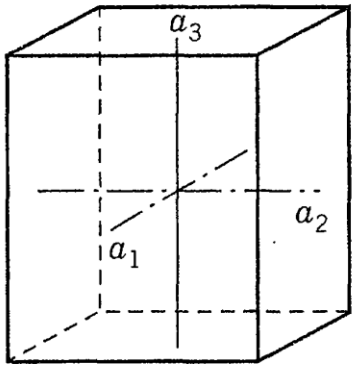
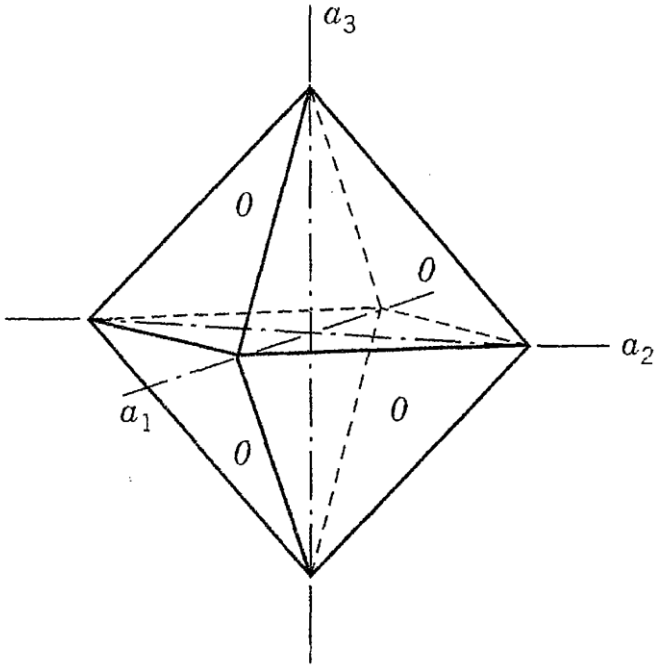
Mineralogy

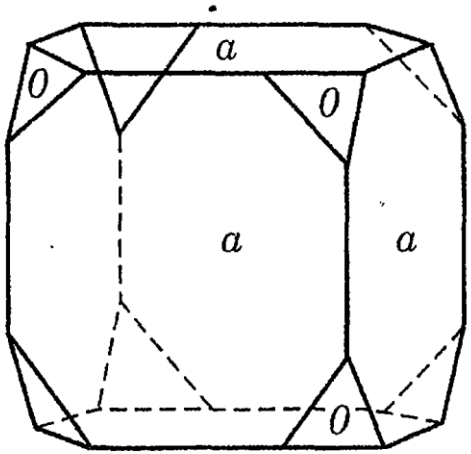
A mineral is a naturally occurring solid with a highly ordered atomic arrangement a definite (but not always fixed) chemical composition and is usually formed by inorganic processes

