POLICY OF THE JOURNAL AND INSTRUCTIONS TO AUTHORS

POLICY AND ORGANIZATION OF THE JOURNAL

It is the policy of the Biochemical Journal to publish papers in English in all fields of biochemistry, provided that they make a sufficient contribution to biochemical knowledge. Papers may include new results obtained experimentally, descriptions of new experimental methods of biochemical importance, or new interpretations of existing results. Theoretical contributions will be considered equally with papers dealing with experimental work. All work presented should have as its aim the development of biochemical concepts rather than the mere recording of facts. Preliminary or inconclusive experiments should not generally be described.

Two types of paper are accepted by the editors.

1. Full-Length Papers

These should be written in the style described on p. 2, their length being the minimum required for precision in describing the experiments and clarity in interpreting them. A concise well-written paper tends to be published more rapidly.

2. Rapid Papers

Rapid papers offer authors the opportunity of publication within 10–12 weeks of receipt of the typescript in the Editorial Office. The paper must not occupy more than four pages of the printed journal. The criteria for acceptance are otherwise the same as those for full-length papers. Rapid papers are not regarded as preliminary communications but as complete and final accounts.

This statement of policy has been approved by the Committee of the Biochemical Society. The interpretation is in the hands of the Editorial Board, who judge whether each paper submitted as a full-length paper or rapid paper is scientifically acceptable.

Functions of the Editorial Board and Editorial Office

Members of the Editorial Board are appointed by the Committee of the Society on the recommendation of the Editorial Board. The aim is to have a Board whose members have a wide experience of biochemical research.

Normally a paper is read by at least two people: either by two members of the Editorial Board, or, more usually, by an independent referee and a member of the Editorial Board. The members of the Overseas Advisory Panel are also available to act as referees. The main task of the editors and referees is to make recommendations on the acceptability of a paper. If rejection of a paper is recommended, or if there is any serious disagreement between those who have read the paper, the final decision is made by the Chairman or a Deputy Chairman. If a paper is considered to be acceptable in principle, requests for revision may be made by the editor (normally in the form of one or more Editorial Reports). At this stage the paper may also be partly prepared for press in the office before being returned to the author. This subediting process has no bearing on the decision by the editors on the acceptability of the paper. After revision by the author the paper is checked by a member of the Editorial Board before being finally prepared for press by the subeditors. In this final process attention is paid to grammar and the detailed conventions of the Journal.

The Editorial Secretary, who is in charge of the Editorial Office, administers the business of the Journal, in consultation with members of the Board and with the Chairman of the Board, to whom he is responsible.

The Editorial Board meets twice a year to discuss matters related to the production of the Journal. An Editorial Committee, consisting of the Chairman, Deputy Chairmen, three members of the Board and the Editorial Secretary, meets more frequently to expedite the business of the Journal. The Board reports to the Committee of the Society, whose decision is required on financial matters, appointments or major aspects of policy.

Relations between Authors and the Editorial Board

The aim of the Editorial Board is to maintain a high standard both of subject matter and of its presentation. Requests for revision range from minor matters to criticisms of the clarity or validity of statements or arguments.

Authors' replies to criticism or rejection will be sympathetically considered. Although editors and referees are normally anonymous, it is sometimes a help if direct discussion can take place between an author and an editor or a referee. This can be arranged, after consultation with the Chairman, if the author and the editor or referee consent.
INSTRUCTIONS TO AUTHORS

Submission of a paper to the Editorial Board implies that it has been approved by all the named authors, that it reports unpublished work, that it is not under consideration for publication elsewhere, and that if accepted for the Biochemical Journal it will not be published elsewhere in the same form, either in English or in any other language, without the consent of the Editorial Board. The inclusion in a paper of material that has been wholly or largely published elsewhere will not be acceptable. This applies to tables and figures particularly. The main way in which authors can contribute to shortening the time between receipt of a paper and its publication date is to follow the requirements and suggestions in these Instructions to Authors.

Papers that are scientifically acceptable but need revision because they are not clear or concise or do not conform sufficiently to the conventions of the Biochemical Journal will be returned to the authors for amendment. If a paper is not resubmitted within one month or if a significant amount of new material is added, the date of receipt will be altered to the date of resubmission.

Authors are asked to indicate which section of the Biochemical Journal (Molecular Aspects or Cellular Aspects) and which heading in the Contents list (see current issues) are most appropriate for their paper.

All communications about reprints should be addressed to the Executive Secretary, The Biochemical Society, 7 Warwick Court, London WC1R 5DP.

Requests for consent for reproduction of material should be addressed to the Editorial Secretary.

Full-Length Papers

Papers should be sent, preferably in duplicate, together with an extra copy of the synopsis (see below), to the Editorial Secretary, The Biochemical Journal, 7 Warwick Court, London WC1R 5DP. Typescripts should bear the name and address of the person to whom the proof of the paper is to be sent.

Before preparing papers authors should consult a current issue of the Journal to make themselves familiar with the general format, such as the use of cross-headings, lay-out of tables and citation of references. Papers should be in double-spaced typing throughout (including the references and legends of tables and figures) on sheets of uniform size with wide margins. The top copy should be submitted. Submission of a duplicate typescript in addition may avoid delay.

Papers on specialized subjects should be intelligible to the ordinary reader of the Journal. Sufficient information must be included to permit repetition of the experimental work.

It would help the editors if the author, when submitting a paper, would enclose copies (which will be returned) of relevant preceding papers, especially if they were not published in the Biochemical Journal.

The full title should be concise but informative enough for use in coding for information storage and retrieval. Papers should also be headed by the authors’ names (preferably with one forename in full for each author, other forenames being given as initials) and by the name and address of the establishment where the work was done. A running title of up to 60 letters and spaces should also be given.

Separate papers in a series may not be numbered, but subtitles may be used if they are particularly necessary.

The synopsis, which can be in numbered sections, should be of less than 250 words and normally only 3–4% of the length of the paper. It should be as informative as possible for abstracting journals or ‘fringe’ readers but should not contain inessential details or material not described in the body of the paper. (The extra copy of the synopsis requested above is required solely to assist in the choice of particular editors or referees or both.)

The main body of the paper may be divided into (a) the introduction; (b) Experimental, including materials and methods; (c) Results; (d) Discussion; (e) acknowledgments, including details of financial support; (f) References. It is often an advantage to combine (b) and (c) (e.g. in papers describing techniques) or (c) and (d) with gains of conciseness and clarity. In chemical papers, the Experimental section may be placed after the Discussion. The Discussion section should not recapitulate the Results, but only discuss their implications.

Rapid Papers

Typescripts should be submitted in duplicate, written in English, and conform strictly to the form of the Journal as far as spelling and abbreviations are concerned. Each rapid paper should be provided with a short synopsis (normally not exceeding 50 words). Such papers should not exceed 2400 words in length inclusive of title, references etc. Authors may include insertions (preferably not more than two) such as tables, figures or schemes; in these cases authors must assess what proportion of a page these insertions will occupy and reduce the number of text words accordingly at the rate of 700 words per full page of the Journal. The preparation of tables and especially figures is liable to
INSTRUCTIONS TO AUTHORS

cause an increase in publication time. In no circumstances whatsoever can a complete rapid paper occupy more than four pages of the Journal. Papers should be complete in themselves: (1) the methods used in experimental work must be adequately described or sufficient references given to allow repetition of the work; (2) sufficient indication of the results of experimental work must be included to justify the claims made. Rapid papers should be addressed to the Editorial Secretary, The Biochemical Journal, 7 Warwick Court, London WC1R 5DP. To minimize delay in publication, proofs of accepted rapid papers are not supplied to authors. However, authors are given details of any editing of their papers at the same time that the typescripts are sent to the printer, with a request that any essential amendments be sent to the Editorial Secretary as soon as possible. The scientific staff in the Editorial Office check the proofs to ensure that they tally exactly with the edited typescripts and make any necessary alterations indicated by the authors. Contributions that are not being published will be returned to the authors with minimal delay. If a rapid paper has to be returned to the author for amendment, for whatever reason, it will on resubmission be deemed a new paper, and will be redated accordingly. In all cases the editors' decisions will be final.
NOTES ON THE PREPARATION OF PAPERS

Acknowledgments

These must be as short as possible.

Animals

The full binominal Latin names should be included for all experimental animals other than common laboratory animals. The strain, and if possible the source, of laboratory animals should be stated.

Centrifuging

When conditions for centrifuging are critical sufficient information should be given for the procedure to be repeated. The quantitative composition of the suspension medium should be stated. The centrifuge rotor should be unambiguously identified and the temperature of operation stated.

The time of operation of the rotor at sustained plateau speed (ignoring initial rotor acceleration and deceleration periods) should be stated. The centrifugal field should be stated in multiples of \( g \) (as defined on p. 19), based on the average radius of rotation of the liquid. For example: ‘The rotor was operated for 15 min at 2°C and 10000 \( g \) \((r_{av}, 8 \text{ cm})\).’

Alternatively, where it is necessary to take into account periods of acceleration and deceleration of the rotor, the rotor speed \((\omega \text{ in rad/s})\) and time of operation should be integrated and the total integrated field-time stated (as multiples of \( g \)) for the average radius of rotation \((r_{av})\) of the column of liquid in the rotor. For example: ‘The rotor was operated at 5°C. The integrated field-time was 250000 g-min at \( r_{av} \), 6.5 cm’ [i.e. \( (r_{av}/g) \int_0^t \omega^2 \cdot dt = 250000 \) (at \( r_{av} \), 6.5 cm)].

INSTRUCTIONS TO AUTHORS

For nomenclature please refer to the separate section on pp. 11–16, or, for specialized problems, the relevant documents listed there.


Authors are encouraged to employ their own style, although papers must be concise and should conform to normal English usage.

The following items in the present section are listed in alphabetical order.

Acknowledgments

Animals
Density-gradient centrifugation

The make of centrifuge and rotor used, the temperature of the run and the composition of the gradients should be stated. Results should preferably be plotted against distance from rotor centre rather than against fraction numbers; it is then unnecessary to indicate top and bottom of the gradient. If fraction numbers are used, the top and bottom of the gradient should be indicated.

Ultracentrifuge data

Sedimentation coefficient (not constant), s; sedimentation coefficient corrected to 20°C in water, $s_{20,w}$; sedimentation coefficient at zero concentration, $s^0$; $s_{20,w}^0$, Svedberg unit (10$^{-13}$s), S; partial specific volume, $\bar{v}$; diffusion coefficient, $D$, $D^0$, $D_{20,w}$ etc. as for sedimentation coefficient. The temperature at which the sedimentation and diffusion measurements are made should be stated.

Chromatography

Photographs or drawings of paper or thin-layer chromatograms are not generally published unless they convey information, such as a demonstration of homogeneity, that is not readily established in the text. Densitometric records of chromatograms are always preferable.

The rate of movement of a substance relative to the solvent front in paper or thin-layer chromatography is best expressed as its $R_F$ value, or, if relative to a reference compound X, by its $R_X$ value. Solvents should be described in the form butan-1-ol/acetic acid/water (4:4:1, by vol.) or butan-1-ol/acetic acid (4:1, v/v).

