, readers with access to these systems, through their own terminals or through various information services, will be able to pluck from Martindale Online sections of monographs that answer their specific questions in much the same way as some imaginary reader could answer questions if he had memorised comprehensively the whole of this edition. Martindale Online will be updated regularly with newly revised chapters while the book will continue with its current cycle of publication.

Arrangement

PART 1 (pages 1–1671) contains monographs on some 3990 substances arranged in 105 chapters. These chapters generally bring together drugs that have similar uses or actions. Cross-references are used to guide the reader to drugs that may be of interest in related chapters. Most chapters now have an introduction which provides background information on that group of drugs. Some drugs such as the corticosteroids can be considered readily as a group with its members having many common actions; in such cases the introduction provides much of the information for that chapter.

Monographs follow the introduction in alphabetical order, unless a chapter has the name of a substance in the title when the monograph for that substance appears first.

PART 2 (pages 1673–1771) consists of a series of short monographs on some 1120 drugs and ancillary substances arranged in the alphabetical order of their main titles. It includes monographs on new drugs, on drugs under investigation, on drugs not easily classified, and on obsolescent drugs still of interest. There are also some monographs on toxic substances, the effects of which may require drug therapy.

PART 3 (pages 1773–89) gives the composition of some 900 proprietary medicines that are advertised to the

public in Great Britain and that are usually supplied on demand. The formulas are generally as described by the manufacturers. Herbal medicines have been omitted. As in earlier editions of Martindale, the claims made for these products and their recommended doses are not included.

The number of 'counter' proprietary medicines has declined considerably over the last 5 years. Nevertheless, there is still a large number of preparations with 'product licences of right' and it is expected that further preparations will be discontinued as review of these licences progresses.

Indexes

DIRECTORY OF MANUFACTURERS. Throughout the text the names of manufacturers and distributors are abbreviated. Their full names are given in this directory together with the full address if it is available. Because of our continued expansion of the number of proprietary names, the directory has considerably increased from about 1400 entries to over 3000.

INDEX TO CLINICAL USES. This index is a guide to the uses described in the text; it should not be used otherwise and is not a comprehensive therapeutic index. It refers the reader to the chapters and monographs where the listed diseases are mentioned. The drugs under each disease heading are listed in order of page number and not of preference.

INDEX TO MARTINDALE IDENTITY NUMBERS. Each monograph in Martindale now has an identity number which is used in our computer manipulation. These identity numbers will be referred to in the databank (Martindale Online) and will mainly be of value to the user of the online service; however, they may also be of some value to the user of the book. The numbers have no structure and are not significant in themselves. The index lists the identity number followed by the relevant monograph title and the page on which it appears. Identity numbers for chapter introductions have also been included.

GENERAL INDEX. To make fullest use of the contents of Martindale the general index should always be consulted. The exhaustive index to the drugs, preparations, compounds, and pharmacological and therapeutic groups in the book has been compiled to exacting standards and this has resulted in an index of about 50 000 entries. As in previous editions, the index is arranged alphabetically 'word-by-word' rather than 'letter-by-letter'.

In order to save space we have omitted the inverted entries for pharmaceutical forms which in earlier editions resulted in long lists of tablets, capsules, etc.

Nomenclature

MARTINDALE IDENTITY NUMBERS. Each monograph begins with an identity number which consists of a maximum of 6 figures followed by a check character. These numbers are used in our computer manipulation and their sole purpose is to identify monographs in Martindale. They are referred to in the databank and will mainly be of value to the user of the online service; however, they may also be of value to the reader of the book.

TITLES. The title of each monograph is in English, with preference being given to British Approved Names, United States Adopted Names, International Nonproprietary Names, and names used in the *European Pharmacopoeia*. Other names given as synonyms include commonly-used abbreviated names; English, American, and Latin synonyms; French, German, Scandinavian, Spanish, Portuguese, Italian, and other names from the relevant pharmacopoeias when these may not be readily identifiable; manufacturers' code numbers; and trivial chemical names. In some approved names it is now general policy to use 'f' for 'ph' in sulpha, 't' for 'th', and 'i' for 'y'; for this reason entries in alphabetical lists and indexes should be sought in alternative spellings if the expected spellings are not found. A table of abbreviated names for radicals and groups used in approved names and titles is given on page xx.

BOTANICAL NAMES. The nomenclature follows the International Rules of Botanical Nomenclature.

CHEMICAL NAMES. The nomenclature generally follows the definitive rules issued by the International Union of Pure and Applied Chemistry, 1979.

NAMES OF MICRO-ORGANISMS. The nomenclature used is principally that of the *Catalogue of the National Collection of Type, Cultures—1972* (Public Health Laboratory Service Board, London, HM Stationery Office, 1972); *Nomenclature of Fungi Pathogenic to Man and Animals* (Medical Research Council Memorandum No. 23, 4th Edn, HM Stationery Office, 1977); *Index Bergeyana* (London, E. & S. Livingstone, 1966); and *Approved Lists of Bacterial Names* (V.B.D. Skerman *et al.* (Ed.), *Int. J. syst. Bacteriol.*, 1980, *30*, 225).

CAS REGISTRY NUMBERS. Chemical Abstracts Service (CAS) registry numbers are provided, where available, for each monograph substance to help readers refer to other information systems. Numbers for various forms of the monograph substance are listed with the variation in form given in parenthesis.

Pharmacopoeias

The titles of substances included in the *British Pharmacopoeia* or the *British Pharmacopoeia (Veterinary)* are followed in parentheses by the initials *B.P.* or *B.P. Vet.* respectively; those not included in these pharmacopoeias but included in the *British Pharmaceutical Codex* or the *British Veterinary Codex* are followed by *B.P.C. 1973* (or earlier) or *B. Vet. C. 1965* respectively. Substances which are the subject of monographs in the *European Pharmacopoeia*, the *United States Pharma-*

copeia, or the *United States National Formulary* are similarly indicated by the abbreviations *Eur. P.*, *U.S.P.*, or *U.S.N.F.* after the main title or synonyms.

The pharmacopoeias in which each substance appears are listed and differences of chemical, pharmaceutical, or therapeutic significance are usually indicated. Current and amended copies of the pharmacopoeias should be consulted for confirmation and for details of standards.