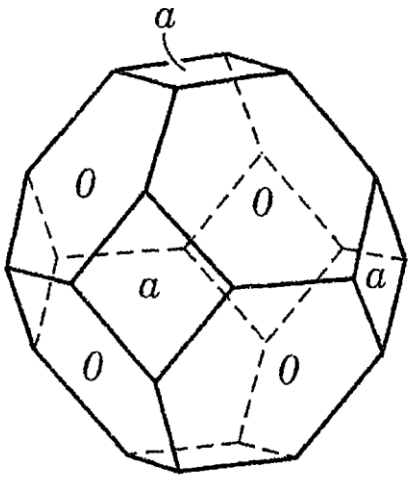
Crystal Habit



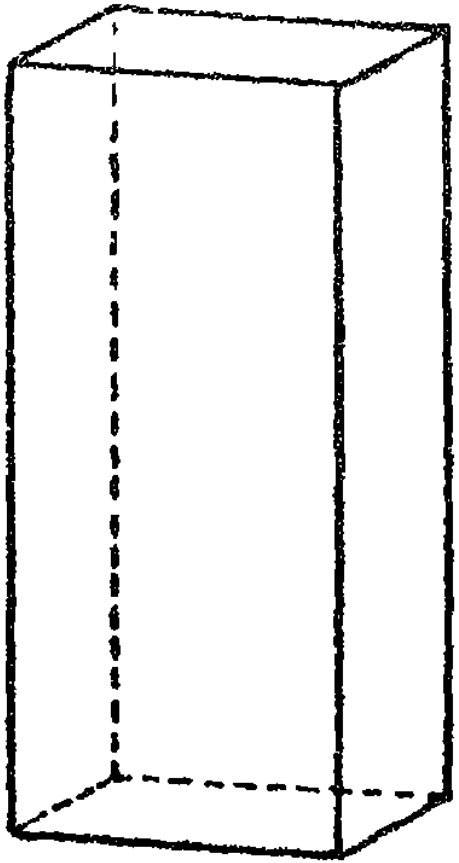


The regular geometric shape

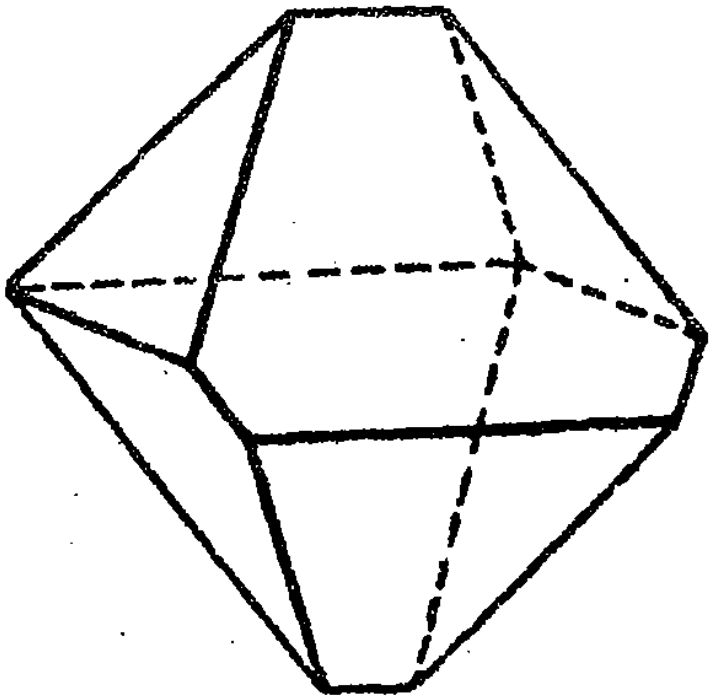




In Reality

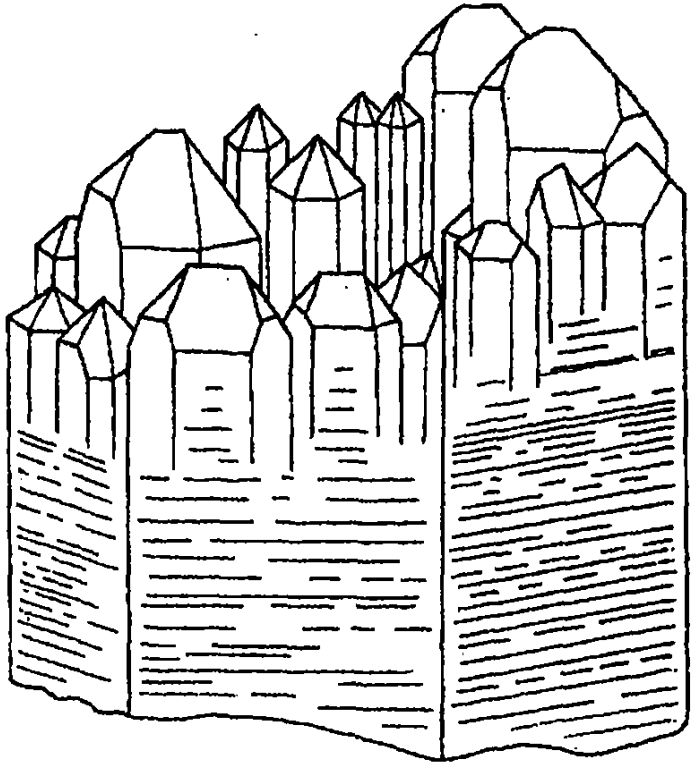


Malformed Cube

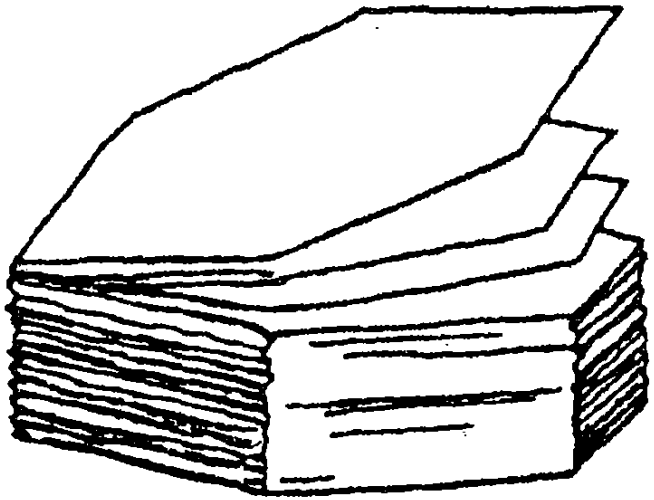


Asymmetric
Octahedron

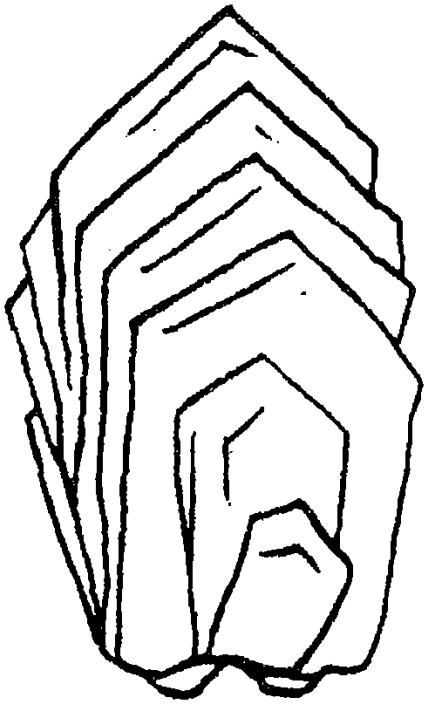