Elution diagrams for chromatographic columns should be shown with the effluent volume increasing from left to right. Units of concentration and volume must be shown clearly.

Column (i.e. bed) dimensions should always be quoted, and where possible column void volumes ($V_0$) should be given. Elution zone maxima may be characterized by elution volumes ($V_2$) or preferably by partition coefficients ($\alpha$ or $K_a$). The course of any eluent gradients used should be indicated clearly.

Deposition of Data

Information (computer programs, evidence for amino acid sequences, spectra etc.) supplementing papers in the Biochemical Journal may be deposited free of charge with the British Library Lending Division, Boston Spa, Wetherby, West Yorkshire LS23 7BQ, U.K., where it will be stored in its original form. The supplementary material must in the first instance be sent to the Journal with the parent paper, and not direct to the B.L.L.D. It will be subject to editing in the normal manner before being accepted for deposition. (It should be noted, however, that the Editorial Board cannot accept the responsibility of checking the accuracy of computer programs.) The authors will then be responsible for preparing camera-ready copy according to the following specifications.

(a) Limiting page size for text or tables in typescript: 33cm x 24cm.

(b) Limiting size for diagrams, graphs, spectra etc.: 39cm x 28.5cm.

(c) Tabular matter should be headed descriptively on the first page, with column headings recurring on each page.

(d) Pages should be clearly numbered to ensure correct sequence.

It is suggested that some prefatory text should be included, such as the author's synopsis from the parent paper. If the authors have the facilities available, the use of a type-face designed to be 'read' by computers is encouraged.

The Editorial Office will be responsible for depositing the material with the B.L.L.D. at this stage.

This supplementary information will be available as full-size copies from the Library's photocopying services, which work on a pre-paid flat-rate coupon basis.

The present coupon buys 1–10 pages of photocopy from a single item.

The present coupon costs are:

U.K. £5 for 20 coupons (or 25p each) + VAT

Europe £25 for 20 coupons (or £1.25 each) excluding VAT

U.K. £33 for 20 coupons (or £1.65 each)

The cost includes postage. Outside the U.K. all items are sent by air-mail. The Supplementary Publication number given in the paper in question should be quoted when the item is ordered.

A memorandum on the preparation of material for data deposition is available from the Biochemical Journal Editorial Office on request.

Dialysis

The terms 'diffusate' and 'non-diffusible material' (or 'dialysis residue') should be used. 'Dialysate' should not be used.

Electrophoresis

Photographs or drawings of electrophoretic separations on paper or cellulose acetate will be
published only if they convey information, such as a demonstration of homogeneity, that is not readily established in the text.

Photographs of electrophoretic separations in gels such as starch or polyacrylamide may be published if they convey essential information, but, as reproduction may not always be satisfactory, line drawings may be more informative. Densitometric records are usually superior.

Electrophoretic mobilities \( (m) \) and the composition of the electrophoretic medium, \( \text{pH} \) and temperature should be quoted. The operative voltage gradient should be specified where possible.

The symbol \( \text{pI} \) should be used for isoelectric point.

**Enzymes**

*Enzyme nomenclature*

The recommendations of the latest edition of *Enzyme Nomenclature* ([1973] Elsevier Publishing Co., Amsterdam, London and New York) and supplement *Biochim. Biophys. Acta* (1976) 429, 1–45 will be followed as far as possible. This includes the quoting of EC numbers.

*Enzyme units:*

Units of the amount of enzyme should be defined in each paper, and this may be done in terms of the rate of reaction catalysed under conditions specified. The SI unit for the rate is 1 mol of substrate transformed/s (or, if necessary, 1 mol of measured product formed/s), and this gives the unit of the amount of enzyme that has been given the name of katal (symbol: kat) [see *Enzyme Nomenclature* (1973)]. Units of the amount of enzyme may, however, be expressed in terms of the amount that can catalyse other rates, e.g. 1 \( \mu \text{mol} \) of substrate transformed/min.

*Standard protein solutions*

When standard proteins such as bovine serum albumin are used as a basis for the determination of other protein concentrations, the type of protein, its source of supply and the moisture content (if appropriate) should be given.

*Kinetic constants*

Velocity constants for the forward and the backward reactions in the \( n \)th step of an enzymic reaction should be represented by \( k_{s,n} \) and \( k_{a,n} \) respectively. The Michaelis constant is defined as \( K_m = [S] \) when \( v = V/2 \), where \( v \) is the velocity of appearance of product or disappearance of substrate at a given substrate concentration \( [S] \) and \( V \) is the velocity when the enzyme is saturated with that substrate. When reactions with two substrates \( A \) and \( B \) are being considered \( K_m^A = [A] \) when \( v = V/2 \) and \( [B] \) has been extrapolated to infinity; a value for \( [A] \) when \( v = V/2 \) at a finite concentration (which must be specified) of \( B \) should be referred to as an apparent \( K_m \) for \( A \). \( K_c \) is the equilibrium constant of the dissociation of the substrate–enzyme complex.

**Ethics of Human Experimentation**

The Editorial Board agrees with the principles laid down in the Declaration of Helsinki (1964) [Br. Med. J. (1964) II, 177–178; see also Report of the Medical Research Council for 1962–63, pp. 21–25]. Authors should ensure that their work complies with these declarations. A paper describing any experimental work with humans should include a statement that the Ethical Committee of the Institution in which the work was performed has approved it, and should state that the subjects have given informed consent to the work.

**Experimental Hazards**

Authors should draw attention to any particular chemical or biological hazards that may be involved in carrying out the experiments described. It may be appropriate to describe relevant safety precautions taken for any hazard, or to include a statement that an accepted code of practice has been followed. In the latter case a reference to the relevant standards should be given. The potential dangers involved in the use of pathogens or in the manipulation of the genetic composition of micro-organisms were considered in three reports: (a) Report of the Working Party on the Laboratory Use of Dangerous Pathogens (Chairman: Sir George Godber; H.M.S.O., London, May 1975, Command No. 6054); (b) Report of the Working Party on the Experimental Manipulation of the Genetic Composition of Micro-organisms (Chairman: Lord Ashby; H.M.S.O., London, January 1975, Command No. 5880); (c) Report of the Working Party on the Practice of Genetic Manipulation (Chairman: Sir Robert Williams; H.M.S.O., London, August 1976, Command No. 6600).

**Footnotes**

These should be avoided as far as possible. Where they must be used, as in tables, reference is made by the symbols * † § ¶‖‖‖‖, in that order.

**Illustrations**

Each illustration should be on a separate sheet and packed flat; each should bear the author's name,
the title (abbreviated if necessary) of the paper and the figure number on the back. Its approximate position should be indicated in the margin of the typescript. Illustrations constitute an expensive item of publication and may increase the time taken in printing. Their number should be kept to a minimum.

Headings and legends

Each illustration should be supplied with an informative heading, which should be underlined, and an explanatory legend, starting on a new line. The heading and legend should make the general meaning comprehensible without reference to the text. Conditions specific to a particular experiment should be stated. Reference to the text for general experimental details is permissible provided that there is no ambiguity.

Reproduction of line diagrams

If possible, artwork should be supplied in a form (apart from lettering) that can be reproduced directly by the printer. Authors are referred to the Appendix (pp. 24–27) for full details. Line diagrams that are submitted in a form unsuitable for direct reproduction, for any reason, will be redrawn by the printer’s draughtsman, with consequent delay.

If it is impracticable to supply line drawings suitable for direct reproduction, photographs of line drawings (to be redrawn by the printer’s draughtsman) are acceptable, but if submitted should be on matt paper, not as glossy prints.

Reproduction of half-tone illustrations (photographs)

Plates on art paper are used for the reproduction of half-tone illustrations such as electron micrographs, X-ray-diffraction patterns etc. Glossy prints are required for these. Where the magnification is to be indicated (e.g. on electron micrographs), this is best done by adding a bar representing a stated length.

The editors will accept Plates for publication only (a) when they make a sufficiently important scientific contribution to the paper and (b) when the photographs supplied are of a quality that justifies publication in this form.

Thus photographs of electrophoretograms, radioautograms etc., for example, will normally be reproduced as half-tone figures on text paper. If it is not possible to obtain photographs of the required quality, such illustrations can often be replaced by tracings for reproduction as line diagrams.

Isotope Experiments

The information given should include: (a) sufficient details of the method of assay to allow an estimate of the efficiency of detection (preferably an assay of a standard under the same conditions); (b) details of corrections made to the observed count rate; (c) standard error of the results or a statement of the total counts above background collected; (d) in general the specific activity of the starting and final materials should be given, preferably in terms of curies per unit weight or, for stable isotopes, as atoms % excess. For some purposes the count rate under defined conditions such as at infinite thickness is satisfactory, but authors should consider any limitations that such statements may impose on the deductions from their work.

In assessment of the specific activities of starting materials, dilution with unlabelled materials in the incubation mixture should be allowed for. This is not always possible, but, unless the dilution is known, the radioactivity measurements do not indicate the amount of material transferred.

Where possible, radioactivity should be expressed in absolute terms, i.e. curies (Ci) or disintegrations/second (d.p.s.).

Mass Spectrometry

Full mass spectra are often not published, but the editors may wish to see these. If deemed necessary, full spectra may be deposited with the British Library Lending Division (see the Deposition of Data section on p. 5).

Spectra may be described as, e.g., ‘m/e 300 [M+ (the molecular ion)], 282 (M+–H2O) etc.’. If parenthetic values are quoted for percentage peak heights, it should be stated what these are relative to.

Micro-organisms

In the title, in the synopsis and at the first mention in the text, micro-organisms should be given their full binominal Latin name, underlined. Each organism should preferably have been obtained from or deposited with a recognized collection of micro-organisms, and the collection number must be given. Alternatively, a strain number or name should be quoted; this should not be underlined. Names of ranks higher than genus (e.g. Eubacteriales, Lactobacillae), generic names used adjectivally (e.g. 'staphyloccocal') and names of micro-organisms used colloquially (e.g. as in 'most lactobacilli behave thus') should not be underlined. The first (i.e. generic) name should be spelt with a capital letter. Elsewhere in the text, single-letter abbrevia-
tions may be given for the generic name; if two genera with the same initial letter are studied, abbreviations such as Strep. and Staph. may be used. If the author selects for stated reasons a name that does not conform to that chosen in the most recent edition of one of the reference books quoted below, the name given in the reference book should be added in parentheses after the first mention of the organism in the synopsis, and also in the text. Characteristics of the organism that are known to differ from those quoted in the reference book should also be given, since they are essential for subsequent interpretation of the work.

Recommendations on nomenclature in bacterial genetics have been proposed by M. Demerec, E. A. Adelberg, A. J. Clark & P. E. Hartman (1966) Genetics 54, 61–76. Authors should follow these guidelines wherever appropriate.

Authors are urged to offer new organisms to collections of micro-organisms so that they may be readily available to other workers.

Reference books


Plants

The full binominal Latin names should be included for all plant species. Where appropriate, the variety and the source should be specified.