The pharmacopoeias covered include: Argentine, *Austrian* (*Supplement II*), *Belgian* (*Supplements I* and *II*), *Brazilian*, *British* (including *Addendum 1981*), *British Veterinary* (including *amendments 1977*), *Chinese*, *Czechoslovakian* (*Addendum 1976*), *European* (*Supplement 1977*), *French* (*Amendments 1976*), *German*, Hungarian, *Indian* (*Supplement 1975*), International, *Italian* (*Supplement 1978*), *Japanese*, Jugoslavian, Mexican, *Netherlands*, *Nordic* (*Addenda* to *1976*), Polish, Portuguese, *Roumanian*, Russian, Spanish, *Swiss* (*Supplements 1973, 1976,* and *1977*), *Turkish*, and *United States* (including the *Formulary* and *Supplements 1, 1a, 2,* and *2a*). Those *italicised* in the above list either appeared as new editions or were revised by supplements (as shown in brackets) since the last edition of Martindale, and have been examined for this 28th edition.

Atomic and Molecular Weights

Atomic weights are based on the table of Atomic Weights as revised in 1977 by the Commission on Atomic Weights, XXIX International Union of Pure and Applied Chemistry General Assembly and based on the ^{12}C scale (see page xxx). Molecular weights are given corrected to one place of decimals or to four significant figures for relative weights of less than 100.

Pharmaceutical Information

Chemical and physical properties likely to be of use or interest are given for each drug. This information is culled from a variety of sources and is not definitive in the pharmacopoeial sense. Special attention has been paid to the collection of data on the stability of drugs and on incompatibilities with drugs and preparations of drugs, particularly those likely to occur in solutions for intravenous administration.

ISO-OSMOTIC SOLUTIONS. The term iso-osmotic is used for solutions which exert the same osmotic pressure as serum and does not necessarily indicate that such solutions would be in osmotic equilibrium with red blood cells. It is used in preference to the more generally employed term 'isotonic' which in pharmaceutical practice has not always been correctly used to indicate osmotic equilibrium with red blood cells. Care is necessary if solutions not in osmotic equilibrium with red blood cells are administered by rapid intravenous infusion. The osmotic activity of the blood or its components is sometimes expressed in milliosmoles (mosmol). An osmole has the molal concentration in moles per 1000 g of solvent [molar concentration is in moles per 1000 g of solution] of an ideal solution of a non-dissociating substance which exerts the same osmotic pressure as the solution under consideration; it is calculated as the weight of any solute that depresses the freezing point of water by 1.86°. For real solutions correction factors have to be applied.

PERCENTAGE STRENGTHS. Unless otherwise stated, solutions of solids in liquids are expressed as percentage w/v, of liquids in liquids as percentage v/v, and of gases in liquids as percentage w/w.

SOLUBILITY. The figures given for solubility in each monograph have generally been obtained from the major pharmacopoeias in which the drug is described or from the manufacturers. These sources have not always used comparable materials or methods of determination and the figures should not be considered absolute. Unless otherwise indicated in the text, the figures are for solubility at 'ordinary room temperature'. At one time this was considered to be in the range 15° to 20° but 20° to 25° is the probable range in most laboratories today. In this edition, the solubility terms used by most of the world's pharmacopoeias have been adopted:

solubility	
very soluble	1 in less than 1
freely soluble	1 in 1 to 1 in 10
soluble	1 in 10 to 1 in 30
sparingly soluble	1 in 30 to 1 in 100
slightly soluble	1 in 100 to 1 in 1000
very slightly soluble	1 in 1000 to 1 in 10 000
practically insoluble	1 in more than 10 000

STORAGE. Substances and preparations should be stored under conditions which prevent contamination and diminish deterioration, and the conditions of storage given in the text indicate the precautions which should be taken in specific cases. The term 'a cool place' is generally used to describe a place in which the temperature does not exceed 15°. Unless otherwise specified, all injections should be stored in alkali-free containers.

TEMPERATURE. Temperatures are expressed in degrees Celsius (centigrade) unless otherwise indicated.

Pharmacological and Therapeutic Information

Information on the adverse effects, treatment of adverse effects, precautions, absorption and fate, and uses of each substance is provided by concise statements under these headings and these are elaborated and expanded by abstracts from published papers and reviews. In compiling these statements the intention has been to present unbiased summaries and, where views are conflicting, to represent these as fairly as possible by a suitable selection of abstracts and in some instances by providing a review of the conflict.

The abstracts of medical and pharmaceutical literature have been a characteristic and valuable feature of Martindale since the book was first published. During revision for this edition a wider selection of journals was used than for any previous edition and out of the large store

of abstracts created from these journals about 57000 were selected for inclusion as abstracts or references. Some abstract journals were used to lead the editorial staff to the original publication. When it was not possible to obtain the original, an abstract was prepared from the abstract journal and a reference supplied both to that journal and to the original journal.

Much information has been found in sources such as World Health Organization publications, government reports and legislation, and other official and standard publications. Manufacturers' literature has been considered in the light of other available information.

The risks of administering drugs in pregnancy are well known and the general principle is to give a drug only when the benefit to the individual mother outweighs the risk to the foetus. Where there is a clear risk it is noted under the Precautions or Adverse Effects heading but safety should not be inferred from the absence of a statement for any drug.

Interactions are described under the Precautions heading with detailed information being provided in the monograph for the drug that is being affected.

Doses

Doses are described under the Uses heading with as much detail as is necessary and available. The abbreviated 'Dose' section near the beginning of each monograph of previous editions has been deleted. Unless otherwise stated the doses represent the average range of quantities which are generally regarded as suitable for adults when administered by mouth and may usually be repeated three or four times in twenty-four hours. If it is usual to administer a drug by a method other than by mouth, the dose suitable for that method of administration is stated. More information on doses and drug administration may be given in the abstracts and under the Preparations section. Unless otherwise specified, dextrose injection is 5% w/v, sodium chloride injection is 0.9% w/v, and water is purified water.

When doses for children are expressed as a range of quantities within specified age limits, the lower dose applies at the lower age and the higher dose at the higher age.