Most minerals occur as <u>aggregate</u> of grains (but having internal order as evidenced by optical properties and X-ray diffraction)



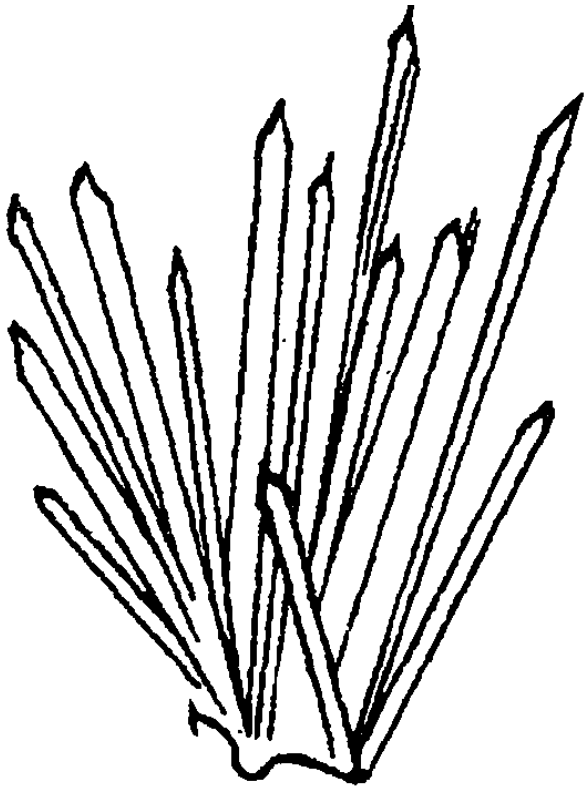
Parallel growth in quartz



Lamellar, foliated, micaceous, as in mica



Bladed as in stibnite



Acicular, radiating as in millerite

Dendritic as in manganese oxide minerals

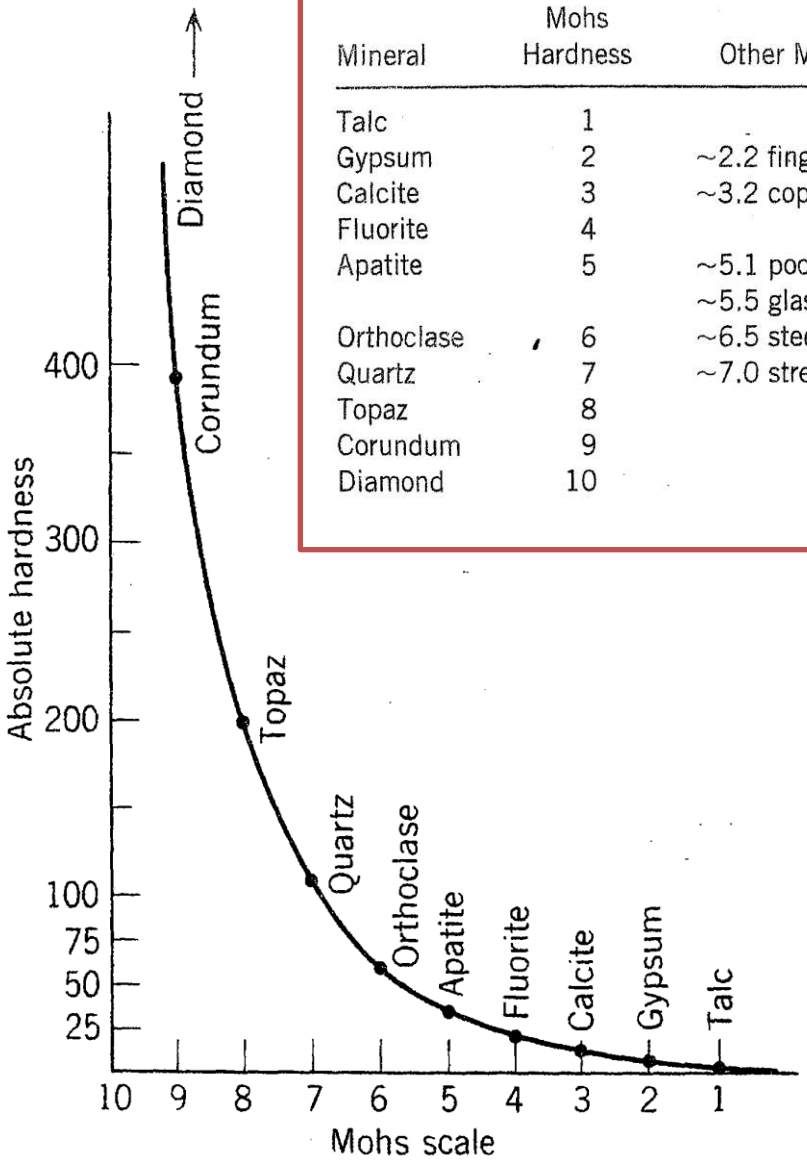
Luster: General appearance of minerals in reflected light

