

# MINERALOGY G102

## SOURCES

### BOOKS

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- Nesse, W.D., 2012. *Introduction to mineralogy*
- Aydinalp, C. ed., 2012. *An Introduction to the Study of Mineralogy.*
- Correns, C.W. and Zemann, J., 2013. *Introduction to mineralogy: crystallography and petrology.*
- Haldar, S.K., 2020. *Introduction to mineralogy and petrology.*

### JOURNALS

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- American Mineralogist
- Canadian Mineralogist
- Australian Journal of Mineralogy
- Mineralogy and Petrology
- Mineralogical Magazine
- The Open Mineralogy Journal
- Elements
- Clay Minerals

# MINERALS AND MINERALOGY

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**Mineral:** is a naturally occurring crystalline solid with a definite but not fixed chemical composition and definite crystal structure.

Each paragraph of the definition is discussed as follow:

- by naturally occurring, we mean that the minerals are formed without intervening of human action.



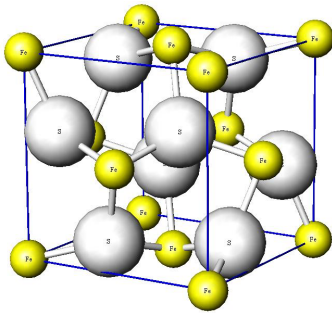
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- Sometimes minerals can be synthesized in the laboratory. These materials are called “synthetic minerals”.

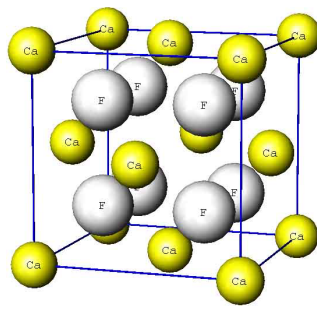


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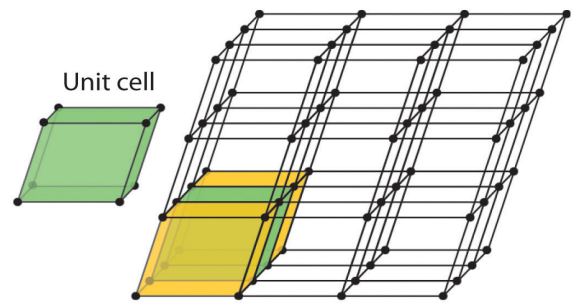
- by crystalline solid with a definite crystal structures, we mean that the minerals have a systematic arrangement of atoms and/or ions and they are chemically bounded in a regular and repeated pattern. The beautiful symmetrically arranged crystal faces in many minerals are a result of this internal arrangement of the atoms and ions.



Pyrite  $\text{FeS}_2$

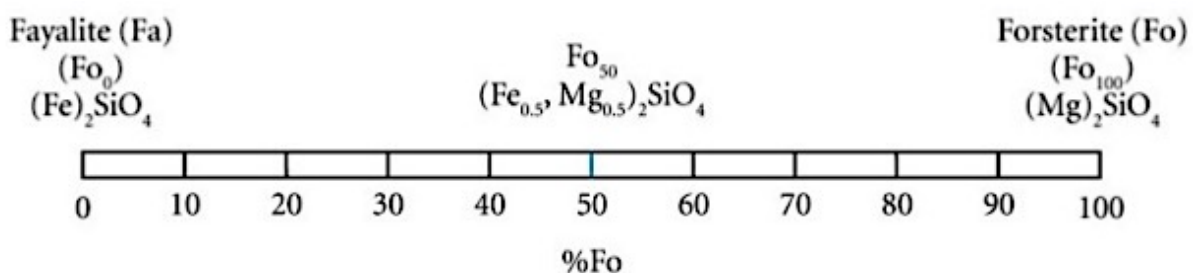


Fluorite  $\text{CaF}_2$



- Solids such as glass have not internal atomic arrangement and so have no systematic structure, hence they are not considered as a mineral and they are called amorphous solids.
- By a definite but not fixed chemical composition, we mean that the chemical composition may change within a limit, for example the mineral olivine which has composition  $(\text{Mg}, \text{Fe})_2\text{SiO}_4$  but this mineral may form a series where sometimes it will be Mg-rich so its composition will be  $\text{Mg}_2\text{SiO}_4$ , sometimes it will be Fe-rich so its composition will be  $\text{Fe}_2\text{SiO}_4$ , and sometimes it has an intermediate composition between these two end members, that is  $(\text{Mg}, \text{Fe})_2\text{SiO}_4$

Forsterite olivine endmember  $\rightarrow \text{Mg}_2\text{SiO}_4 \dots (\text{Mg}_{80}\text{Fe}_{20})_2\text{SiO}_4 \dots (\text{Mg}_{60}\text{Fe}_{40})_2\text{SiO}_4 \dots (\text{Mg}_{40}\text{Fe}_{60})_2\text{SiO}_4 \dots (\text{Mg}_{20}\text{Fe}_{80})_2\text{SiO}_4 \rightarrow \text{Fe}_2\text{SiO}_4$  Fayalite olivine endmember



- Because minerals are crystalline solids, they have definite physical properties.
- Part of the definition of a mineral is that they are “inorganic” but many are produced by organic processes, for example the shells of many marine