Formulas

Formulas are given for preparations in current editions of the *British Pharmacopoeia*, and the *United States Pharmacopeia* and *National Formulary*. Formulas from the *British Pharmaceutical Codex 1973* are included if not yet covered by the *British Pharmacopoeia* and formulas from other pharmacopoeias and national formularies are also included if they are considered to be of special interest. Selected formulas from hospital formularies and from the medical and pharmaceutical literature are included for their special interest to those pharmacists required to formulate comparable preparations.

Ingredients of preparations are named according to the title under which they are described in Martindale. The term 'freshly prepared' is used to indicate that a preparation must be made not more than twenty-four hours before issue for use, and the term 'recently prepared' indicates that deterioration is likely if the preparation is stored for more than a few weeks at temperate room conditions.

Proprietary Preparations

In Parts 1 and 2, the information on proprietary preparations available in Great Britain is presented in the same manner as in the last edition, each product being described at the end of the monograph on its principal ingredient. The proprietary names of single-ingredient preparations have been included for Argentina, Australia, Belgium, Canada, Denmark, France, Germany, Italy, the Netherlands, Norway, South Africa, Spain, Sweden, Switzerland, the United States of America, and for some other countries. It is hoped that the inclusion of this increased number of proprietary names will assist pharmacists and physicians in identifying the active ingredients used; the route of administration and dose may not be comparable.

The proprietary preparations described in Parts 1 and 2 are mostly those intended for supply on prescription. Most proprietary medicines which are advertised in Great Britain to the public and supplied on demand are described in Part 3.

The information on composition, dosage, and uses of proprietary preparations is mainly taken from the literature issued by the manufacturers or their distributing agents and has been confirmed by them, but no responsibility can be accepted for the accuracy of this information.

Information on diluents suggested for liquid proprietary preparations for oral administration has been provided by the manufacturers or taken from the *Diluent Directory* issued by the National Pharmaceutical Association (formerly National Pharmaceutical Union).

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Martindale staff have been able to call freely on the expertise of other members of the Pharmaceutical Society's staff. In particular the Editor is grateful to Ainley Wade for encouragement and advice, Pamela M. North and the staff of the library and information department for helping to collect our sources of information, Janet

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The Editor welcomes this opportunity to record his warmest appreciation of the dedicated services rendered by the editorial staff P. Blake, Rosalind Dixon, Chloe Loewe, Theresa Ormiston, Anne V. Parsons, Marion Savva, D. Shenton, S. Sweetman, and especially of the senior staff Anne B. Prasad, G.E. Diaper and Kathleen Parfitt. Revision of Martindale normally calls for many talents and a wide range of knowledge from the staff; computerisation of this edition made considerable additional demands.

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Abbreviations

The titles of journals are abbreviated according to the general style of *World List of Scientific Periodicals* (London, Butterworths, 1963–80).

For abbreviations of the names of manufacturers or their distributors, see Directory of Manufacturers, p.1791.

≈—approximately equals.
α—alpha. Also used in radiation data for alpha particles.
A—ampere(s).
Å—ångström(s).
aa—*ana*, 'of each'.
Aberdeen Roy. Infirm.—Aberdeen Royal Infirmary, Scotland.
ABPI—Association of the British Pharmaceutical Industry.
Addenbrooke's Hosp.—Addenbrooke's Hospital, Cambridge, England.
Adelaide Child. Hosp.—The Adelaide Children's Hospital Inc., Australia.
ADI—acceptable daily intake.
A.D.T.—Accepted Dental Therapeutics, published by the American Dental Association.
Afghan.—Afghanistan.
agg.—aggregate (in botanical names), including 2 or more species which resemble each other closely.
Ala—alanine.
Alg.—Algeria.
a.m.—*ante meridiem*, 'before noon'.
AMA—American Medical Association.
A.P.F.—Australian Pharmaceutical Formulary and Handbook, 1978.
Arg—arginine.
Arg.—Argentina, Argentine, *or* Argentinian.
Arg. P.—Argentinian Pharmacopoeia 1966 (Farmacopea Nacional Argentina, Quinta Edicion).
Asn—asparagine.
Asp—aspartic acid.
Aust.—Austria *or* Austrian.
Aust. P.—Austrian Pharmacopoeia 1960 (Österreichisches Arzneibuch, 9 Ausgabe) and Supplements I (1966) and II (1975).
Austral.—Australia.
β^+—beta particles: positrons.
β^-—beta particles: electrons.
B.—*Bacillus, Bacteroides*, or *Bordetella*.
BAN—British Approved Name.
Barb.—Barbados.
Belg.—Belgium *or* Belgian.
Belg. P.—Belgian Pharmacopoeia 1962 (Pharmacopée Belge, Cinquième Édition) and Supplements I (1966) and II (1969).
B.N.F.—British National Formulary.
Bol.—Bolivia.
Born.—Borneo.
B.P.—British Pharmacopoeia. Unless otherwise specified in the text, *B.P.* references are to the 1980 Edn, including the addendum 1981.
b.p.—boiling point.
B.P. Vet.—British Pharmacopoeia (Veterinary) 1977 and amendments 1977.
B.P.C.—British Pharmaceutical Codex.
Bq—becquerel(s).
Br.—British *or Brucella*.
Braz.—Brazil *or* Brazilian.
Braz. P.—Brazilian Pharmacopoeia 1977 (Farmacopéia Brasileira, 3ª Edição).
Bristol Roy. Infirm.—Bristol Royal Infirmary, England.
Brompton Hosp.—Brompton Hospital, London, England.
BS—British Standard (specification).
BSI—British Standards Institution.
BUN—Blood-urea-nitrogen.
B. Vet. C.—British Veterinary Codex.
°C—degrees Celsius (centigrade). Unless otherwise indicated in the text, temperatures are expressed in this thermometric scale.
C.—*Campylobacter, Candida*, or *Corynebacterium*.
Canad.—Canada.
CAS—Chemical Abstracts Service.
CCID50—cell-culture-infective dose 50 (the dose of the micro-organism which infects 50% of cell cultures inoculated).
Charing Cross Hosp.—Charing Cross Hospital (Fulham), London, England.
Chin.—Chinese.
Chin. P.—Chinese Pharmacopoeia.
CI—Colour Index (Colour Index, 3rd Edn 1971 and supplements.)
Ci—curie(s).
CIA—Chemical Industries Association (UK).
Cl.—*Clostridium*.
CM—Chick-Martin (coefficient).
cm—centimetre(s).
cm^2—square centimetre(s).
cm^3—cubic centimetre(s).
CNS—central nervous system.
Col.—Colombia.
cP—centipoise(s).
CRM—Committee on the Review of Medicines (UK).
CSF—cerebrospinal fluid.
CSM—Committee on Safety of Medicines (UK).
cSt—centistokes.
Curac.—Curaçao.
Cys—cysteine.
Cz.—Czechoslovakia *or* Czechoslovak.
Cz. P.—Czechoslovak Pharmacopoeia 1970 (Československý Lékopis, Vydání třetí; Pharmacopoea Bohemoslovenica, Editio tertia) and Addendum 1976.
D & C—designation applied in USA to dyes permitted for use in drugs and cosmetics.
Dan.—Danish.
Dan. Disp.—Danish Dispensatory 1963 (Dispensatorium Danicum) including all amendments to 1973.
d.c.—direct current.
Denm.—Denmark.
DHSS—Department of Health and Social Security (UK).
DNA—deoxyribonucleic acid.
Dom. Rep.—Dominican Republic.
D.P.F.—Dental Practitioners' Formulary.
D.T.F.—Drug Tariff Formulary: Drug Tariff, 1981 (National Health Service, Department of Health and Social Security, UK).
E.—*Escherichia*.
EC—electron capture.
ECG—electrocardiogram.
ECT—electroconvulsive therapy.
Ecuad.—Ecuador.
Ed.—editor(s) *or* edited by.
Edn—edition.
EEC—European Economic Community.
EEG—electro-encephalogram.
e.g.—*exempli gratia*, 'for example'.
EID50—egg-infective dose 50 (the dose of the micro-organism which infects 50% of the eggs inoculated).
El Salv.—El Salvador.