Metallic
(Galena, Pyrite, Chalcopyrite)

Non-metallic
- **Vitreous**
- **Resinous/Waxy**
- **Pearly**
- **Greasy**
- **Silk-like**
- **Adamantine**

Hardness: The resistance that a smooth surface of mineral offers to scratching

Mineral	Mohs Hardness	Other Materials	Observations on the Minerals
Talc	1		Very easily scratched by the fingernail; has a greasy feel
Gypsum	2	~2.2 fingernail	Can be scratched by the fingernail
Calcite	3	~3.2 copper penny	Very easily scratched with a knife and just scratched by a copper coin
Fluorite	4		Easily scratched with a knife but not as easily as calcite
Apatite	5	~5.1 pocketknife ~5.5 glass plate	Scratched with a knife with difficulty
Orthoclase	6	~6.5 steel file	Cannot be scratched with a knife, but scratches glass with difficulty
Quartz	7	~7.0 streak plate	Scratches glass easily
Topaz	8		Scratches glass very easily
Corundum	9		Cuts glass
Diamond	10		Used as a glass cutter



Hardness is a vectorial property

<u>Tenacity</u>: The resistance a mineral offers to breaking, crushing, bending or tearing

- **Brittle**
- **Malleable**
- **Ductile**
- **Sectile**
- **Flexible**
- **Elastic**

Color (not particularly diagnostic except for a few…) and Streak

Minerals with diagnostic colors:

- **Malachite**
- **Azurite**
- **Rhodonite**
- **Turquoise**

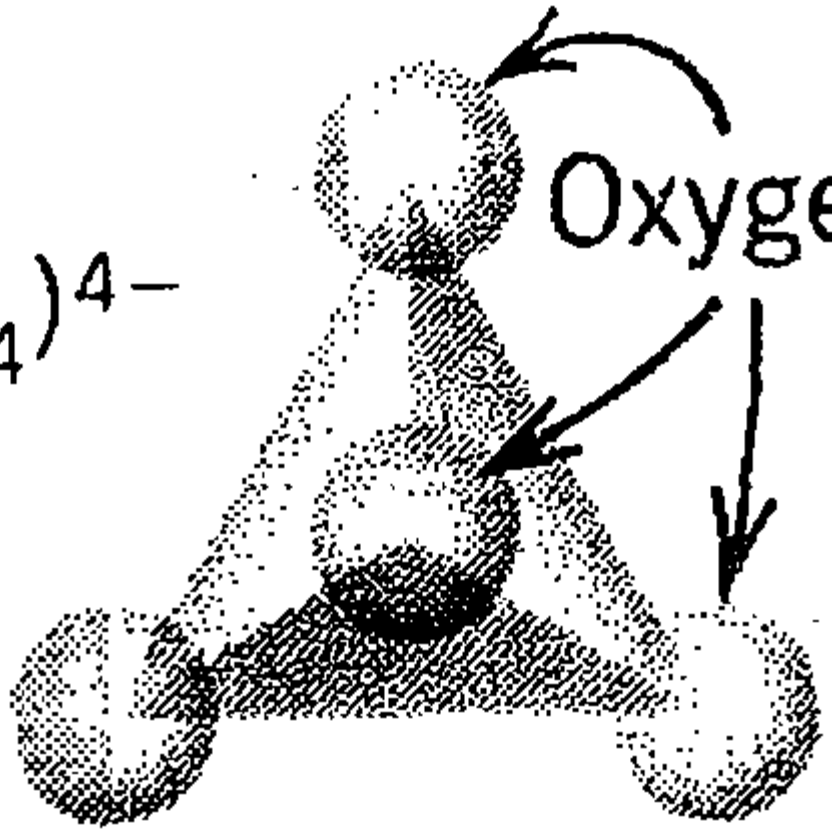
Diamond- the best example for the variability of color

Members of orthopyroxene series (Enstatite to Ferosilite) range from light beige to darker brown

