Assigning IMA Approved Mineral Symbols to Minerals in the Powder Diffraction File™

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Abstract

Mineral abbreviations, as standardized by the International Mineralogical Association (IMA), are crucial for facilitating clear and efficient exchange of information across various fields of study. The project's main objective was to align mineral diffraction data from the ICDD-PDF 5+ database with the IMA's approved list of mineral abbreviations, identifying any discrepancies or missing entries. The methodology involved cross-referencing the ICDD database with the Mindat database to update and verify mineral information, focusing on mineral space groups, crystal systems, and other vital parameters obtained through powder X-ray diffraction. We were provided with a list of ~1000 mineral names that couldn't be matched using database queries. An instance of abbreviation matching highlighted in the study is the identification and correction of the mineral Quatrandorite (Andorite IV), misspelled as "Quatandorite" in the database. This work underscores the importance of standardized mineral abbreviations in enhancing the accuracy and efficiency of database search/match. This poster describes our work as volunteer interns in finding IMA approved mineral symbols for minerals in powder diffraction file.

Introduction

Mineral symbols (abbreviations) streamline communication and data exchange by condensing complex names into symbols. They make referencing minerals easier to recall and prevent confusion. Over the last four decades or so a number of text symbols for common rock-forming minerals have been published but not standardized internationally (Warr, 2021). The International Mineralogical Association (IMA) Commission on New Minerals, Nomenclature and Classification (CNMNC) approved collection of 5744 mineral name abbreviations by combining four methods of nomenclature based on the Kretz symbol approach (Krez, 1983, Warr, 2021). Abbreviations are advantageous for communication and, certainly in maintaining the data integrity when dealing with complex mineral names.

IMA Symbol Nomenclature

The nomenclature scheme adopted to generate symbols uses a combination of the following four methods (Warr, 2021)

1. The initial letters of a mineral name.Examples, **V**anadium=V, **Ad**amite=Ad, **Aca**nthite=Aca. There are also some rare instances of using the first four letters of a name, but only when shorter options are not available (e.g. **mits**cherlichite = Mits).
2. A combination of two to four letters considered characteristic of the mineral name. At least two of the letters of this type of symbol are usually clustered together to highlight a characteristic section of the name that aids its recognition
3. A selection of two to four letters expressing components of the name (pronunciation). e.g , **h**ell**d**ite = Hld
4. Four or more lettered abbreviations when prefixes are present (e.g. ferro-, ferri, and magnesio-). These are used when related mineral symbols have been previously defined and the letters are selected to preserve consistency between the mineral abbreviations (e.g. **c**hlorocalcite = Ccal, or **m**ono**h**ydrocalcite = Mhcal, where **cal**cite = Cal).

Mineral Name-Symbol Matching

Approximately 1,000 mineral names we looked at are the ones couldn't match to a symbol by a compute program mainly due to misspelled mineral name (Fig. 1), non alphabetical letters or modifier descriptors

In case of modifier descriptors care should be taken such that it was mapped to a right mineral symbol. Table 1 shows some examples wherein symbol changes with modification such as chemical or structural

Mineral Name	Symbol	Mineral Name	Symbol	Mineral Name	Symbol
Whiteite-(CaFeMg)	Wt-CaFeMg	Julgoldite-(Fe2+)	Jul-Fe2+	Gersdorffite-P213	Gdf-P213
Whiteite-(CaMgMg)	Wt-CaMgMg	Julgoldite-(Fe3+)	Jul-Fe3+	Gersdorffite-Pa3	Gdf-Pa3
Whiteite-(CaMnMg)	Wt-CaMnMg	Pumpellyite-(Mn2+)	Pmp-Mn2+	Gersdorffite-Pca21	Gdf-Pca21

Table 1. Examples of symbols of mineral names with modifiers

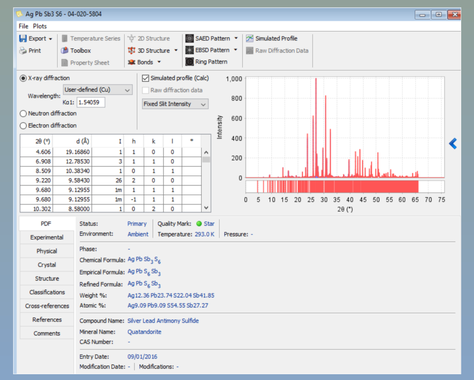

Figure 1.Example of a misspelled mineral name (Quatandorite instead of Quantrandorite) corresponds to the symbol Ado IV

Conclusion

We have successfully completed mapping the list of ~1,000 mineral names to their corresponding IMA symbols. The result was submitted to the editorial department for the further review.

Acknowledgement

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References
Kretz, Ralph. "Symbols of rock-forming minerals." *American Mineralogist* 68, bo. 1-2 (February 1983): 277–279.
Warr, Laurence N. "IMA–CNMNC Approved Mineral Symbols." *Mineralogical Magazine* 85, no. 3 (June 2021): 291–320. https://doi.org/10.1180/mgm.2021.43.

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