ENL—erythema nodosum leprosum.
ENT—ear, nose and throat.
ESR—erythrocyte sedimentation-rate.
et al.—*et alii*, 'and others': for three or more co-authors or co-workers.
Eur.—European.
Eur. P.—European Pharmacopoeia vol. I 1969, vol. II 1971, vol. III 1975, and Supplements 1973 and 1977.
eV—electronvolt(s).
Ext. D & C—designation applied in USA to dyes permitted for use in external drug and cosmetic preparations.
°F—degrees Fahrenheit.
FAC—Food Additives and Contaminants Committee of the Ministry of Agriculture, Fisheries and Food (UK).
FAO—Food and Agriculture Organization of the United Nations.
FAO/WHO—Food and Agriculture Organization of the United Nations *and the* World Health Organization.
FDA—Food and Drug Administration of USA.
F D & C—designation applied in USA to dyes permitted for use in foods, drugs, and cosmetics.
FDD—Food and Drug Directorate of Canada.
FEV_1—forced expiratory volume in 1 second.
Fin.—Finland.
fl—femtolitre(s).
fl oz—fluid ounce(s).
F. N. Belg.—The Belgian National Formulary 1977 (Formularium Nationale, Editio Quinta).
F. N. Fr.—The National Formulary of France 1974 (Formulaire National, I^re^ Édition) and Supplement 1976.
f.p.—freezing point.
FPA—Family Planning Association (UK).
Fr.—France *or* French.
Fr. P.—French Pharmacopoeia 1972 (Pharmacopée Française, IX^e^ Edition) and amendments 1974 and 1976.
FSC—Food Standards Committee of the Ministry of Agriculture, Fisheries and Food (UK).
ft—foot (feet).
ft^2—square foot (feet).
γ—gamma. Also used in radiation data for gamma-radiation.
g—gram(s).
gal—gallon(s).
Ger.—W. Germany *or* W. German.
Ger. P.—West German Pharmacopoeia 1978 (Deutsches Arzneibuch, 8 Ausgabe).
GFR—glomerular filtration-rate.
Gib.—Gibraltar.
Gln—glutamine.
Glu—glutamic acid.
Gly—glycine.
GRAS—generally recognised as safe. A designation applied to food additives.
Groote Schuur Hosp.—Groote Schuur Hospital, S. Africa.
Gt Ormond St Child. Hosp.—The Hospitals for Sick Children, Great Ormond Street, London, England.
Guat.—Guatemala.
Guy's Hosp.—Guy's Hospital, London, England.
Gy—Gray.
H.—*Haemophilus*.
Hadassah Univ. Hosp.—Hadassah University Hospital, Jerusalem, Israel.
Hb—haemoglobin.
HDL—high-density lipoproteins.
His—histidine.
HLB—hydrophilic-lipophilic balance.
Hond.—Honduras.
Hung.—Hungary *or* Hungarian.
Hung. P.—VIth Hungarian Pharmacopoeia 1967 (Magyar Gyógyszerkönyv).
Hz—hertz.
IAEA—International Atomic Energy Agency.
ibid.—*ibidem*, 'in the same place (journal or book)'.
ICRP—International Commission on Radiological Protection.
ICRU—International Commission on Radiation Units and Measurements.
idem—'the same': used for the same authors and titles.
i.e.—*id est*, 'that is'.
Ig—immunoglobulin.
Ile—isoleucine.
in—inch(es).
in^2—square inch(es).
Ind.—India *or* Indian.
Ind. P.—Pharmacopoeia of India, 2nd Edn, 1966 and Supplement 1975.
Int.—International.
Int. P.—International Pharmacopoeia 1967 (Specifications for the Quality Control of Pharmaceutical Preparations, 2nd Edn) and Supplement 1971.
IQ—intelligence quotient.
i.r.—infra-red.
ISO—International Organization for Standardization.
IT—isomeric transition.
It.—Italian.
It. P.—Italian Pharmacopoeia 1972 (Farmacopea Ufficiale della Repubblica Italiana, Ottava Edizione) and Supplement 1978.
Ital.—Italy.
iu—international unit(s).
IUB—International Union of Biochemistry.
IUD—intra-uterine device.
IUPAC—International Union of Pure and Applied Chemistry.
J—joule(s).
Jam.—Jamaica.
Jap.—Japan *or* Japanese.
Jap. P.—The Pharmacopoeia of Japan, 9th Edn, 1976.
Jug.—Jugoslav.
Jug. P.—Jugoslav Pharmacopoeia 1972 (Farmakopeja SFRJ; Pharmacopoea Jugoslavica, Editio Tertia).
K—kelvin.
kcal—kilocalorie(s).
keV—kiloelectronvolt(s).
kg—kilogram(s).
King's Coll. Hosp.—King's College Hospital, London, England.
kJ—kilojoule(s).
Kleb.—*Klebsiella*.
Kor.—Korea.
kPa—kilopascal(s).
L.—*Listeria*.
lb—pound(s) avoirdupois.
LD50—a dose lethal to 50% of the specified animals or micro-organisms.
LDL—low-density lipoproteins.
Leeds Gen. Infirm.—The General Infirmary, Leeds, England.
Leu—leucine.
Lf—limit flocculation.
loc. cit.—*loco citato*, 'in the place cited'.
Lux.—Luxembourg.
Lys—lysine.
m—metre(s).
m^2—square metre(s).
m^3—cubic metre(s).
M—molar.
M.—*Mycobacterium* or *Mycoplasma*.
mA—milliampere(s).
Malay.—Malaysia.
MAOI—monoamine oxidase inhibitor.
max.—maximum.
MB 1959: Sweden—MB Formulary 1959 (Apotekarsocietetens Förlag, Stockholm).
MBC—minimum bactericidal concentration.
mCi—millicurie(s).
mEq—milliequivalent(s).