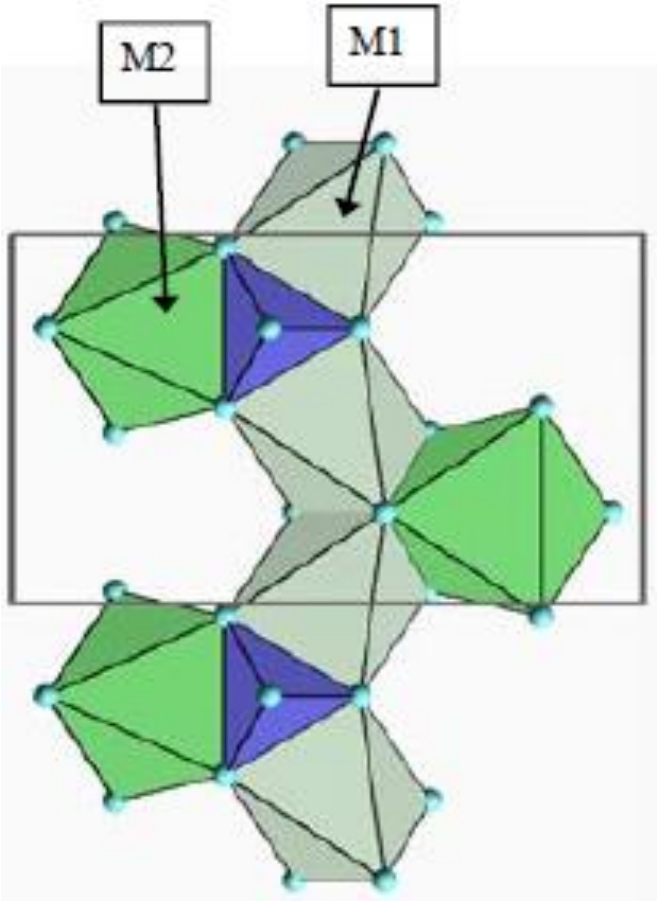
Members of plagioclase feldspar series range from pure white in Albite through light gray to darker gray towards Anorthite end-member