Powers in Tables and Figures

Care is needed where powers are used in table headings and in figures in order to avoid numbers with too many digits. The quantity expressed is to be preceded by the power of 10 by which its value has been multiplied. The units in which the quantity is expressed may not be multiplied by a power of 10; the unit may be changed by the use of prefixes, e.g. m, μ, n or p. For example: (i) an entry '2' under heading $10^3k$ means that the value of $k$ is 0.002; an entry '2' under heading $10^{-3}k$ means that the value of $k$ is 2000; (ii) a concentration 0.00015 M may be expressed as 0.15 under heading 'conc. (mM)', or as 150 under heading 'conc. (μM)' or as 15 under heading $10^5 \times$conc. (M), but not as 15 under heading 'conc. (M $\times 10^{-5}$)'; (iii) complex quantities are treated similarly; a value for $1/[S]$ of 200 m$^{-1}$ would appear as '2' under the heading $10^{-2}/[S]$ (m$^{-1}$) or as '0.2' under the heading $1/[S]$ (m$^{-1}$). Square brackets may conventionally be used to indicate concentration.

Prefixes for Multiples and Submultiples of Units

These should be as follows:

<table>
<thead>
<tr>
<th>Multiple</th>
<th>Prefix</th>
<th>Symbol</th>
</tr>
</thead>
<tbody>
<tr>
<td>$10^{12}$</td>
<td>Tera</td>
<td>T</td>
</tr>
<tr>
<td>$10^{9}$</td>
<td>Giga</td>
<td>G</td>
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<tr>
<td>$10^{6}$</td>
<td>Mega</td>
<td>M</td>
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<td>$10^{3}$</td>
<td>Kilo</td>
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<td>$10^{2}$</td>
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<td>$10^{-2}$</td>
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<td>Nano</td>
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<tr>
<td>$10^{-12}$</td>
<td>Pico</td>
<td>p</td>
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<td>$10^{-15}$</td>
<td>Femto</td>
<td>f</td>
</tr>
<tr>
<td>$10^{-18}$</td>
<td>Atto</td>
<td>a</td>
</tr>
</tbody>
</table>

* To be avoided where possible (except for cm).

A combination of a prefix and a symbol for a unit is regarded as a single symbol, which may be raised to a power without the use of parentheses or brackets, e.g. mm$^{-1}$ and cm$^2$.

References

The Harvard System, not the Numbering System, should be used for the citation of references in the text, as follows: for papers written by one or two authors, as 'Trop & Birk (1970)' or 'Harrison, 1971)'; for papers written by three or more authors, as 'Mayer et al., (1970)' or 'Mayer et al., (1970)'. Where more than one paper by the same authors has appeared in one year the references should be given as 'Lowe & Yuthavong (1971a,b)' or 'Slater & Sawyer, 1969, 1971a,b,c'.

At the end of the paper references should be listed in alphabetical order, except for papers by three or more authors (which are given in the text only as 'et al.'), which should be grouped in chronological order after any other papers by the first author. The authors' initials should be included, but not the title of the paper. The style to be used is shown in the following examples.


It should be noted that first and last pages should be cited for all references.
INSTRUCTIONS TO AUTHORS

Titles of journals should be abbreviated in accordance with the Chemical Abstracts Service Source Index (1907–1974 Cumulative) (1975) and subsequent Quarterly Supplements (American Chemical Society).

References to books and monographs should be in accordance with the following examples.


References to a paper ‘in the press’ is permissible, provided that it has been accepted for publication, thus:


References to ‘personal communication’ and ‘unpublished work’ are permitted in the text only, i.e. not in the list of references; editors may require documentary evidence for the former citation. The use of ‘in preparation’, ‘private communication’ and ‘submitted for publication’ is not allowed.

The above requirements are in accordance with the recommendations of the Commission of Editors of Biochemical Journals [see Biochem. J. (1973) 135, 1–3].

Solutions

Solutions should be described in terms of molarity (M), not normality (N). Fractional concentrations should be expressed in the decimal system, e.g. 0.25 M HCl (not m/4 HCl). The term % must be defined as w/w, w/v or v/v, e.g. 5% (w/v) means 5 g/100 ml. For aqueous solutions of concentration less than 1%, w/v need not be inserted if it is clear that the concentration is stated in terms of weight of solute. For solutions of salts expressed as % it must be made clear whether anhydrous or hydrated compounds are used. It may be noted that SI recommends that the symbol ‘m’ should be replaced by ‘mol/l’, and that % (w/v) and % (v/v) should be given in terms of e.g. g/l and ml/l. For the time being at least, however, the use of ‘M’, ‘% (w/v)’ and ‘% (v/v)’ will continue to be accepted in the Biochemical Journal.

Buffers

These must be specified so that readers can reproduce the conditions used by the authors. It is often useful to give the complete composition of each solution, e.g. ‘0.09 M sodium acetate/0.01 M acetic acid, pH 5.6’ (which means that a single solution has these concentrations of these substances) at the first mention or in the Experimental section. A short designation, e.g. ‘0.1 M sodium acetate buffer, pH 5.6’, may be used elsewhere throughout the paper. In such designations the concentration specified should be the sum of the concentrations of all forms of the partly ionized species. If a buffer contains two or more partly ionized species (e.g. pyridine and acetic acid) then the concentration of each substance included should be stated.

Other forms of specification are permissible, provided that they enable readers to repeat the procedures. Thus buffers may be specified by reference, or by adjustment to a certain pH. The description ‘0.1 M sodium acetate buffer, pH 5.6’ used above is adequate, since it means that the sum of the final concentrations of acetic acid and sodium acetate is 0.1 M. For buffers made by adjustment of pH, the temperature and approximate concentration of the solution at which the pH is adjusted must be specified if either differs from that at which the buffer is used, e.g. ‘Approx. 0.2 M KH2PO4 was adjusted to pH 7.4 with NaOH solution and diluted to 0.1 M’. If the temperature of adjustment differs from room temperature, then the procedure must be described in detail, stating, for example, whether only the glass electrode or both it and the reference electrode are at the changed temperature.

An initial capital letter should be used for trivial names such as Hapes [4-(2-hydroxyethyl)-1-piperazine-ethanesulphonic acid], which should be defined in a footnote.

Incubation media such as Krebs–Ringer solution, Eagle’s medium, Waymouth’s medium etc. should be defined either by reference or by giving the composition.

The symbol for ionic strength (mol/l) is I.

Spectra and Spectroscopic Data

Full spectra should be published when important or novel features are demonstrated; however, other spectra or spectral information may be deposited with the British Library Lending Division (see the Deposition of Data section on p. 5).

The spectra for u.v. and visible absorption, fluorescence, circular dichroism and optical rotation should have a wavelength scale (e.g. nm or μm) whether or not a wavenumber scale (e.g. cm⁻¹) is given. Where possible, molar terms should be used in absorption, circular dichroism and optical rotation.

C.d., n.m.r. (use when nuclei other than ¹H are used), p.m.r., e.s.r. or e.p.r. and o.r.d. are acceptable abbreviations and need not be defined.

Visible- and ultraviolet-absorption spectroscopy

Absorbance [log (Iₒ/I)] should be used, and not extinction or optical density [see IUPAC Manual of Symbols and Terminology for Physicochemical Quantities and Units (1975) Butterworths, London]. Symbols used are: A, absorbance; a, specific absorption coefficient (litre·g⁻¹·cm⁻¹) (alternatively use Aᵢ⁻⁺⁻⁻⁻⁻⁻⁻­⁻⁻⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻⁻⁻⁻⁻­⁻⁻­⁻⁻­⁻⁻}
equal to the absorbance of a 1 mol/litre solution in a 1 cm light-path) (use units of litre·mol⁻¹·cm⁻¹ and not cm²·mol⁻¹). Wavelengths are given (in nm) as subscripts without units, e.g. \( A_{\text{nm}}^{10} \). No equals sign need be given between \( \varepsilon \) or \( A \) and its value.

**Infrared spectroscopy**

Spectra are reported as percentage transmission, \( T \), as a function of wavelength (given in \( \mu \text{m} \)) or frequency (given in cm⁻¹). When assigning bands the units need be given for the first value only and the description should be in the style, e.g., '(broad NH band)'.

**Optical rotation**

This is reported as the specific rotation, \([\alpha]_D\), which is numerically equal to the rotation in degrees of a 1 g/ml solution with a pathlength of 1 dm (10cm) at wavelength \( \lambda \) and temperature \( t \). The concentration (g/100ml) and solvent are quoted, e.g. \('[\alpha]_D^{19} = -27.5 \text{ (c 2 in methanol)}\). The corresponding molar expressions for the molar rotation, \([M] = [\alpha] \times \text{molecular weight} \) and \([m] = [\alpha] \times \text{molecular weight/100} \) should be defined.

For biopolymers the mean residue molecular weight is used, and \([m] \) is the mean residue rotation. Where a refractive-index correction is applied, \([m']\), the reduced mean residue rotation, is reported. Dimensions of \([m]\) and \([m']\) are degrees·cm²·dmol⁻¹.

Optical rotatory dispersion is reported as the variation of \([\alpha] \) or \([m] \) with wavelength (or frequency).

**Circular dichroism**

This is reported as the molar circular-dichroism absorption coefficient \( \Delta \varepsilon = \varepsilon_\ell - \varepsilon_\ell \) [or the molar ellipticity, \( \theta \) (see below)]. For biopolymers, molar concentrations in terms of the mean residue molecular weight are generally used. Units of \( \Delta \varepsilon \) are the same as for \( \varepsilon \), i.e. litre·mol⁻¹·cm⁻¹.

Specific ellipticity \( [\psi] \), molar ellipticity \( [\theta]_M \) and mean residue ellipticity \( [\theta]_{m.r.w.} \) are directly analogous to the terms used in optical rotation. The units of \( [\theta] \) are as for \([m]\). Note that \([\theta]_M = 3300 \times \Delta \varepsilon \).

**Fluorescence spectroscopy**

In reporting fluorescence excitation and emission spectra it should be stated whether intensities, \( F \), are relative, normalized or corrected (and the nature of the correction).

Fluorescence-polarization data and spectra are reported as polarization ratio, \( P \), or preferably anisotropy ratio, \( A \); both are dimensionless.

**Nuclear magnetic resonance**

N.m.r. chemical-shift data, \( \delta \), are expressed as parts per million (p.p.m.) and the reference compound must be quoted. The recommended convention is that downfield shifts are positively signed. Coupling constants are expressed in Hz.

For reporting structural n.m.r. data the style suggested is: '\( \delta \) (p.p.m.) (solvent) chemical-shift value [integration, peak type, coupling constant (in Hz), designation (relevant proton in *italics*)]. E.g. '\( \delta \) (p.p.m.) (\(^6\)Hchloroform) 0.92 [6H, d, \( J \) 6 Hz, CH(CH₃)$_2$], 2.16 (2H, t, \( J \) 7 Hz, CH₂CH₂CO\).

Singlet, doublet etc. are abbreviated to s, d etc. without definition, but other descriptions, e.g. broad and overlapping, should be in full.