Met—methionine.
MeV—megaelectronvolt(s).
Mex.—Mexico *or* Mexican.
Mex. P.—Mexican Pharmacopoeia 1952 (Farmacopea Nacional de los Estados Unidos Mexicanos, Segunda Edicion).
mg—milligram(s).
MIC—minimum inhibitory concentration.
Middlesex Hosp.—The Middlesex Hospital, London, England.
min—minute.
min.—minimum.
MJ—megajoule(s).
ml—millilitre(s).
mm—millimetre(s).
mm^2—square millimetre(s).
mm^3—cubic millimetre(s).
mmHg—millimetre(s) of mercury.
mmol—millimole.
mol—mole.
mol. wt—molecular weight.
Moorfields Eye Hosp.—Moorfields Eye Hospital, London, England.
Mor.—Morocco.
mosmol—milliosmole.
m.p.—melting point.
Mrad—megarad.
MRC—Medical Research Council (UK).
mrem—millirŏntgen-equivalent-man.
μCi—microcurie(s).
μg—microgram(s).
μl—microlitre(s).
μm—micrometre(s).
N.—*Neisseria.*
nCi—nanocurie(s).
NCTC—National Collection of Type Cultures (Central Public Health Laboratory, London, England).
Neth.—The Netherlands.
Neth. P.—Netherlands Pharmacopoeia 1978 (Nederlandse Farmacopee, Achtste Uitgave).
ng—nanogram(s).
NIH—National Institutes of Health (USA).
nm—nanometre(s).
Nord.—Nordic.
Nord. P.—Nordic Pharmacopoeia 1963 (Pharmacopoea Nordica) including all addenda published up to 1976.
Norw.—Norway.
NPU—National Pharmaceutical Union, now the National Pharmaceutical Association (NPA).
NRPB—National Radiological Protection Board, Harwell, Oxfordshire, England.
NZ—New Zealand.
OECD—Organisation for Economic Co-operation and Development.
OP—over proof.
Orsett Hosp.—Orsett Hospital, Grays, Essex, England.
o/w—oil-in-water.
oz—ounce(s).
P—probability.
Pa—pascal(s).
Parag.—Paraguay.
PBI—protein-bound iodine.
pCO_2—plasma partial pressure (concentration) of carbon dioxide.
p_aCO_2—arterial plasma partial pressure (concentration) of carbon dioxide.
per—'through'.
pg—picogram(s).
pH—the negative logarithm of the hydrogen ion concentration.
Phe—phenylalanine.
Pharm. Soc. Lab. Rep.—Pharmaceutical Society's Laboratory Report.
Phillipp.—Phillippines.
pK_a—the negative logarithm of the dissociation constant.
p.m.—*post meridiem*, 'afternoon'.
pO_2—plasma partial pressure (concentration) of oxygen.
P_aO_2—arterial plasma partial pressure (concentration) of oxygen.
Pol.—Poland *or* Polish.
Pol. P.—Polish Pharmacopoeia 1965 (Farmakopea Polska IV).
Port.—Portugal *or* Portuguese.
Port. P.—Portuguese Pharmacopoeia 1946 (Farmacopeia Portuguesa IV) and Supplements 1961 and 1967.
ppm—parts per million.
Pr.—*Proteus.*
P.R.—Puerto Rico.
Pro—proline.
Ps.—*Pseudomonas.*
PSGB—The Pharmaceutical Society of Great Britain.
q.s.—*quantum sufficit*, 'as much as suffices'.
Queen Eliz. Hosp., S. Australia—The Queen Elizabeth Hospital, South Australia.
q.v.—*quod vide*, 'which see'.
R—röntgen.
rad—radiation absorbed dose.
RCGP—Royal College of General Practitioners (UK).
REM sleep—rapid-eye-movement sleep.
rem—röntgen-equivalent-man.
RNA—ribonucleic acid.
Rochester Methodist Hosp.—Rochester Methodist Hospital, Minnesota, USA.
Roum.—Roumanian.
Roum. P.—Roumanian Pharmacopoeia 1976 (Farmacopeea Română. Editia A. IX-A).
Roy. Free Hosp.—The Royal Free Hospital, London, England.
Roy. Hallamshire Hosp.—Royal Hallamshire Hospital, Sheffield, England.
Roy. Marsden Hosp.—The Royal Marsden Hospital, London, England.
Roy. Melb. Hosp.—The Royal Melbourne Hospital, Australia.
Roy. Nat. Orthopaedic Hosp.—Royal National Orthopaedic Hospital, Stanmore, Middx, England.
Roy. Nat. T. N. and E. Hosp.—The Royal National Throat, Nose and Ear Hospital, London, England.
Roy. Victoria Hosp.—Royal Victoria Hospital, Belfast, Northern Ireland.
Roy. Victoria Infirm.—The Royal Victoria Infirmary, Newcastle-upon-Tyne, England.
Rus.—Russian.
Rus. P.—Russian Pharmacopoeia (State Pharmacopoeia of the USSR, Tenth Edition).
RW—Rideal-Walker (coefficient).
S.—*Salmonella* or *Serratia.*
S. Afr.—South Africa.
St. Bart.'s Hosp.—St. Bartholomew's Hospital, London, England.
St. John's Hosp.—St. John's Hospital for Diseases of the Skin, London, England.
St. Mark's Hosp.—St. Mark's Hospital, London, England.
St. Mary's Hosp.—St. Mary's Hospital, London, England.
St. Thomas' Hosp.—St. Thomas' Hospital, London, England.
Scand.—Scandinavian.
SCI—Society of Chemical Industry (UK).
Ser—serine.
SGOT—serum glutamic oxaloacetic transaminase (serum aspartate aminotransferase *now preferred*).
SGPT—serum glutamic pyruvic transaminase (serum alanine aminotransferase *now preferred*).
Sh.—*Shigella.*
SI—Statutory Instrument *or* Système International d'Unités (International System of Units).
SLE—systemic lupus erythematosus.
sp.—species (plural spp.).