Rock-Forming Minerals

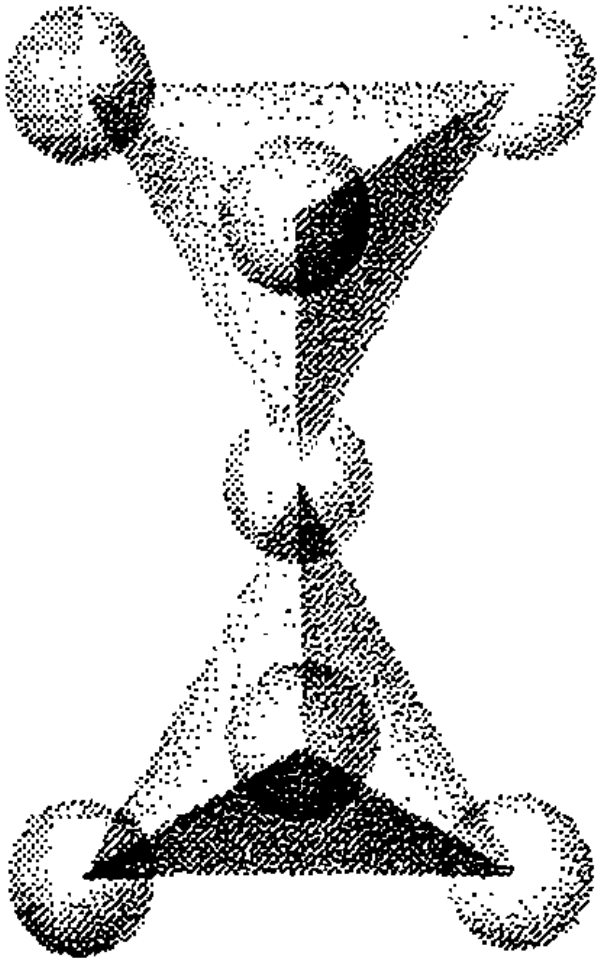
$(SiO_4)^{4-}$



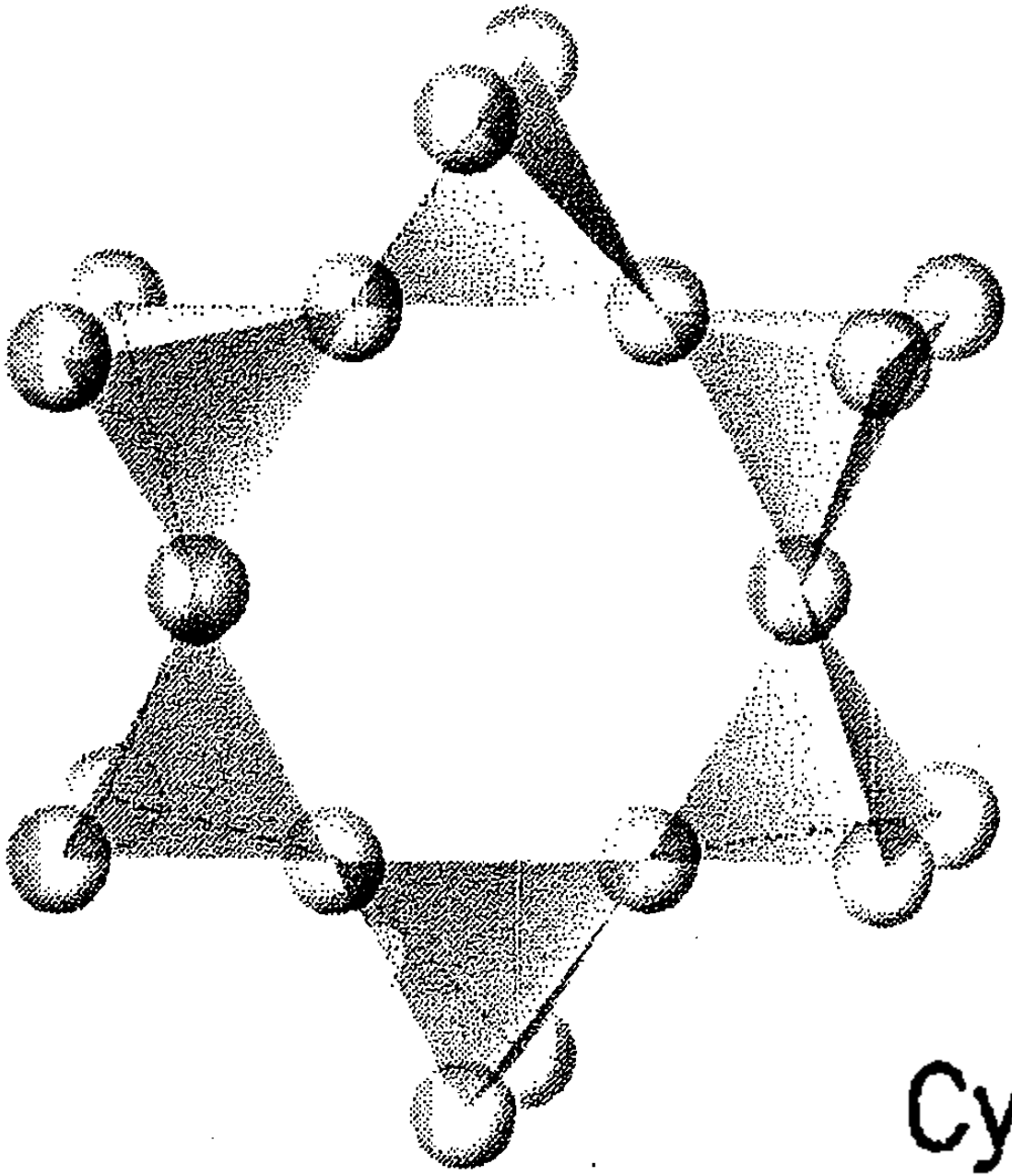