**Electron spin resonance, electron paramagnetic resonance**

Derivative spectra are given, unless otherwise stated; a scale of the magnetic-field strength (in mT) and/or g values should be given. Peaks are described as, e.g., 'the \( g = 2 \) peak'.

**Mössbauer spectroscopy**

The absorption (in \( \% \)) arbitrary units or crude channel counts is plotted against the doppler velocity, \( v \) (in mm/s). The chemical shift, \( \delta \), in units of mm/s should be quoted relative to a specified standard (e.g. metallic iron at 290 K). The temperature should always be given and the applied magnetic field, if any, should be precisely described.

**Statistical Treatment of Results**

Wherever possible all authors should adopt a statistical approach in reporting their results. Data from a sufficient number of independent experiments should be reported to permit evaluation of the reproducibility and significance of the results. When the object is to determine the value of a quantity or the statistical characteristics of a population, sufficient information is usually conveyed by the following: (i) the number of independent experiments (replicate measurements in an individual animal or preparation and results from pooled tissues etc. represent only one independent estimate); (ii) the mean value; (iii) the standard deviation (s.d.), the coefficient of variation or the standard error of the estimate of mean value (s.e.m.), as may be appropriate. *It should be made clear whether the standard deviation or the standard error is used.* A convenient form for inclusion in a table is, for example, 263±2.5 (10), where the number in parenthesis represents the number of values used in calculating the mean.

When any significance is claimed, the test of significance used should be stated and an estimate of the probability given.

Statistical tests appropriate for a normal distribution will be assumed unless stated otherwise.
Symbols for Physical Units

The Biochemical Journal uses the recommended SI symbols for units [see Pure Appl. Chem. (1970) 21, 1–44; Quantities, Units and Symbols, 2nd edn. (1975) The Royal Society, London]. Preference should be given to the recommended SI units, e.g. either ‘42kJ/mol’ or ‘42kJ mol⁻¹ (10kcal/mol)’, is permissible, but not ‘10kcal/mol’ alone. Details are given below under ‘Abbreviations, Symbols, Conventions and Definitions’ (pp. 17–23). The symbol for the plural of a unit is the same as that for the singular.

Tables

Each table should be supplied with an informative heading, which should be underlined, and an explanatory legend, starting on a new line. The heading and legend should make the general meaning comprehensible without reference to the text. Footnotes should be as few as possible. Conditions specific to the particular experiment should be stated. Reference to the text for general experimental methods is permissible provided that there is no ambiguity. The units in which the results are expressed, e.g. g/100ml, should be given at the top of each column, and not repeated on each line of the table.

Tables should be typed on separate sheets and their approximate position in the text indicated. Words or numerals should be repeated on successive lines: ‘ditto’ or ‘‘, is not to be used.

Trade Names

The names of the manufacturers or suppliers of special apparatus or materials should be given, and also their addresses. Wherever possible, the chemical nature of the proprietary material should be specified at the first mention.

NOMENCLATURE

Biochemical Nomenclature

As far as possible authors should follow the Recommendations of the IUPAC-IUB Commission on Biochemical Nomenclature.

1. Abbreviations and symbols for chemical names of special interest in biological chemistry: Bioch. J. (1966) 101, 1–7 (extended by items 6, 11 and 15 below).

2. Trivial names of compounds of importance in biochemistry; nomenclature of quinones with isoprenoid side chains; nomenclature and symbols for folic acid and related compounds; nomenclature for corrinoids: Biochem. J. (1967) 102, 15–22 (but see items 10, 22, 23 and 24 below).


Reprints of these Recommendations and information on them can be obtained from Waldo E. Cohn, Director, NRC Office of Biochemical Nomenclature, Oak Ridge National Laboratory, Box Y, Oak Ridge, TN 37830, U.S.A. Comments on the Tentative Rules should be sent to the Nomenclature Committee of the International Union of Biochemistry (Secretary: H. B. F. Dixon, Department of Biochemistry, University of Cambridge, Tennis Court Road, Cambridge CB2 1QW, U.K.).

Abbreviations

The Biochemical Journal in general follows the Tentative Rules of the IUPAC–IUB Commission on Biochemical Nomenclature [see Biochem. J. (1966) 101, 1–7] and discourages the use of other abbreviations or symbols (except for well-known chemical ones, e.g. Me, Et, Ph, Ac). However, no abbreviations (except, when necessary to avoid unwieldiness, the ‘accepted’ abbreviations listed below) should be used in the title. Non-standard abbreviations should also not normally be used in the synopsis, in text subheadings and in titles to tables, figures, schemes and plates. All abbreviations except those listed below must be defined together in a footnote on the title page. New abbreviations should be coined only for unwieldy names, and then only if their repeated use is essential; symbols for parts of chemical names are preferred (e.g. Me₂ for DM, H₄ for TH). The name of an entity can often be replaced by short alternatives such as ‘the compound’, ‘the protein’, ‘the enzyme’ etc., or even by ‘it’. If an abbreviation is used for an biochemical entity, it is preferable that some indication of the type or class of material should be spelled out. Thus ‘turnip yellow-mosaic virus’ may be abbreviated to ‘TYMV’ but not to ‘TYMIV’, and ‘poly(XY)’ should not be ‘PXY’. Cumbersome names of enzymes used frequently may be abbreviated, although this practice is not encouraged. Any such abbreviation should be based on the EC recommended name, which should be given, together with the EC number, in the footnote.

Abbreviations that may be used without definition, and are therefore ‘accepted’, are:

ADP, CDP, GDP, IDP, UDP, XDP, dTDP, AMP etc.
ATP etc.
CM-cellulose, CoA and acyl-CoA
DEAE-cellulose, DNA, EDTA, EGTA, FAD, FMN, NAD*, NADP*, NMN, Pᵢ, PPᵢ, RNA, mRNA, rRNA, tRNA†

ADP, CDP, GDP, IDP, UDP, XDP, dTDP
AMP etc.
ATP etc.
CM-cellulose
CoA and acyl-CoA
cyclic AMP etc.
DEAE-cellulose
DNA
EDTA
EGTA
FAD
FMN
NAD*
NADP*
NMN
Pᵢ, PPᵢ
RNA, mRNA, rRNA, tRNA†

ADP, CDP, GDP, IDP, UDP, XDP, dTDP
AMP etc.
ATP etc.
CM-cellulose
CoA and acyl-CoA
cyclic AMP etc.
DEAE-cellulose
DNA
EDTA
EGTA
FAD
FMN
NAD*
NADP*
NMN
Pᵢ, PPᵢ
RNA, mRNA, rRNA, tRNA†
INSTRUCTIONS TO AUTHORS

Tris 2-Amino-2-hydroxymethyl-propane-1,3-diol

* Oxidized and reduced forms of the dinucleotides should be indicated as, for example, either "NAD⁺", NADH, or NAD, NADH₂, not NAD, NADH. The NAD⁺, NADH form is preferred and has the advantage that NAD can be used when the state of oxidation need not be indicated.

† Specific tRNA species should be given as, for example, alanine tRNA or tRNA₂₅⁸; tRNA bound to amino acid should be given as, for example, alanyl-tRNA or alanyl-tRNA₂₅⁸ (note: fMet = formylmethionyl). sRNA should not be used.


These are for use only in representing polymers or sequences and in tables and figures, and need not be defined:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Amino Acid</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ala</td>
<td>Alanine</td>
</tr>
<tr>
<td>Arg</td>
<td>Arginine</td>
</tr>
<tr>
<td>Asn</td>
<td>Asparagine</td>
</tr>
<tr>
<td>Asp</td>
<td>Aspartic acid</td>
</tr>
<tr>
<td>Asx</td>
<td>Aspartic acid or asparagine (undefined)</td>
</tr>
<tr>
<td>Cys</td>
<td>Cysteine</td>
</tr>
<tr>
<td></td>
<td>Cystine (half)</td>
</tr>
<tr>
<td>Gln</td>
<td>Glutamine</td>
</tr>
<tr>
<td>Glu</td>
<td>Glutamic acid</td>
</tr>
<tr>
<td>Glx</td>
<td>Glutamic acid or glutamine (undefined)</td>
</tr>
<tr>
<td>Gly</td>
<td>Glycine</td>
</tr>
<tr>
<td>His</td>
<td>Histidine</td>
</tr>
<tr>
<td>Hyl</td>
<td>Hydroxlylsine</td>
</tr>
<tr>
<td>Hyp</td>
<td>Hydroxyproline</td>
</tr>
<tr>
<td>Ile</td>
<td>Isoleucine</td>
</tr>
<tr>
<td>Leu</td>
<td>Leucine</td>
</tr>
<tr>
<td>Lys</td>
<td>Lysine</td>
</tr>
<tr>
<td>Met</td>
<td>Methionine</td>
</tr>
<tr>
<td>Orn</td>
<td>Ornithine</td>
</tr>
<tr>
<td>Phe</td>
<td>Phenylalanine</td>
</tr>
<tr>
<td>Pro</td>
<td>Proline</td>
</tr>
<tr>
<td>Ser</td>
<td>Serine</td>
</tr>
<tr>
<td>Thr</td>
<td>Threonine</td>
</tr>
<tr>
<td>Trp</td>
<td>Tryptophan</td>
</tr>
<tr>
<td>Tyr</td>
<td>Tyrosine</td>
</tr>
<tr>
<td>Val</td>
<td>Valine</td>
</tr>
</tbody>
</table>

Others are listed in Biochem. J. (1972) 126, 773–780.

In polymers or sequences the symbols should be joined by hyphens if the sequence is known, or by commas if it is not; e.g.:

Gly-Ile-Gly-Phe(Gly,Tyr,Val,Ser)Leu-Val-Ala

represents an undecapeptide composed of four amino acids whose sequence has been established, four for which the sequence is unknown and then three in known sequence. The glycine on the left carries the free amino group and the alanine on the right the free carboxyl group. Further details are given in Biochem. J. (1972) 127, 753–756. The prefix poly or the suffix subscript n may accompany these symbols to indicate polymers [see Biochem. J. (1972) 127, 753–756].

