

## A system of nomenclature for rare-earth mineral species: Revision and extension

PETER BAYLISS, A. A. LEVINSON

Department of Geology and Geophysics, The University of Calgary, Alberta T2N 1N4, Canada

### ABSTRACT

Revisions to an earlier paper on the nomenclature of rare-earth mineral species are reported. Now, only the dominant element in a specified crystal-structure site within isostructural minerals may be appended to the group name as a parenthesized suffix. This nomenclature system is mandatory for rare-earth mineral species. More than one chemical symbol may be appended only if the elements occupy different crystal-structure sites, which must be defined. Before publication of any new mineral name, approval is required from the Commission on New Minerals and Mineral Names (CNMMN) of the International Mineralogical Association.

### INTRODUCTION

The nomenclature system of chemical-symbol suffixes described by Levinson (1966) originally only applied to rare-earth mineral species, which are defined to have the total atomic percentage of the rare-earth elements and Y greater than any other element within a single set of crystal-structure sites, e.g., ( $\Sigma$ REE,Ca). Of the 14 rare-earth elements (La through Lu) and Y, 6 have been observed to predominate in mineral species on the basis of atomic percentage of rare-earth elements within a single set of crystal-structure sites. The rare-earth mineral species in order of abundance are Y (59), Ce (51), Nd (13), La (12), Yb (2), and Gd (1). The numbers in parentheses are the numbers of mineral species in which the particular rare-earth element predominates.

### DEFINITIONS

A group name is given to a rare-earth mineral that has been identified without detailed chemical analysis of the rare-earth elements, e.g., monazite. Each rare-earth analogue, i.e., mineral species, within the group must be isostructural.

A species name is given to a rare-earth mineral whenever the rare-earth element distribution has been determined. The chemical-symbol for the predominant rare-earth element is appended, in parentheses, by means of a hyphen to the group name; this results in mineral-species names such as monazite-(Ce), monazite-(La), and monazite-(Nd). Therefore, all rare-earth mineral species must have a chemical-symbol suffix (Nickel and Mandarino, 1987).

### DISCUSSION

This nomenclature system was made retroactive (Levinson, 1966) by the discreditation of abukumalite [now britholite-(Y)], doverite [now synchysite-(Y)], priorite [now aeschynite-(Y)], and spencite [now tritomite-(Y)].

In addition, this nomenclature system was recently made mandatory for all new rare-earth mineral species (Nickel and Mandarino, 1987). New mineral names conforming to this usage must be approved before publication by the CNMMN.

Levinson (1966, p. 155) proposed that "If a rare-earth mineral contains considerable quantities of a rare-earth element which is unusual, or for any reason merits notice, two or more chemical symbols may be placed in the parentheses. In these cases, the 'considerable' quantity is not high enough to warrant the species designation, i.e., the respective element is not predominant. For example, a monazite-(Ce) with a considerable amount of samarium would be written as monazite-(Ce,Sm). The first symbol, Ce in this case, represents the species, whereas Sm is an element which occurs in important amounts." This nomenclature system has been followed by Andersen (1986) with monazite-(Ce,Nd). However, modification of this particular aspect of the nomenclature system is desirable.

When two or more chemical symbols within parentheses are suffixed, the second chemical symbol may mean either (a) a chemical variety or (b) a mineral species; i.e., the second chemical symbol represents a rare-earth element in a different crystal-structure site compared to the first chemical symbol. Ancyllite-(Ce) has rare-earth elements in four different crystal-structure sites (Szymański and Chao, 1986). Therefore, the CNMMN has recently approved a modification to the original nomenclature system (Levinson, 1966) such that a chemical adjectival modifier should be used instead of two or more chemical symbols within parentheses if two or more elements substitute for each other within a single set of crystal-structure sites. This decision of the CNMMN is recorded here for the first time.

The example of monazite-(Ce,Sm) should now be written as samarian monazite-(Ce). The reasons for the modifications to the original nomenclature system are as fol-

lows: (a) Greater uniformity will result since all mineral species would follow the chemical adjectival modifier rule; (b) altering the end of a mineral species name [e.g., monazite-(Ce) with designations such as Sm and Nd], would create numerous varietal names; and (c) special characters, like commas, have been used for computer sorting or searching, so that they should be avoided in mineral names, if possible.

#### ACKNOWLEDGMENTS

Dr. E. H. Nickel, vice-chairman of the CNMMN, provided advice. Financial assistance was provided by the Natural Sciences and Engineering Research Council of Canada.

#### REFERENCES CITED

- Andersen, Tom. (1986) Compositional variation of some rare earth minerals from the Fen complex (Telemark, SE Norway): Implications for the mobility of rare earths in a carbonate system. *Mineralogical Magazine*, 50, 503-509.
- Levinson, A.A. (1966) A system of nomenclature for rare-earth minerals. *American Mineralogist*, 51, 152-158.
- Nickel, E.H., and Mandarino, J.A. (1987) Procedures involving the I.M.A. Commission on New Minerals and Mineral Names, and guidelines on mineral nomenclature. *American Mineralogist*, 72, 1031-1042.
- Szymański, J.T., and Chao, G.Y. (1986) The crystal structure of monoclinic ancylite (abs.). American Crystallographic Association, Annual Meeting, Hamilton, Paper PA2.

MANUSCRIPT RECEIVED FEBRUARY 5, 1987

MANUSCRIPT ACCEPTED NOVEMBER 20, 1987