Nesosilicates



$(Si_2O_7)^{6-}$

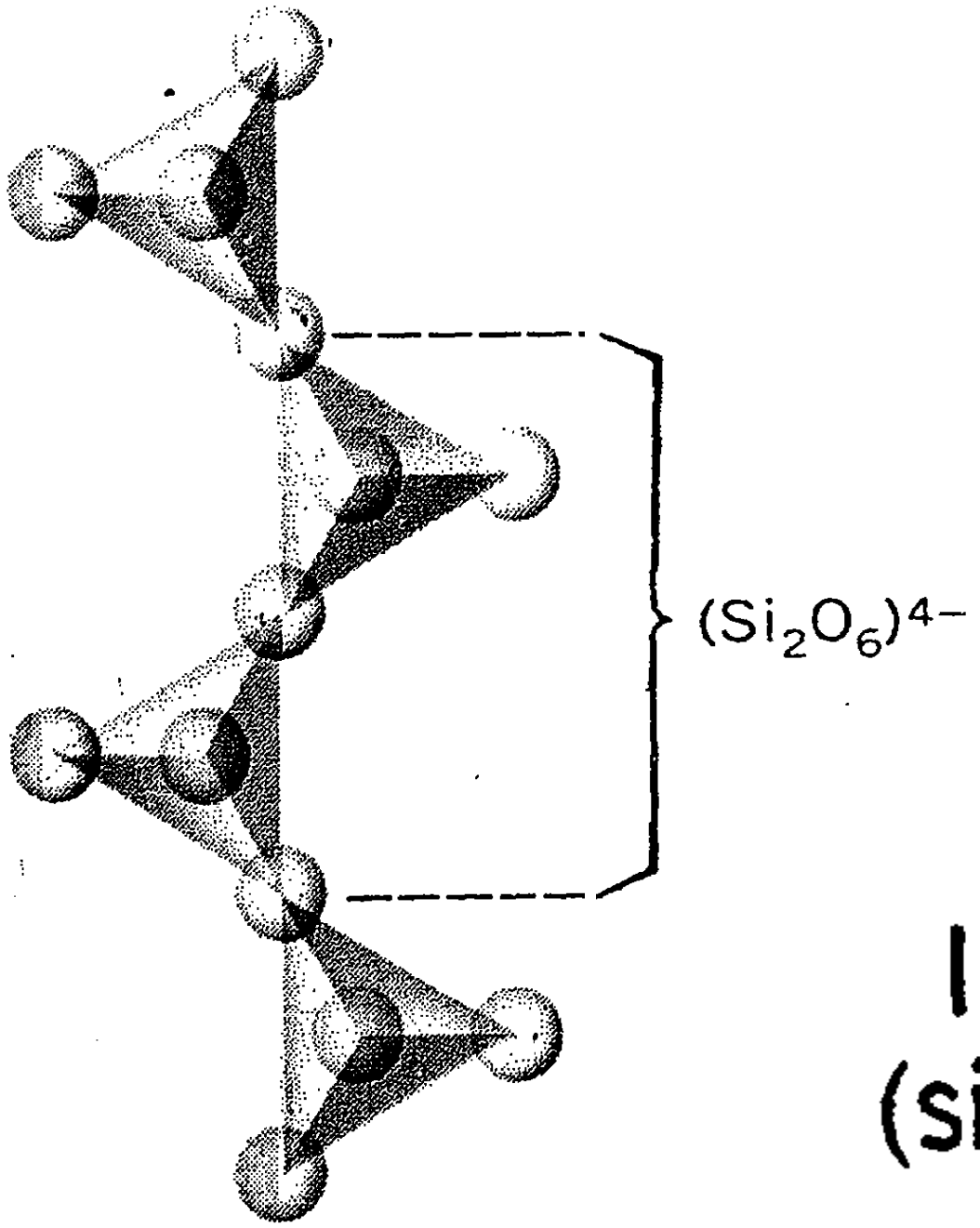


Sorosilicates

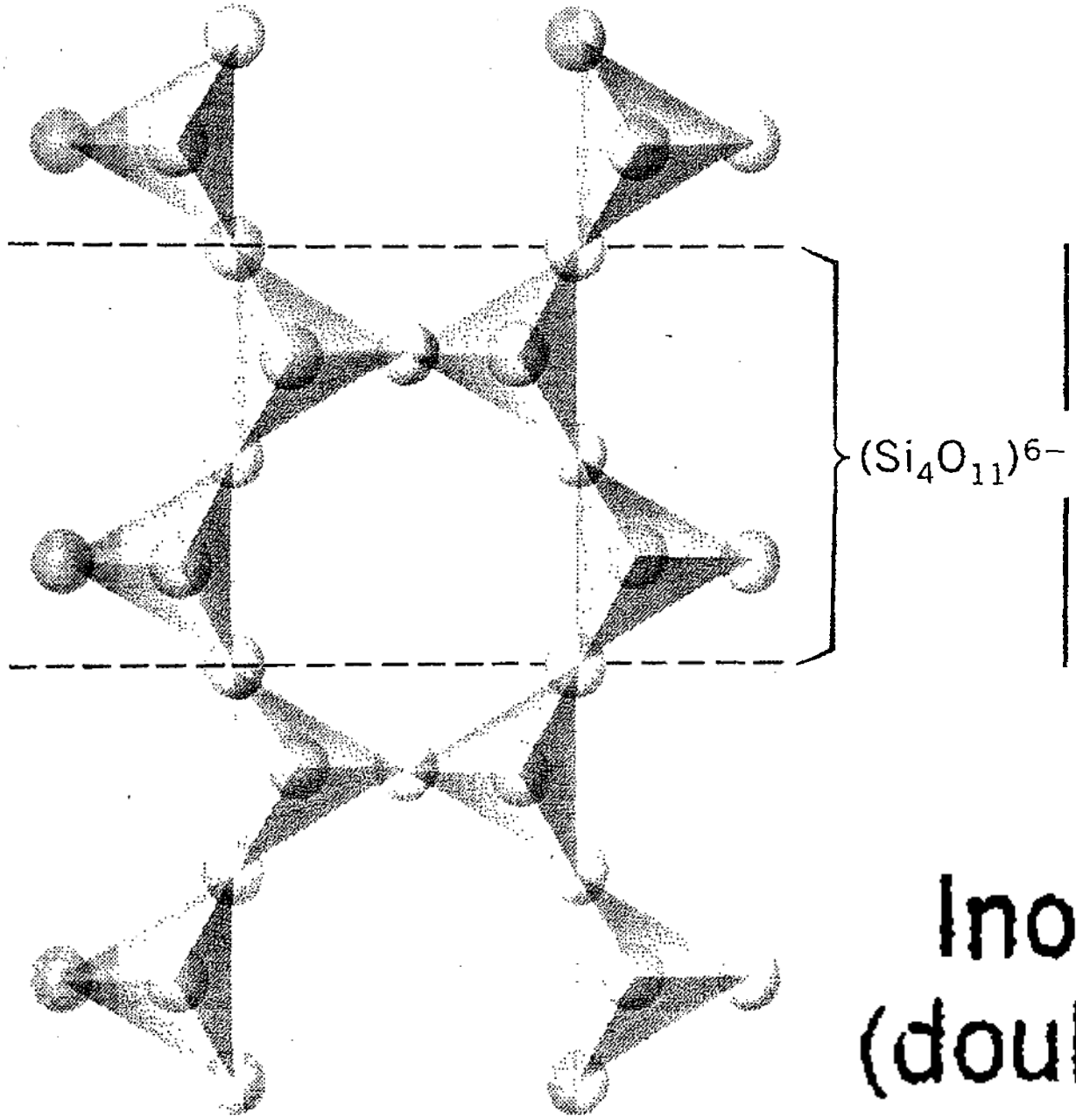