Symbols for nucleosides, nucleotides and polynucleotides [see Biochem. J. (1970) 120, 449–454, which also contains symbols for bases (three-letter system)]

The symbols for ribonucleosides, which need not be defined, are as follows (the prefix r should be used if there is possible ambiguity):

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Nucleoside</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Adenosine</td>
</tr>
<tr>
<td>G</td>
<td>Guanosine</td>
</tr>
<tr>
<td>I</td>
<td>Inosine</td>
</tr>
<tr>
<td>X</td>
<td>Xanthosine</td>
</tr>
<tr>
<td>rA</td>
<td>rAdenosine</td>
</tr>
<tr>
<td>rG</td>
<td>rGuanosine</td>
</tr>
<tr>
<td>rI</td>
<td>rInosine</td>
</tr>
<tr>
<td>rX</td>
<td>rXanthosine</td>
</tr>
<tr>
<td>C</td>
<td>Cytidine</td>
</tr>
<tr>
<td>T</td>
<td>Ribosylthymine</td>
</tr>
<tr>
<td>U</td>
<td>Uridine</td>
</tr>
<tr>
<td>rC</td>
<td>rCytidine</td>
</tr>
<tr>
<td>rT</td>
<td>rRibosylthymine</td>
</tr>
<tr>
<td>rU</td>
<td>rUridine</td>
</tr>
</tbody>
</table>

General symbols:

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Nucleoside</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>Unspecified purine nucleoside</td>
</tr>
<tr>
<td>Y</td>
<td>Unspecified pyrimidine nucleoside</td>
</tr>
<tr>
<td>N</td>
<td>Unspecified nucleoside (not X)</td>
</tr>
</tbody>
</table>

The 2'-deoxyribonucleosides are designated by the same symbols preceded by d, e.g.:

dA 2'-Deoxyribosadenine

dT 2'-Deoxyribosylthymine (thymidine)

The letter p (for terminal phosphate only) or a hyphen (for phosphodiester group only) to the left of a nucleoside symbol indicates a 5'-phosphate; to the right it indicates a 3'-phosphate, e.g.:

pA-G 5'-Phosphoadenylyl(3'-5')-guanosine or guanylyl(5'-3')-adenosine 5'-phosphate

A-Gp Adenylyl(3'-5')guanosine 3'-phosphate

doA(T) Deoxyadenylyl(3'-5')thymidine

A-G-cyclic-p Adenylyl(3'-5')guanosine or A-G-p 2'-3'-phosphate

Other points of attachment may be indicated by numerals, e.g.:

A2'-5'G2'p Adenylyl(2'-5')guanosine 2'-phosphate

A-G-(mixed) A mixture of A-Gp and 2',3'-p A-G2'p

In sequences, oligonucleotides or polynucleotides the phosphate between nucleoside symbols is shown by a hyphen if the sequence is known, or by a comma if it is not; e.g.:

G-A-U(C₃,U)Gp

indicates a heptanucleotide composed of three nucleotides of known sequence but with a trinucleotide of unknown sequence before the final Gp. In the special case of triplet codons the hyphens may be omitted, e.g. UUU.
For sequences that are repetitive or obscure, shorter forms may be used [see Biochem. J. (1972) 127, 753–756], e.g.:

\[
\begin{align*}
\text{poly(A)} & \quad \text{a simple homopolymer of A} \\
\text{poly(A,C)} & \quad \text{random co-polymer of A and C in 3:2 proportions} \\
\text{poly(d(A-T)) or poly(dA-dT)} & \quad \text{alternating co-polymer of dA and dT} \\
\text{poly(A,G,C,U)} & \quad \text{random co-polymer of A, G, C and U, proportions unspecified}
\end{align*}
\]

The prefix co-poly or oligo may replace poly, if desired. An alternative form is, e.g., An for poly(A), where the subscript n may be replaced by numerals indicating actual size. Similarly, d(A-T)m etc. may be used for poly(dA-dT) etc. It should be noted that no space follows the prefix ‘poly’.

Associated (e.g. hydrogen-bonded) chains, or bases within chains, are indicated by a centre dot (not a hyphen or a plus sign) separating the complete names or symbols; non-associated chains are separated by a plus sign, and unspecified or unknown association by a comma; e.g.:

\[
\begin{align*}
\text{poly(A) \cdot poly(U)*} & \quad \text{associated poly(A) and poly(U)} \\
\text{poly(G) \cdot 2poly(C)} & \quad \text{triple-stranded complex of poly(G) and poly(C) in the proportions 1:2} \\
\text{poly(dA-dC) \cdot poly-(dG-dT) or (dA-dC)n \cdot (dG-dT)n} & \quad \text{associated poly(dA-dC) and poly(dG-dT)} \\
\text{poly(A) + poly(U)†} & \quad \text{non-associated poly(A) and poly(U)} \\
\text{poly(A),poly(U)} & \quad \text{poly(A) and poly(U), no definite information on association}
\end{align*}
\]

* Also ‘adenine-thymine base pair’ or ‘A • T base pair’ in the text.
† Also ‘A+T content’ (and ‘A-T sequence’), not ‘AT content’ (nor ‘AT sequence’), in the text.


These are for use only in representing polymers or sequences and in tables and figures, and need not be defined:

\[
\begin{align*}
\text{Ara} & \quad \text{Arabinose} \\
\text{dRib*} & \quad \text{2-Deoxyribose} \\
\text{Fru} & \quad \text{Fructose} \\
\text{Fuc} & \quad \text{Fucose} \\
\text{Gal} & \quad \text{Galactose} \\
\text{Glc†} & \quad \text{Glucose} \\
\text{Man} & \quad \text{Mannose} \\
\text{Rib} & \quad \text{Ribose} \\
\text{Xyl} & \quad \text{Xylose}
\end{align*}
\]

* Similarly for other 2-deoxy sugars.
† Where no ambiguity can arise, the single-letter symbol G may be used, but is not preferred.

When it is necessary to indicate furanose or pyranose, the letter f or p after the saccharide symbol may be used: e.g. Rib f for ribofuranose.

Symbols thus formed are joined by short dashes or arrows to indicate the links between units. The position and nature of the links are shown by numerals and the anumeric symbols α and β, e.g.:

\[
\begin{align*}
\text{Maltose} & \quad \text{Glcpa1–4Glc or Glcpa1→4Glc} \\
\text{Lactose} & \quad \text{Galpβ1–4Glc or Galpβ1→4Glc}
\end{align*}
\]

The arrow points away from the hemiacetal link. If the dash is used, it is assumed that the hemiacetal link is to the left of it.

The following suffixes may be used, also without definition, to indicate derivatives:

\[
\begin{align*}
\text{A} & \quad \text{for uronic acids (e.g. GlcA for glucuronic acid, GalA for galacturonic acid)} \\
\text{N and NAc} & \quad \text{for 2-amino-2-deoxysaccharides and their N-acetyl derivatives (e.g. GlcN for glucosamine and GalNAc for N-acetylgalactosamine)}
\end{align*}
\]

Note: AcNeu suffixes for N-acetylneuraminic acid [see Biochem. J. (1972) 126, 775].

This system differs in some respects from that described previously [Biochem. J. (1966) 101, 1–7] and from that recommended by the Chemical Society. Authors may use the Chemical Society system if they wish, but should state this explicitly, to avoid possible ambiguity.

Definitive names for oligosaccharides are often too cumbersome for repeated mention in the text of a paper, and shortened names that, within the conventions of the system employed, are unambiguous may be used [see, e.g., Biochem. J. (1956) 63, 200–206; 64, 340–351; 64, 351–361]. At its first mention the definitive name should be given in parenthesis after the shortened name.

Chemical Nomenclature

The IUPAC Rules on chemical nomenclature should be followed, the most important of these being as follows.


2. Nomenclature of organic chemistry:

Sections A (hydrocarbons), B (fundamental heterocyclic systems) and C (characteristic groups containing carbon, hydrogen, oxygen, nitrogen, halogen, sulphur, selenium and/or tellurium) (combined and revised edition) [(1971) Butterworths, London].
INSTRUCTIONS TO AUTHORS

Section D (organic compounds containing elements which are not exclusively carbon, hydrogen, oxygen, nitrogen, halogen, sulphur, selenium and tellurium) [Tentative Nomenclature Appendix No. 31 (August 1973) to IUPAC Information Bulletin].

Section E (stereochemistry) [Pure Appl. Chem. (1976) 45, 11–30].

Section F (natural products and related compounds) [Provisional Nomenclature Appendix No. 53 (December 1976) to IUPAC Information Bulletin].

Section H (isotopically modified compounds) [Provisional Nomenclature Appendix No. 62 (July 1977) to IUPAC Information Bulletin].


[Copies of the IUPAC Information Bulletin and Appendices are available from the IUPAC Secretariat, 2–3 Pound Way, Cowley Centre, Oxford OX4 3YF, U.K.]

The Handbook for Chemical Society Authors [(1961) The Chemical Society, London] contains the first editions of the IUPAC Rules for the nomenclature of inorganic chemistry and for the nomenclature of organic chemistry (sections A and B) with useful explanatory footnotes, together with detailed proposals on points of nomenclature not specifically covered in these Rules. This book is now out of print, but authors may find it useful to consult if they have access to a copy.

Elementary analyses and physical properties

Standard forms for reporting these are as follows.

The new compound (name in italics) had m.p. 175°C (decomp.), [α]D² +17±2° (c 1.6 in water), light-absorption max. in ethanol 226 and 265nm (e 2200 and 2500 respectively) (Found: C, 40.8; H, 6.9; N, 11.5; OMe, 26.0; C₉H₁₆N₂O₆ requires C, 40.7; H, 6.8; N, 11.9; OMe, 26.3%).

The known compound (name in roman type) had m.p. 178–179°C, unchanged by admixture with an authentic sample kindly supplied by Dr. Z (Found: C, 48.6; H, 6.1; OMe, 50.1. Calc. for C₁₀H₁₀O₇: C, 48.4; H, 6.4; OMe, 50.0%). Or: The known compound had m.p. 178–179°C. The mixed m.p. with an authentic sample (m.p. 179–181°C) prepared by the method of X & Y (1932) was 178–180°C (Found: C, 49.4; H, 3.8; N, 3.9; loss at 100°C, 5.1. Calc. for C₂₅H₂₂₅N₂₂H₂O: C, 49.7; H, 3.9; N, 4.2; H₂O, 5.3%). (If water of crystallization is claimed, evidence should be given, e.g. as loss at 100°C as above, or the reason why it cannot be given should be explained.)

Distillation of the product gave a middle fraction (0.3 g), b.p. 120°C/1.9 kPa (15 mmHg), nD⁺ 1.4767.

Elementary analyses. Percentages should generally be given to one place of decimals only. Elements are to be listed in the order C, H and then the remainder in alphabetical order of symbols.

Melting points. It is desirable to state whether these are corrected or uncorrected for the emergent stem of the thermometer.

Specific optical rotations. An estimate of the error should be given.

Formulae

Chemical symbols may be used for elements, groups and simple compounds, but authors are advised that the excessive use of chemical symbols may reduce the readability of a paper.

Where formulae of more complex organic molecules are included they should, if possible, be written in one line, as this saves space and expense in printing. Dashes are used to represent the links in the main chain; side chains are in parentheses, and condensed main chains are in square brackets, e.g.:

CH₂=CH-CH(OH)-CH₃
H₂N-[CH₂]ₙ-CH(NH₂)-CO₂H

Formulae with rings or branched chains should be clearly written on a separate sheet so that they can be copied by the draughtsman. Hetero atoms should be shown in the ring, and aromatic rings must show double bonds.

R, R', R" (or R¹, R², R³, R⁴ if more than three) should be used to denote variable substituents in formulae.

C₃₀ acid is used to denote an acid containing 20 carbon atoms and C-3 or C₁₃ to denote the carbon atom numbered 3. C₁₈₀: C₁₈: etc. are used similarly to denote the number of double bonds in an unsaturated fatty acid.

Ions

These should be represented thus: Na⁺, Zn²⁺, Cl⁻, PO₄³⁻.

