A BRIEF HISTORY OF MINERAL SYMBOLS

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Laurence N. Warr

At some stage you may have abbreviated the name of a mineral when writing a thesis, report, or publication. This could have been for a common mineral such as quartz (Qz) or muscovite (Ms). But there are some more notoriously long mineral names for which a shortened version can be rather useful. Take, for example, the 34 letter-long potassic-magnesio-fluoro-arfvedsonite (usefully abbreviated to "Pmfarf", where "arf" represents "arfvesonite"). Our friends the chemists long ago got their act together and developed a universally accepted system for abbreviating the chemical elements in a system that uses either one or two letters as symbols. This scheme was first proposed by chemist Jöns Jacob Berzelius (1779–1848) and is still applied over 200 years later under the auspices of the International Union of Pure and Applied Chemistry.

So, what about minerals? Adopting the very same idea of using letter symbols as abbreviations, Ralph Kretz (University of Ottawa, Canada) presented a pioneering short paper in 1983 entitled "Symbols for rock-forming minerals". Known as Kretz symbols, he used two- or three-letter symbols to represent 192 of the more common mineral species. This list was later modified and updated to 371 minerals by Whitney and Evans (2010), which today has become the more widely applied set of abbreviations.

However, the buck didn't stop here. Because available abbreviation listings are recommendations rather than rules, there has been a bit of a free-for-all in abbreviation use by the mineral community. According to a survey of published clay mineral abbreviations conducted in 2020 (Warr 2020), only 30% of authors used the recommended Kretz symbol for kaolinite ("Kln"). For this mineral, and for many other common species, there were no less than 8 different symbols in use for the same name. And what about the many minerals that have not been allocated a recommended abbreviation? Currently, there are over 5,700 approved minerals but less than 18% have been included in any published list of symbols.

Things, however, are set to change. The Commission on New Minerals, Nomenclature and Classification (CNMNC) of the International Mineralogical Association (IMA) has recently approved a complete list of >5,700 mineral symbols that cover all approved IMA mineral species (Warr 2021). This listing is 91% compatible with Kretz (1983) and 97% compatible with Whitney and Evans (2010). In the future, any new symbols for new minerals will need to be approved simultaneously by the CNMNC committee and be reported in related publications (e.g., Mills 2010; Pasero 2021). This step will finally bring us a universally consistent system of standardized minerals symbols that will be compatible with the very same system used for the chemical elements.

For fun: there are 30 natural elements listed as minerals. Can you work out which ones?*

Happy symbolizing.

Laurence N. Warr
(University of Greifswald, Germany)

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* Elements listed as minerals are Al, Sb, As, Bi, Cd, Ce, Cr, Cu, Au, In, Ir, Fe, Pb, Hg, Ni, Os, Pd, Pt, Rh, Ru, Se, Si, Ag, S, Te, Sn, Ti, W, V, Zn

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(3) Individual editorial board members may give personal encouragement, and act as mentors, to potential editors who are of diverse backgrounds and identities.

(4) Ask scientists from under-represented groups how they could be supported in order to participate on an editorial board, for example through workloads that are set using principles of equity.

(5) Journals editorial boards present an infographic of diversity of the editorial board and/or the geographical scope of the published articles. This may attract attention from diverse researchers, as well as raise awareness of diversity/equity/inclusion in the scientific publishing space.

One-time actions to tackle diversity are not enough. Journals must monitor the impact of new diversity efforts to ensure real change is happening on their boards.

Recent shifts towards more equal gender and geographic representation for *Elements*, *Geochemical Perspectives Letters* or *Geochimica et Cosmochimica Acta* are very encouraging, but this is not the case for all the journals from the participating societies. Achieving representative diversity on editorial boards needs sustained effort. Furthermore, we recommend that the editorial boards of the journals published by *Elements* participating societies should consider prioritizing and establishing a mentoring approach to address negative and unconstructive critiques of articles. Finally, the barriers to publishing must be minimized. This is particularly important given the unequal impacts of the COVID-19 pandemic on submissions by men and women and their geographical location of origin.

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