sp. gr.—specific gravity.
Span.—Spanish.
Span. P.—Spanish Pharmacopoeia 1954 (Farmacopea Oficial Española, Novena Edicion).
St—stokes.
Staph.—*Staphylococcus.*
Stoke Mandeville Hosp.—Stoke Mandeville Hospital, Aylesbury, Bucks, England.
Str.—*Streptococcus.*
Suppl.—supplement(s).
Sv—sievert.
Swed.—Sweden.
Swiss P.—Swiss Pharmacopoeia 1971 (Pharmacopoea Helvetica, Editio Sexta, Édition Française) and Supplements 1973, 1976, and 1977.
Switz.—Switzerland.
Tanz.—Tanzania.
TCID—tissue-culture-infective dose.
TCID50—tissue-culture-infective dose 50 (the dose of the micro-organism which infects 50% of tissue cultures inoculated).
Thai.—Thailand.
Thr—threonine.
Trp—tryptophan.
Tun.—Tunisia.
Turk.—Turkey *or* Turkish.
Turk. P.—Turkish Pharmacopoeia 1974 (Türk Farmakopesi).
Tyr—tyrosine.
UK—United Kingdom.
UKAEA—United Kingdom Atomic Energy Authority.
Univ. Coll. Hosp.—University College Hospital, London, England.
UP—under proof.
Urug.—Uruguay.
US and *USA*—United States of America.
USAID—United States Agency for International Development.
USAN—United States Adopted Name.
U.S.N.F.—The United States 'National Formulary XV', 1980, and Supplements 1 (1980), 1a (1980), 2 (1981), and 2a (1981).
U.S.P.—The United States Pharmacopeia XX, 1980, and Supplements 1 (1980), 1a (1980), 2 (1981), and 2a (1981).
U.S.P. units—units defined in the United States Pharmacopeia.
USSR—Union of Soviet Socialist Republics.
u.v.—ultraviolet.
V—volt(s).
V.—*Vibrio.*
Val—valine.
var.—variety.
Venez.—Venezuela.
Viet.—Vietnam.
VLDL—very low-density lipoproteins.
vol.—volume(s).
v/v—volume in volume.
v/w—volume in weight.
WHO—World Health Organization.
w/o—water-in-oil.
wt—weight.
wt per ml—weight per millilitre.
w/v—weight in volume.
w/w—weight in weight.
Wycombe Gen. Hosp.—Wycombe General Hospital, High Wycombe, Bucks, England.
Y.—*Yersinia.*

Abbreviated Names for Radicals and Groups

The following abbreviated names for radicals and groups are used in approved names and titles:

Abbreviated Name	*Chemical Name*
acetonide	isopropylidene ether of a dihydric alcohol
acetophenide	methylphenylmethylene ether of a dihydric alcohol
aceturate	*N*-acetylglycinate
amsonate	4,4′-diaminostilbene-2,2′-disulphonate
benetonide	acetonide 3-benzamido-2-methylpropionate (as in triamcinolone benetonide)
besylate	benzenesulphonate
bunapsylate	3,7-di-*tert*-butylnapthalene-1,5-disulphonate
camsylate	camphor-10-sulphonate
caproate	hexanoate
carbesilate	4-carboxybenzenesulphonate
closylate	4-chlorobenzenesulphonate
cromacate	[(6-hydroxy-4-methyl-2-oxo-2*H*-chromen-7-yl)oxy]-acetate
cromesilate	6,7-dihydroxycoumarin-4-methanesulphonate
cyclotate	4-methylbicyclo[2.2.2]oct-2-ene-1-carboxylate
cypionate	3-cyclopentylpropionate
dibudinate	2,6-di-*tert*-butylnapthalene-1,5-disulphonate
diolamine	diethanolamine
edetate	ethylenediamine-*NNN′N′*-tetra-acetate
edisylate	ethane-1,2-disulphonate
eglumine	*N*-ethylglucamine
embonate	4,4′-methylenebis(3-hydroxy-2-naphthoate) (= pamoate)
enanthate	heptanoate
estolate	propionate dodecyl sulphate
esylate	ethanesulphonate
fendizoate	2-[(2′-hydroxy-4-biphenylyl)-carbonyl]benzoate
gluceptate	glucoheptonate
hybenzate	2-(4-hydroxybenzoyl)benz-oate
hyclate	monohydrochloride hemi-ethanolate hemihydrate
isethionate	2-hydroxyethanesulphonate
lauryl sulphate	dodecyl sulphate
megallate	3,4,5-trimethoxybenzoate
meglumine	*N*-methylglucamine
mesylate	methanesulphonate
napadisylate	naphthalene-1,5-disulphonate
napsylate	naphthalene-2-sulphonate
olamine	ethanolamine
oxoglurate	2-oxoglutarate
pamoate	4,4′-methylenebis(3-hydroxy-2-naphthoate) (=embonate)
phenpropionate	3-phenylpropionate
pivalate	trimethylacetate
steaglate	stearoyloxyacetate
tebutate	*tert*-butylacetate
teprosilate	3-(theophyllin-7-yl)propane-sulphonate
theoclate	8-chlorotheophyllinate
tofesilate	2-(theophyllin-7-yl)ethane-sulphonate
tosylate	toluene-4-sulphonate
triclofenate	2,4,5-trichlorophenolate
trolamine	triethanolamine
troxundate	3,6,9-trioxaundecanoate