Isotopically labelled compounds

The symbol for the isotope introduced is placed in square brackets directly attached to the front of the name (word), as in [¹⁴C]urea. When more than one position in a substance is labelled by means of the same isotope and the positions are not indicated (as below), the number of labelled positions is added as a right-hand subscript, as in [¹⁴C₂]glycollic acid. The symbol 'U' indicates uniform and 'G' general labelling, e.g. [U-¹⁴C]glucose (where the ¹⁴C is uniformly distributed among all six positions) and
[G-14C]glucose (where the 14C is distributed among all six positions, but not necessarily uniformly); in the latter case it is often sufficient to write simply '14C]glucose'.

The isotopic prefix precedes that of the name to which it refers, as in sodium [14C]formate, iodo-
[14C2]acetic acid, 1-amino[14C]methylcyclopentanol (H2N-14CH2-C5H4-OH), α-naphth[14C]onic acid (C10H7-14CO2H), 2-acetamido-7-[131I]iodofluorene, fructose 1,6-[1-32P]bisphosphate, D-[14C]glucose, 2H-2H]pyran, ε-[14C]adenosyl[35S]methionine. Terms such as '131I-labelled albumin' should not be contracted to '[131I]albumin' (since native albumin does not contain any iodine), and [14C]-labelled amino acids' should similarly not be written as '[14C]amino acids' (since there is no carbon in the amino group).

When isotopes of more than one element are introduced, their symbols are arranged in alphabetical order, including 2H and 3H for deuterium and tritium respectively.

When not sufficiently distinguished by the foregoing means, the positions of isotopic labelling are indicated by Arabic numerals, Greek letters, or prefixes (as appropriate), placed within the square brackets and before the symbol of the element concerned, to which they are attached by a hyphen; examples are [1-3H]ethanol (CH3-C2H5-OH), [1-14C]aniiline, L-[2-14C]leucine (or L-[α-14C]-leucine), [carboxy-14C]leucine, [Me-14C]isoleucine, [2,3-14C]maelic anhydride, [6,7-14C]xanthopterin, [3,4-13C,35S]methionine, [2-13C,1-14C]acetalddehyde, [3-14C,2,3-2H,15N]serine.

The same rules apply when the labelled compound is designated by a standard abbreviation or symbol, other than the atomic symbol, e.g. [γ-32P]ATP.

For simple molecules, however, it is often sufficient to indicate the labelling by writing the chemical formulae, e.g. 14CO2, H318O, 2H2O (not D2O), H234SO4, with the prefix superscripts attached to the proper atomic symbols in the formulae. The square brackets are not to be used in these circumstances, nor when the isotopic symbol is attached to a word that is not a chemical name, abbreviation or symbol (e.g. '131I-labelled').

**Naming compounds**

All chemical names are run together except for those of acids, acetals, esters, ethers, glycosides, ketones and salts, which are printed as separate words: hyphens are used to separate numbers, Greek letters or some configurational and italic prefixes from words, e.g. m-dinitrobenzene, ββ-dimethyl-b- cysteine, 2-p-isopropylphenylheptane, ethyl methyl ketone (butan-2-one).

**Optically active isomers**

Names of chiral compounds whose absolute configuration is known may be differentiated by the prefixes R- and S- [see IUPAC Information Bulletin no. 35 (1969) pp. 36-79; also Biochim. Biophys. Acta (1970) 208, 1-44]. When the compound can be correlated sterically with glyceraldehyde, serine or other standard accepted for a specialized class of compound, small capital letters D-, L- and DL- may be used for chiral compounds and their racemates. Where the direction of optical rotation is all that can be specified, (+)-, (-)- and (±)-, or dextro, laevo and 'optically inactive', are used.

**Prefixes**

Italics are used for certain prefixes, e.g. cis-, trans-, α-, m-, 4, dextro, laevo, meso, and also for O-, N- etc. to indicate an element carrying a substituent, e.g. N-acyethylsulphanilamide. Italics are not used for aldo, bis, cyclo, epi, iso, n- (not n-), neo, nor, s- (not sec.-), t- (not tert.-), tris.

An alphabetical order will be followed for prefixes denoting substituents. Syllables indicating multiple substituents, e.g. di-, tri-, do not count in deciding the order.
### ABBREVIATIONS, SYMBOLS, CONVENTIONS AND DEFINITIONS

This list includes accepted symbols and abbreviations and also serves as an index; definitions are included that may be of help to authors. See also the lists of relevant documents (pp. 11–12 and 14–15).

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>absorbance</td>
<td>$A = \log(I_0/I)$ (see p. 9)</td>
</tr>
<tr>
<td>absorption coefficient</td>
<td>$e$ (see pp. 9–10)</td>
</tr>
<tr>
<td>acceleration due to gravity</td>
<td>$g$ (see p. 4)</td>
</tr>
<tr>
<td>adenosine 3':5'-phosphate</td>
<td>cyclic AMP</td>
</tr>
<tr>
<td>adenosine 5'-phosphate</td>
<td>AMP</td>
</tr>
<tr>
<td>adenosine 5'-pyrophosphate</td>
<td>ADP</td>
</tr>
<tr>
<td>adenosine triphosphatase</td>
<td>ATPase (to be defined in a footnote)</td>
</tr>
<tr>
<td>adenosine 5'-triphosphate</td>
<td>ATP; the three phosphorus atoms are distinguished as $\alpha$, $\beta$ and $\gamma$, thus: adenosine-$P^\alpha$-$O$-$P^\beta$-$O$-$P^\gamma$</td>
</tr>
<tr>
<td>alternating current</td>
<td>a.c.</td>
</tr>
<tr>
<td>amino acids, symbols for</td>
<td>p. 13</td>
</tr>
<tr>
<td>2-amino-2-hydroxy-methylpropane-1,3-diol</td>
<td>Tris</td>
</tr>
<tr>
<td>ampere</td>
<td>A</td>
</tr>
<tr>
<td>angstrom</td>
<td>Å (use SI units: 1 Å = 0.1 nm)</td>
</tr>
<tr>
<td>approximately</td>
<td>approx. (or use about, not c. or ca.)</td>
</tr>
<tr>
<td>aqueous</td>
<td>aq.</td>
</tr>
<tr>
<td>ascorbic acid</td>
<td>*alternative permitted vitamin C</td>
</tr>
<tr>
<td>atmosphere</td>
<td>atm (use SI units: 1 atm = 101 325 Pa)</td>
</tr>
<tr>
<td>atomic weight</td>
<td>at.wt.</td>
</tr>
<tr>
<td>atto ($10^{-18}$)</td>
<td>a (prefix)</td>
</tr>
<tr>
<td>bar (-pressure)</td>
<td>bar (use SI units: 1 bar = $10^5$ Pa)</td>
</tr>
<tr>
<td>barn ($10^{-28}$ m$^2$)</td>
<td>b</td>
</tr>
<tr>
<td>boiling point</td>
<td>b.p.</td>
</tr>
<tr>
<td>buffers</td>
<td>p. 9</td>
</tr>
<tr>
<td>calciferol</td>
<td>*use ergocalciferol, alternative permitted vitamin D$_2$</td>
</tr>
<tr>
<td>calculated</td>
<td>calc.</td>
</tr>
<tr>
<td>*calorie, I.T.</td>
<td>cal$<em>{IT}$ (use SI units: 1 cal$</em>{IT}$ = 4.1868 J)</td>
</tr>
<tr>
<td>*calorie, thermochemical</td>
<td>cal$_h$ (use SI units: 1 cal$_h$ = 4.184 J)</td>
</tr>
<tr>
<td>candela</td>
<td>cd</td>
</tr>
<tr>
<td>capric acid</td>
<td>*use decanoic acid</td>
</tr>
<tr>
<td>caproic acid</td>
<td>*use hexanoic acid</td>
</tr>
<tr>
<td>caproyl</td>
<td>*use hexanoyl</td>
</tr>
<tr>
<td>capryl, caprinoyl</td>
<td>*use decanoyl</td>
</tr>
<tr>
<td>caprylic acid</td>
<td>*use octanoic acid</td>
</tr>
<tr>
<td>capryl, capryloyl</td>
<td>*use octanoyl</td>
</tr>
<tr>
<td>carbobenzoxy</td>
<td>*use benzylloxycarbonyl</td>
</tr>
<tr>
<td>carboxymethylcellulose</td>
<td>CM-cellulose</td>
</tr>
<tr>
<td>catalytic-centre activity</td>
<td>number of molecules of substrate transformed/ s per catalytic centre</td>
</tr>
<tr>
<td>centi ($10^{-2}$)</td>
<td>c (prefix) (see p. 8)</td>
</tr>
<tr>
<td>centimetre</td>
<td>cm</td>
</tr>
<tr>
<td>centimetre gram(me) second</td>
<td>c.g.s.</td>
</tr>
<tr>
<td>centrifuging</td>
<td>pp. 4–5</td>
</tr>
<tr>
<td>cholecalciferol</td>
<td>*alternative permitted vitamin D$_3$</td>
</tr>
<tr>
<td>chromatography</td>
<td>p. 5</td>
</tr>
<tr>
<td>circular dichroism (see also ellipticity)</td>
<td>c.d. (Δe) (see p. 10)</td>
</tr>
</tbody>
</table>

* The symbol 'cal' may be used where the degree of accuracy does not justify distinction between cal$_{IT}$ and cal$_h$.
INSTRUCTIONS TO AUTHORS

cocarboxylase . . . . use thiamin pyrophosphate

coefficient of variation . standard deviation/mean value (see p. 10)

coenzyme A and its acyl derivatives. . . . . CoA and acyl-CoA

compare . . . . . . . cf.

concentrated . . . . conc.

concentration . . . . concn.

concentration (symbol, e.g. in specific rotation) . c

constant, equilibrium . . . . K

constant, velocity . . . . k

corrected (e.g. m.p. for emergent stem) . . . . corr.

coulomb (s·A) . . . . C

counts/min, counts/s . . . . c.p.m., c.p.s.

crystalline, crystallized . . . . cryst.

cubic . . . . . . . cu. or as e.g. mm³

curie (3.7 x 10¹⁰s⁻¹) . . . . Ci

cycles per second . . . . Hz

cytidine 5'-phosphate . . . . CMP

cytidine 5'-pyrophosphate . . . . CDP

cytidine 5'-triphosphate . . . . CTP

dalton (1/2 of the mass of one atom of carbon isotope ¹²C, i.e. 1.663 x 10⁻²⁴g) . . . . not to be used for molecular weights

data (N.B.: plural) . . . . use only in the sense of 'information given'

data, deposition of . . . . p. 5

deci (10⁻¹×) . . . . d (prefix) (see p. 8)

decomposition (m.p.) . . . . decomp.

degrees Celsius (t/°C =T/K−273.15) . . . . °C

degrees Kelvin . . . . K (not °K)

deka (10×) . . . . da (prefix) (see p. 8)

density . . . . . . . ρ (g/ml)

density, relative . . . . d

deoxy (prefix) . . . . not deoxy; symbol d

deoxynucleoside . . . . deoxyribonucleoside, symbols for . . . . p. 13

deoxynucleotide . . . . . . . D, D⁰, D₂₀,w etc. (as for sedimentation coefficient) (see p. 5)
dialysable . . . . . . . not permitted; use diffusible (see p. 5)
dialysate . . . . . . . not used; for diffusible material use diffusate (see p. 5)
diethylaminoethylcellulose . . . . DEAE-cellulose
diffusion coefficient . . . . D, D⁰, D₂₀,w etc. (as for sedimentation coefficient) (see p. 5)
dilute . . . . . . . dil.

