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RECOMMENDED NOMENCLATURE FOR AUTOMATIC ANALYSIS

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527

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INTRODUCTION

This report was prepared initially by R. W. Fennell (U.K.) on behalf of the Commission. It was circulated to all members of the Analytical Chemistry Division and, following moderation, it was presented for general comment in the *IUPAC Information Bulletin* No. 26. The comments which were received extensively from all parts of the world were considered at two full Commission meetings during the 1967 and 1969 IUPAC Conferences at Prague and Cortina d'Ampezzo respectively and at two inter-Conference meetings of the Commission in London in 1966 and 1968. This final version which is now presented is the summation of many opinions and much informed experience and represents a reasoned compromise between differing views on automation and mechanization.

RECOMMENDED TERMINOLOGY FOR AUTOMATIC ANALYSIS

The term *automation* is very commonly used at the present time and is often understood to mean the replacement, partial or complete, of a manual operation, or sequence of operations, during the course of an analysis. This wide use of the term robs it of any precise meaning and, in many cases, makes it merely a synonym for mechanization or instrumentation.

The list of terms which follows is proposed so that the three concepts may be distinguished. All are concerned with the diminution of human intervention in analytical procedures; mechanization is concerned with the production of *movement*, instrumentation with the production and relaying of *information*, automation with the use of systems in which an element of non-human *decision* is incorporated.

A distinction is proposed between the words automatic, as used in normal English, and automated, which implies more than does automatic: viz., that feed-back is applied in an automated system as a result of which the performance of the system is modified. If this distinction between two ideas is accepted, two sets of words are required, for which the following are suggested: automatize (already in the dictionary although little used), automatic, automatization and automate, automated, automation.

† The membership of the (V3) Commission which was responsible for the production of this report was as follows:
Chairman: R. Belcher (U.K.); *Secretary:* T. S. West (U.K.); *Titular Members:* I.P. Alimarin (U.S.S.R.), E. Bayer (Germany), W. Fischer (Germany), H. M. N. H. Irving (U.K.), O. Samuelson (Sweden), E. B. Sandell (U.S.A.).
D. Ambrose and R. W. Fennell, both former Titular Members of the Commission, were also very active in the discussions of this report.

Automation is a term coined for use in fields other than chemistry. However, the authors have not found a satisfactory definition of the word, and have therefore endeavoured to fill this gap as far as chemistry is concerned: they hope that in so doing they have not run counter to usage accepted in other disciplines.

Mechanism. A combination of parts, of which at least one is movable, capable of producing an effect.

Machine. A device, including one or several mechanisms, that can be made to perform useful work.

Mechanical. Relating to or concerned with machines or mechanisms.

Mechanization. The use of mechanical devices to replace, refine, extend or supplement human effort.

Mechanize. To equip with or to use mechanical devices.

Instrument (noun). A device, used for observing, measuring or communicating the state of a quality, which replaces, refines, extends or supplements human faculties.

Note: An instrument may include one or more mechanisms and/or machines.

Instrumentation. The use of instruments.

Note: This term may be used to describe an assembly of instruments used for a particular purpose, but should not be used as a collective noun for instruments in general.

Instrumental. Relating to or concerned with instruments.

Instrument (verb). To equip with, or to use, instruments.

Note: This term is preferred, in English, to the synonymous terms *instrumentate* and *instrumentalize.*

Programme (verb). To equip apparatus with commanding devices that require the performance of given operations (discrete, sequential or continuous) in single or repeated cycles.

Note: A programmed apparatus contains no self-adjusting devices and thus cannot vary its performance of given acts without human intervention.

Feed-back system. A combination of a sensing and a commanding device which can modify the performance of a given act.

Notes: 1. Feed-back control may be continuous or discontinuous.
2. A feed-back system is an instrumental device.

Automatic. Having self-acting or regulating devices that cause required acts to be performed at given points in an operation, without human intervention.

Note: This term may be used to describe mechanical or instrumental devices which perform in accordance with a *manually* preset set of conditions.

Automatize (n., Automatization). To make automatic.

Automate (adj., Automated). To replace human manipulative effort and faculties in the performance of a given process by mechanical and instrumental devices which are regulated by feed-back of information, so that the apparatus is self-monitoring or self-adjusting.

Automation. The use of combinations of mechanical and instrumental devices to replace, refine, extend or supplement human effort and faculties in the performance of a given process, in which at least one major operation is controlled, without human intervention, by a feed-back system.