Weights and Measures

The International System of Units

The International System of Units (Système International d'Unités; SI) was established by resolutions of the Eleventh General Conference on Weights and Measures, 1960; some additions and changes have been made by later resolutions. The SI units are of 3 types: *base*; *supplementary*; and *derived*. The base units for the seven physical quantities which are regarded as dimensionally independent, are:

metre (m) (length)
kilogram (kg) (mass)
second (s) (time)
ampere (A) (electric current)
kelvin (K) (thermodynamic temperature)
mole (mol) (amount of substance)
candela (cd) (luminous intensity)

There are supplementary units for plane angle (radian = rad) and solid angle (steradian = sr).

The derived unit for any other physical quantity is that obtained by the dimensionally appropriate multiplication and division of the base units. Many of the derived units have special names and symbols. They include:

hertz	$Hz=s^{-1}$	frequency
newton	$N=m\ kg\ s^{-2}$	force
pascal	$Pa=m^{-1}\ kg\ s^{-2}$	pressure
joule	$J=m^{2}\ kg\ s^{-2}$	energy
watt	$W=m^{2}\ kg\ s^{-3}$	power
coulomb	$C=s\ A$	quantity of electricity, electric charge
volt	$V=m^{2}\ kg\ s^{-3}\ A^{-1}$	electric potential
ohm	$\Omega=m^{2}\ kg\ s^{-3}\ A^{-2}$	electric resistance
siemens	$S=m^{-2}\ kg^{-1}\ s^{3}\ A^{2}$	electric conductance
farad	$F=m^{-2}\ kg^{-1}\ s^{4}\ A^{2}$	electric capacitance
degrees Celsius	$°C=K$	Celsius temperature
becquerel	$Bq=s^{-1}$	activity of a radioactive source
gray	$Gy=J\ kg^{-1}$	absorbed dose of ionising radiation
sievert	$Sv=J\ kg^{-1}$	dose equivalent

In addition there are units which although not part of SI will continue to be used in appropriate contexts, such as the minute (min), hour (h), day (d) (time); and electronvolt (energy) and units which although not part of SI will continue in use for a limited time. They include:

ångström	Å	length
curie	Ci	activity of a radioactive source
rad	rad	absorbed dose of ionising radiation
röntgen	R	exposure to ionising radiation

It is recommended that some units be not generally used with SI units. They include:

dyne	dyn	force
erg	erg	energy
poise	P	dynamic viscosity
stokes	St	kinematic viscosity

The use of other units not part of SI is generally deprecated; the values of some that may be encountered are defined in the equivalent tables below.

In the European Communities a directive (80/181/EEC, as amended) requires, with various exceptions, that SI units be used as legal units of measurements and specifies dates after which some non-SI units may not be used.

The following prefixes may be used to construct decimal submultiples and multiples of units.

Factor	Prefix	Symbol
10^{-18}	atto	a
10^{-15}	femto	f
10^{-12}	pico	p
10^{-9}	nano	n
10^{-6}	micro	μ
10^{-3}	milli	m
10^{-2}	centi	c
10^{-1}	deci	d
10	deca	da
10^{2}	hecto	h
10^{3}	kilo	k
10^{6}	mega	M
10^{9}	giga	G
10^{12}	tera	T
10^{15}	peta	P
10^{18}	exa	E

Thousandfold multiples are to be preferred, e.g. gram, milligram, microgram, nanogram; μg per ml, mg per litre; joule, kilojoule, megajoule.

Millimoles and Milliequivalents

The mole (mol) is the amount of substance of a system which contains as many elementary entities (atoms, molecules, ions, electrons, or other particles or specified groups of such particles) as there are atoms in 0.012 kilogram of carbon-12. A millimole is one thousandth this amount and for ions is the ionic mass (the sum of the relative atomic masses of the elements of an ion) expressed in milligrams. A milliequivalent is this quantity divided by the valency of the ion.

1 Millimole (mmol) = 10^{-3} mole

For ions, 1 millimole (mmol) = 1 milliequivalent (mEq) × valency of the ion.

The following terms, though not strictly correct, are still in common use:

ionic weight, for ionic mass
atomic weight, for relative atomic mass
molecular weight, for relative molecular mass.

Concentration

In the SI units, concentration may be expressed either as mass concentration (e.g. g per dm^3, conventionally expressed as g per litre) or as 'amount of substance' concentration (e.g. mol per litre). The term 'molar' or the symbol M, to describe a solution containing one mole per dm^3, should not be used.

Mass concentration is used for the measurement of the concentration of mixtures or of substances with an indefinite or unknown molecular weight. It is recommended that mass concentration should not be expressed using 100 ml (1 dl) as the unit of volume. Common exceptions are measurements of blood alcohol and haemoglobin which are usually expressed as mg per 100 ml (mg per dl) and g per 100 ml (g per dl), respectively.

The amount of substance concentration should be used for the measurement of the concentration of substances with defined molecular weights. Equivalent concentration (mEq per litre) should no longer be used.

In medical and pharmaceutical practice amount of substance concentration is only in current use for expressing the strength of parenteral electrolyte infusions and dialysis solutions and for laboratory results. Prescribing and dispensing continue to be carried out in terms of mass concentration. In this edition of Martindale values of mmol and mEq per gram are stated in monographs for electrolytes.