5-dimethylaminonaphthalene-1-sulphonyl . . . . Dns- or dansyl- to be defined in a footnote

2,4-dinitrophenyl . . . . Dnp- or N₂Ph-

direct current . . . . d.c.

disintegrations/min, disintegrations/s . . . . d.p.m., d.p.s.
dissociation constant, minus log of . . . . pK, plural pK values
disulphide group . . . . alternative permitted S-S

dithionite (sodium) . . . . Na₂S₂O₄, not hydro-sulphite, hyposulphite

dry ice . . . . . . . use solid CO₂

dyne . . . . . . . dyn (use SI units: 1 dyn = 10⁻⁵N)

electrode potential, standard . . . . E₀

electrode potential, standard at given pH . . . . E⁺
electromotive force . . . . e.m.f.
electron spin resonance, electron paramagnetic resonance . . . . e.s.r., e.p.r.
electronvolt (≈ 1.6022 x 10⁻¹⁹J) . . . . eV

electrophoretic mobility (m²·s⁻¹·V⁻¹) . . . . m (see p. 6)

elementary analyses . . . . p. 15

1978
ellipticity (see also circular dichroism) ... \[ \theta = 3300 \Delta e \] (see p. 10)

enthalpy (change) ... \[ \Delta H \text{ (kJ} \cdot \text{mol}^{-1}) \]

entropy (change) ... \[ \Delta S \text{ (kJ} \cdot \text{mol}^{-1} \cdot \text{K}^{-1}) \]

(see also circular dichroism).

enzyme units ... p. 6

equation ... eqn.

equivalent (weight) ... equiv. (wt.)

erg ... erg (use SI units: \( 1 \text{erg} = 10^{-7} \text{J} \))

ethanol, ethanolic ... not ethyl alcohol, not alcoholic

ethylenediaminetetraacetate ... EDTA

'Ethylene glycol bis(aminooxyethyl ether) tetraacetate'

\[ (\text{HO}_2\text{C} \cdot \text{CH}_2) \cdot \text{N} \cdot \text{-} \cdot \text{O} \cdot \text{-} \cdot \text{O} \cdot \text{-} \cdot \text{CO}_2\text{H} \]

*EGTA*

Experiment (with reference numeral) ... Expt.; plural Expts.

extinction ... \( \log (I_0/I) \) (see p. 9); use absorbance

farad (m\(^{-2}\)·kg\(^{-1}\)·s\(^4\)·A\(^2\)) ...

\( = A \cdot \text{s} \cdot \text{V}^{-1} = \text{C} \cdot \text{V}^{-1} \). ... F

Faraday (quantity of electricity associated with 1 g-equiv. of chemical change) ... \( F \)

fatty acids ... p. 15

femto (10\(^{-15}\)\( \times \)) ... \( f \) (prefix)

Figure (with reference numeral) ... Fig; plural Figs.

figures, preparation of ... pp. 6-7, 24-27

flavin−adenine dinucleotide ... FAD

flavin mononucleotide ... FMN

fluorescence anisotropy ... \( A \) (see p. 10)

fluorescence polarization ... \( P \) (see p. 10)

folates ... see Biochem. J. (1967) 102, 19-20

foot ... ft (use SI units: \( 1 \text{ft} = 0.3048 \text{m} \))

foot-candle ... ft-candle (use SI units: \( 1 \text{ft-candle} = 10.7639 \text{lx} \))

formulae ... p. 15

free energy (Gibbs) (change) ... \( \Delta G \) (kJ·mol\(^{-1}\))

frictional coefficient (molar) ... \( f \)

frictional coefficient (molar) for sphere of same volume ... \( f_0 \)

gas constant per mole ... \( R \)

gas−liquid chromatography ... g.l.c.

gauss ... G (use SI units: \( 1 \text{G} = 10^{-4} \text{T} \))

giga (10\(^9\)\( \times \)) ... \( G \) (prefix)

glutathione, oxidized ... GSSG \{ to be defined in a footnote \}

glutathione, reduced ... GSH

\( \alpha \)-glycerophosphate ... use sn-glycerol 3-phosphate when the configuration is to be specified

gram(me) ... g

gram(me)-atom ... mol or g-atom

gram(me)-equivalent ... mol or g-equiv.

gram(me)-molecule ... mol

gravitational field, unit of (in centrifuging) ... g (see p. 4)

guanosine 3':5'-phosphate ... cyclic GMP

guanosine 5'-phosphate ... GMP

guanosine 5'-pyrophosphate ... GDP

guanosine 5'-triphosphate ... GTP

haem, protohaem ... prosthetic group of haemoglobin

hecto (10\(^2\)\( \times \)) ... \( h \) (prefix) (see p. 8)

henry (m\(^2\)·kg·s\(^{-2}\)·A\(^{-2}\)) ... H

hertz (s\(^{-1}\)) ... Hz

Hill coefficient ... \( h \) (not \( n \))

hour (3600s) ... h

hydrogen ion concentration, minus log of ... \( \text{pH} \), plural \( \text{pH} \) values

Vol. 169
hydroquinone . . . . use quinol
hydro sulphite, hyposulphite . . . not used, see dithionite
illustrations . . . . pp. 6–7, 24–27
immunoglobulin G etc. . . IgG etc. (to be defined in a footnote)
inches . . . . in (use SI units: 1 in = 2.54 × 10⁻²m)
infrared . . . . i.r.
inhibitor constant . . . Kᵢ (dissociation constant of inhibitor–enzyme complex)
inosine 5′-phosphate . . . IMP
inosine 5′-pyrophosphate . . . IDP
inosine 5′-triphosphate . . . ITP
insoluble . . . insol.
international unit . . . i.u.
ionic strength (mol/l) . . I
ions . . . . p. 15
isoelectric point (the pH at which a molecule has no effective charge) . . pI
isoenzyme . . . . not isozyme
isotonic . . . . specify composition of solution, e.g. use 0.9% NaCl solution
isotopically labelled compounds . . . pp. 15–16
joule (m²·kg·s⁻² = N·m) . . J
katal (amount of enzyme that can catalyse the transformation of 1 mol of substrate/s under conditions specified) . . . kat (see p. 6)
kelvin . . . . K (not °K)
kephalin . . . . use amino phospholipids
keto acid . . . . keto used only generically, otherwise oxo
keto sugars . . . . use pentulose, hexulose etc., not ketopentose, ketohexose etc.
kilo (10³×) . . . . k (prefix)
kilogram(me) . . . . kg
Krebs–Ringer solution . . reference to be given
level . . . . use concentration or amount or activity where necessary to avoid ambiguity
light petroleum . . . not petroleum ether: boiling range to be stated
litre (10⁻³m³ = dm³) . . 1; where there is the possibility of confusion between the numeral ‘1’ and the letter ‘l’, ‘litre’ should be written in full
logarithm (base 10) . . log
logarithm (base e) . . ln
lumen (cd·sr) . . . . lm
lux (m⁻²·cd·sr) . . . . lx
maximum . . . . max.
maxwell . . . . Mx (use SI units: 1 Mx = 10⁻⁸Wb)
median effective dose . . ED₅₀
median lethal dose . . LD₅₀
mega (10⁶×) . . . . M (prefix)
metabolic point . . . . m.p.
metabolic quotients . . as far as possible the notation Qₓ and qₓ will not be used; metabolic quotients should, if possible, be given as mol/s or µmol/min for a defined arbitrary quantity of material, e.g. mg dry wt., mg of protein, g wet wt. etc.
methanol, methanolic . . not methyl alcohol
metre . . . . m
Michaelis constant . . . Kₘ (see p. 6)
micro (10⁻⁶×) . . . . µ (prefix)
microgram(me) . . . . µg
microgram(me)-atom . . µmol or µg-atom; not µatom
INSTRUCTIONS TO AUTHORS

micromicro \((10^{-12} \times)\) . . . \(p\) (prefix); not \(\mu\mu\)
micromole . . . . \(\mu\text{mol}; not \mu\mu\)
micron \((10^{-6} \text{m})\) . . . \(\mu\text{m}; not \mu\)
milli \((10^{-3} \times)\) . . . \(m\) (prefix)
milliequivalent . . . . \(\text{mmol or mequiv.}\)
millilitre . . . . . . . . . . . ml

millimetre of mercury (conventional) pressure . . \(\text{mmHg} \) (use SI units: \(1 \text{mmHg} \approx 133.3 \text{ Pa}\))
millimicro \((10^{-9} \times)\) . . . \(n\) (prefix); not \(\mu\mu\)
millimicron \((10^{-9} \text{m})\) . . . \(nm; not \mu\mu\)

*millimolar (concentration) . . . . . . . \(\text{mm or mmol/l}\)
millimole . . . . . . . . . . . \(\text{mmol}; not \mu\mu\)
minimum . . . . . . . . . . . \(\text{min.}\)
minute (60s) . . . . . . . . . . . \(\text{min}\)
*molar (concentration) . . . . . . . \(m or \text{mol/l}\)
mole . . . . . . . . . . . \(\text{mol}\)
molecular weight . . . . . . . . . . . \(\text{mol.wt.} \) (molecular weights are ratios and it is incorrect to add the word ‘daltons’)

nano \((10^{-9} \times)\) . . . . . . . \(n\) (prefix)

newton \((\text{m} \cdot \text{kg} \cdot \text{s}^{-2})\) . . . . . . . . \(\text{N}\)
nicotinamide–adenine dinucleotide . . . . . . . \(\text{NAD}\)
nicotinamide–adenine dinucleotide, oxidized . . . \(\text{NAD}^+\) preferred
nicotinamide–adenine dinucleotide, reduced . . . \(\text{NADH} \) preferred
nicotinamide–adenine dinucleotide phosphate . . . \(\text{NADP}\)
nicotinamide–adenine dinucleotide phosphate, oxidized . . \(\text{NADP}^+\) preferred
nicotinamide–adenine dinucleotide phosphate, reduced . . \(\text{NADPH} \) preferred
nicotinamide mono–nucleotide . . . . . . . . \(\text{NMN}\)

* Separated by a hyphen (and no full stop) from a chemical formula or name following it, e.g. 1M-NaCl; 1M-NaOH; 1M-sulphuric acid.