SI Unit Equivalents of Imperial and other Units

LENGTH

1 ångström (Å)	= 10^{-10} metre = 10^{-1} nanometre
1 micron	= 10^{-6} metre
1 inch (in)	= 2.54×10^{-2} metre
1 foot (ft)	= 3.048×10^{-1} metre
1 yard (yd)	= 9.144×10^{-1} metre
1 mile	= 1.60934×10^{3} metres

MASS

1 grain (gr)	= 6.47989×10^{-2} gram
1 ounce (avoirdupois) (oz) (= 437.5 grains)	= 2.83495×10 grams
1 ounce (apothecaries') (= 480 grains)	= 3.11035×10 grams
1 pound (avoirdupois)	= 4.53592×10^{2} grams
1 ton	= 1.01605×10^{3} kg
1 tonne	= 10^{3} kg

AREA

1 are (a)	= 100 square metres
1 square inch (in^2)	= 6.4516×10^{-4} square metre
1 square foot (ft^2)	= 9.29030×10^{-2} square metre
1 square yard (yd^2)	= 8.36127×10^{-1} square metre
1 square mile	= 2.58999×10^{6} square metres

VOLUME

1 millilitre (ml)	= 1 cubic centimetre
1 litre*	= 1 cubic decimetre
1 cubic inch (in^3)	= 1.63871×10^{-5} cubic metre
1 cubic foot (ft^3)	= 2.83168×10^{-2} cubic metre
1 cubic yard (yd^3)	= 7.64555×10^{-1} cubic metre
1 minim (UK)	= 5.91939×10^{-8} cubic metre
1 fluid ounce (UK) (fl oz)	= 2.8413×10^{-5} cubic metre
1 pint	= 5.68261×10^{-4} cubic metre
1 gallon (UK)	= 4.54609×10^{-3} cubic metre
1 fluid ounce (US)	= 2.95735×10^{-5} cubic metre
1 liquid pint (US)	= 4.73176×10^{-4} cubic metre
1 gallon (US)	= 3.78541×10^{-3} cubic metre

* The litre has been redefined as 1 cubic decimetre, which represents a decrease from its former value of 1.000028 cubic decimetres. The litre should not be used for measurements of high precision.

ENERGY

1 kilocalorie, thermochemical (kcal)	= 4.1840×10^{3} joules
1 erg (erg)	= 10^{-7} joule
1 electronvolt (eV)	= 1.60219×10^{-19} joule
1 thousand (kilo) electronvolt (keV)	= 1.60219×10^{-16} joule
1 million (mega) electronvolt (MeV)	= 1.60219×10^{-13} joule
1 British thermal unit (Btu)	= 1.05506×10^{3} joules

PRESSURE

1 millimetre of mercury (mmHg)	= 1.33322×10^{2} pascals
1 bar (bar)	= 10^{5} pascals
1 pound-force per square inch	= 6.89476×10^{3} pascals
1 atmosphere (atm)	= 1.01325×10^{5} pascals

VISCOSITY, DYNAMIC

1 poise (P)	= 10^{-1} pascal second 10^{-1} newton second per square metre

VISCOSITY, KINEMATIC

1 centistokes (cSt)	= 10^{-6} square metre per second
1 stokes (St)	= 10^{-4} square metre per second

TEMPERATURE

1 degree Fahrenheit (°F)	= $\frac{5}{9}$ kelvin.

Imperial and other Equivalents of SI Units

LENGTH

1 metre (m)	= 10^{10} ångströms 10^{6} microns 39.3701 inches 3.28084 feet 1.09361 yards
1 kilometre (km)	= 0.621372 mile

MASS

1 gram (g)	= 15.4324 grains 0.032151 ounce (apothecaries') 0.035274 ounce (avoirdupois)
1 kilogram (kg)	= 35.274 ounces (avoirdupois) 2.20462 pounds

AREA

1 square metre (m^2)	= 1550 square inches 10.7639 square feet 1.196 square yards 3.86102×10^{-7} square mile

VOLUME

1 cubic metre (m^3)	= 6.10236×10^4 cubic inches 35.3147 cubic feet 1.30795 cubic yards
1 cubic centimetre* (cm^3)	= 1 millilitre 16.8934 minims (UK)
1 cubic decimetre (dm^3)	= 1 litre 35.1952 fluid ounces 1.75976 pints 0.21997 gallon (UK)

*The abbreviations 'cc', 'ccm', and 'cu cm' should not be used.

FORCE

1 newton (N)	= 10^5 dynes 1.01972×10^2 gram-force 1.01972×10^{-1} kilogram-force 7.23301 poundals

ENERGY

1 joule (J)	= 2.39006×10^{-4} kilocalorie 10^7 ergs 6.2415×10^{18} electronvolts 9.47813×10^{-4} British thermal unit

PRESSURE

1 pascal (Pa)	= 7.50064×10^{-3} millimetre of mercury 1.45038×10^{-4} pound-force per square inch 9.86923×10^{-6} atmosphere
1 kilopascal (kPa)	= 7.50064 millimetres of mercury

VISCOSITY, DYNAMIC

1 pascal second (Pa s)	= 10.0 poises

VISCOSITY, KINEMATIC

1 square metre per second ($m^2 s^{-1}$)	= 10^4 stokes

TEMPERATURE

1 kelvin (K)	= $\frac{9}{5}$ degrees Fahrenheit

SI Unit Equivalents of Radiation Units

ACTIVITY OF A RADIOACTIVE SOURCE

1 nanocurie (nCi)	= 3.7 × 10 becquerels
1 microcurie (μCi)	= 3.7×10^4 becquerels
1 millicurie (mCi)	= 3.7×10^7 becquerels
1 curie (Ci)	= 3.7×10^{10} becquerels

ABSORBED DOSE OF IONISING RADIATION

1 rad (rad)	= 10^{-2} gray
1 megarad (Mrad)	= 10^4 grays

ABSORBED DOSE RATE

1 rad per second (rad s^{-1})	= 10^{-2} gray per second

EXPOSURE TO IONISING RADIATIONS

1 röntgen (R)	= 2.58×10^{-4} coulomb per kilogram

DOSE EQUIVALENT

1 millirem (mrem)	= 10^{-5} sievert
1 rem (rem)	= 10^{-2} sievert

Radiation Unit Equivalents of SI Units

ACTIVITY OF A RADIOACTIVE SOURCE

1 becquerel (Bq)	= 2.7027×10^{-2} nanocurie 2.7027×10^{-5} microcurie 2.7027×10^{-8} millicurie 2.7027×10^{-11} curie

ABSORBED DOSE OF IONISING RADIATION

1 gray (Gy)	= 100 rads

EXPOSURE TO IONISING RADIATIONS

1 coulomb per kilogram (C kg^{-1})	= 3.876×10^3 röntgens

DOSE EQUIVALENT

1 sievert (Sv)	= 100 rems

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