normal temperature and pressure . . . . . . . \(\text{not used}; use standard temperature and pressure}\)
nuclear magnetic resonance \(\text{n.m.r.}\)
nucleoside (unspecified) . . . . . . . \(\text{N} \) (\text{not} \(X\))
nucleosides, nucleotides and polynucleotides, symbols for . . . . . . . pp. 13–14
number (in enumerations) . . . . . . . \(\text{no}\).
observed . . . . . . . . . . . \(\text{obs}\).
ohm \((\text{m}^2 \cdot \text{kg} \cdot \text{s}^{-3} \cdot \text{A}^{-2})\) . . . . . . . . \(\Omega\)
optical rotation . . . . . . . . . . . . \(\text{specific optical rotation} \) (with concn. 1g/ml, light-path 10cm), e.g. \([\alpha]_{310}^0, [\alpha]_{5461}^25\)
molecular optical rotation \((=\gamma_k^0 \times \text{mol.wt.})\), e.g. \([M]_{50}^0, [M]_{5461}^261\). If a different value, e.g. \([\alpha]_k^0 \times \text{mol.wt./100, }\text{is used, this should be stated}\)
optical rotatory dispersion \(\text{o.r.d.}\)
optically active isomers . . p. 16
orthophosphate (inorganic) \(P_i\)

osmolar . . . . . . . . . . . \(\text{osm or osmol/l}\) (the concentration producing an osmotic pressure equal to that of a molar solution of a perfect solute)

page, pages . . . . . . . . . . . \(p, pp\).
partial specific volume . . . \(\bar{\delta}\)
partition coefficient (dimensionless) . . . \(\alpha\) or \(K_D\)
parts per million . . . . . . . . . \(\text{p.p.m.}\)
pascal \((\text{m}^{-1} \cdot \text{kg} \cdot \text{s}^{-2})\) . . . . \(\text{Pa}\)

per . . . . . . . . . . . \(\%/\)
per cent . . . . . . . . . . . \(\%\)

petroleum ether . . . . . . . . . . . \(\text{not used (see light petroleum)}\)

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phosphatide . . . . use phospholipid
pico (10^{-12} x) . . . . p (prefix)
poise . . . . P (use SI units: 1P = 10^{-1} Pa·s)
potential difference . . . p.d.
pound . . . . lb (use SI units: 1lb ≈ 0.4536 kg)
pound-force per square inch lbf/in² (use SI units: 1 lbf/in² ≈ 6.9 kPa)
precipitate . . . . ppt.
preparation . . . . prep.
probability of an event's being due to chance alone P
proton magnetic resonance p.m.r.
pyridoxine, pyridoxal . . alternative permitted vitamin B-6 [see Biochem. J. (1974) 137, 417–421]
pyrophosphate (inorganic) PP₁
quinol . . . . . not hydroquinone
rad (10^{-2} J·kg^{-1}) . . rad or rd
radian . . . . . rad
recrystallized . . . . recryst.
references . . . . pp. 8–9
refractive index . . . . n; at stated temperature and wavelength represent as, e.g., n_D^{20}
relative band speed (partition chromatography) . . . . R, Rₛ, Rₓ (see p. 5); plural R values etc.
reprints . . . . . p. 2
respiratory quotient . . . . R.Q. (to be defined in a footnote)
revolutions . . . . . rev.
rev./min . . . . . not r.p.m.; use g where possible (see p. 4)
riboflavin . . . . . alternative permitted vitamin B₂
ribonuclease . . . . RNAse (to be defined in a footnote)
ribonucleic acid . . . . RNA
ribonucleosides, symbols for . . . . p. 13
röntgen (2.58 × 10^{-4} C·kg^{-1}) . . R
second (time) . . . . . s

sedimentation coefficient . . s; not sedimentation constant (see p. 5)
sedimentation coefficient corrected to 20°C in water s_{20,w}; s_{20} may be used if it is unambiguous (see p. 5)
sedimentation coefficient at zero concentration . . . . s₀, s_{20,w} etc. (see p. 5)
siemens (m²·kg⁻¹·s⁻³·A² = Ω⁻¹ = A·V⁻¹) . . . . S
sodium dodecyl sulphate . . SDS (to be defined in a footnote)
soluble . . . . . sol.
solution . . . . . soln.
solutions, concentration of . . . . p. 9
solvent systems . . . . e.g. butan-1-ol/acetic acid/water (4:1:1, by vol.), butan-1-ol/acetic acid (4:1, v/v)
species (singular and plural) . . sp., spp.
specific gravity . . . . sp.gr.
square . . . . . sq. or as e.g. cm²
standard deviation . . . . S.D.
standard error of estimate of mean value . . . . S.E.M.
standard temperature and pressure . . . . s.t.p.
statistical treatments . . . . p. 10
steradian . . . . . sr
stokes . . . . . St (use SI units: 1St = 10^{-4} m²·s⁻¹)
substituents (variable, in organic compounds) . . . . . . . . R, R’, R”, or R¹, R², R³, R⁴ (if more than three) (see p. 15)
substrate constant . . . . Kₛ (dissociation constant of substrate–enzyme complex)
sugars, symbols for . . . . p. 14
sulphhydryl . . . . . use thiol or SH
sum . . . . . Σ
Svedberg unit (10^{-13}s) . . . . S (see p. 5)
tables (preparation of) . . . . p. 11
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temperature . . . . (abbreviation) temp.; (symbol) t (empirical), T (absolute)
tera (10^{12}×) . . . . T (prefix)
tesla (kg⋅s^{-2}⋅A^{-1} = V⋅s⋅m^{-2} = Wb⋅m^{-2}) . . . T
thiamin . . . . alternative permitted vitamin B_{1}
thin-layer chromatography . . . t.l.c.
thymidine 5'-phosphate . . . . dTMP
thymidine 5'-pyrophosphate . . . . dTDP
thymidine 5'-triphosphate . . . . dTTP
time (symbol) . . . . t
tocopherol . . . . alternative permitted vitamin E
torr . . . . . . . . . Torr (use SI units: 1 Torr ≈ 133.322 Pa)
trichloroacetic acid . . . . TCA not used
turnover number . . . . (of an enzyme) not used; see catalytic-centre activity
ultracentrifuge data . . . . p. 5
ultraviolet . . . . u.v.
uncorrected (e.g. m.p. for emergent stem) . . . . uncorr.
uridine 3':5'-phosphate . . . . cyclic UMP
uridine 5'-phosphate . . . . UMP
uridine 5'-pyrophosphate . . . . UDP
uridine 5'-triphosphate . . . . UTP
variety (e.g. botanical) . . . . var.

velocity (symbol) . . . . v
veronal . . . . . . . . used only for buffer mixtures; otherwise use 5,5'-diethylbarbituric acid
viscosity, relative . . . . η_{rel}. (viscosity of solution)
viscosity, specific . . . . η_{sp}. (i.e. η_{rel}.−1)
viscosity, reduced . . . . η_{sp}.\div c (units: ml/g)
viscosity, intrinsic . . . . [η], i.e. lim_{c→0} η_{sp}.\div c
volt (m^{2}⋅kg⋅s^{-3}⋅A^{-1} = J⋅A^{-1}⋅s^{-1} = J⋅C^{-1}) . . . V
volume (abbreviation after number) . . . vol.
v/v . . . . . . . . . used only for two components; by vol. used for three or more components
watt (m^{2}⋅kg⋅s^{-3} = J⋅s^{-1}) . . . . W
wavelength . . . . . . . . . . . . . . λ
wavelength of D line of sodium (other wavelengths in Å) . . . . D (as subscript)
wavenumber (unit) . . . . cm^{-1}
weber (m^{2}⋅kg⋅s^{-2}⋅A^{-1} = V⋅s) . . . . . . Wb
weight . . . . . . . . . . . . . . wt.
xanthosine 5'-phosphate . . . . XMP
xanthosine 5'-pyrophosphate . . . . . . XD\={P}
xanthosine 5'-triphosphate . . . . XTP
APPENDIX

Notes on the Preparation of Figures

As far as possible artwork supplied by the author will be used for reproduction. It is therefore essential for authors to adhere to the following instructions with regard to the preparation of line drawings for figures, otherwise their illustrations will have to be redrawn by the printer’s draughtsmen, with consequent delay.

Materials

Diagrams should be in black ink, and may be drawn on white paper, tracing paper or white card. If graph paper is used it is preferable to use one with blue guide lines. Mounting on heavy cardboard is undesirable.

A line thickness obtained with a 0.4mm Rotring pen (or equivalent) is desirable.

Size

Illustrations for reproduction are reduced to 40\% or 50\% of the original dimensions, and should be drawn as follows. For reduction to 40\%, the width of drawings should not exceed 14cm (excluding lettering) and 26cm (excluding lettering) for illustrations intended to be single-column width and double-column width respectively. For reduction to 50\%, the width of drawings should not exceed 11cm (excluding lettering) and 21cm (excluding lettering) for illustrations intended to be single-column width and double-column width respectively. A margin of at least 3cm is essential. Any illustrations not conforming to this guide may be photographically adjusted by the printer.

Distinction between curves in a figure

The preferred symbols for experimental points are \( \circ, \triangle, \Box, \bullet, \Delta, \blacksquare \). The same symbols must not be used on two curves where the points might be confused. The symbols \( \times \) and \( + \) should be avoided. For scatter diagrams filled-in symbols are preferred. The same symbols should, whenever possible, be used for the same entities throughout a paper. Individual curves may also be distinguished by distinctive line forms (e.g. \( \cdash \), \( \ldots \) etc.) or by single-letter labels (e.g. \( A, B \) etc.) or by brief explanatory labels (see below).

Lettering

Final lettering on figures will be done by the printer. It is therefore sufficient for authors to insert clear guide lettering in soft pencil. The addition of carefully drawn lettering in black ink is not necessary, but is permissible.

Authors are encouraged to use brief explanatory labels within a figure if it is thereby more readily understood and if the labels can be inserted without requiring a larger figure. The final lettering of such labels will, again, be done by the printer.

In a drawing of apparatus the scale must be indicated, but, again, the lettering will be done by the printer.

Technique

All curves, lines and symbols should be drawn clearly, and of a line thickness and size that allows for a 40–50\% reduction in size on final reproduction if the figures are to be reproduced directly (see above). Scale marks must be within the graph. Axes should not extend appreciably beyond the curves. It is sometimes unnecessary for an axis scale to start at 0; only the part of the scale relevant to the curves should be given.

Histograms

Simple histograms recording only a few values should not be used. The information can be given more concisely as a table or as a sentence or two in the text.

Specimen figures

Three specimen figures are shown. Fig. 1 illustrates many of the mistakes that necessitate redrawing. Fig. 2 shows a similar figure drawn correctly, and Fig. 3 shows Fig. 2 as it would appear in the *Biochemical Journal.*
Fig. 1. Scale lettering inked in (should be left to Press)

Avoid bulge in line, rule with instrument

All points should be uniform size and true circles

Curve should follow experimental points

Curves should not extend beyond experimental points

Experimental points extend beyond scale

Lines should not run through symbols

Ink spread due to bad paper

Triangles should be equilateral, of uniform size and with straight edges

The same symbols should not be used for two graphs where points could be confused

Avoid too many digits

All curves should be drawn with instruments. Freehand curves are seldom smooth

Breaks in continuity of ink must be avoided

Scale marks should be within axes
Lettering in pencil is acceptable

Fig. 2.
Fig. 3.

Oxygen uptake (μl) vs. [Mg$^{2+}$] (mM)