$(Si_6O_{18})^{12-}$

Cyclosilicates



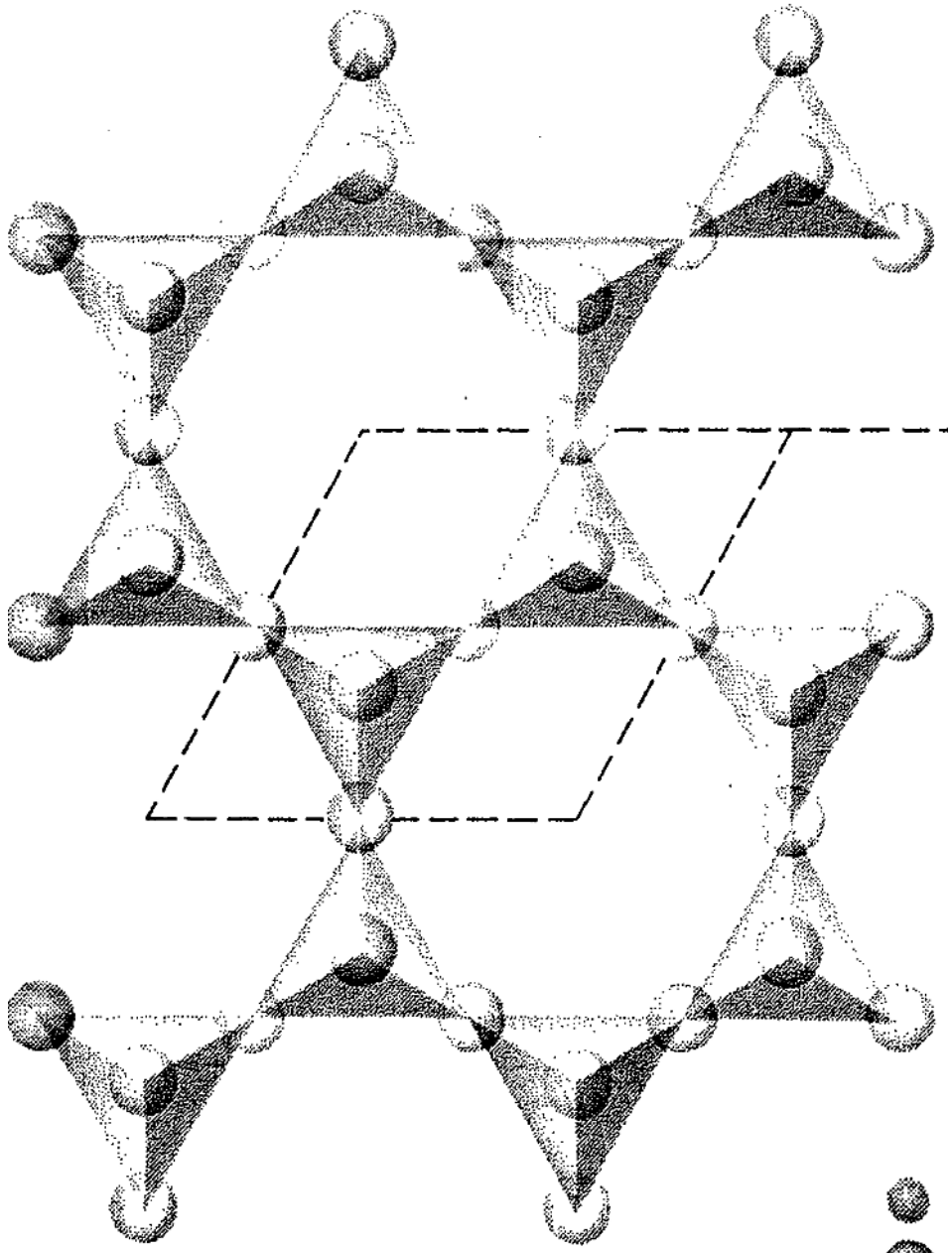
Inosilicates (single chain)

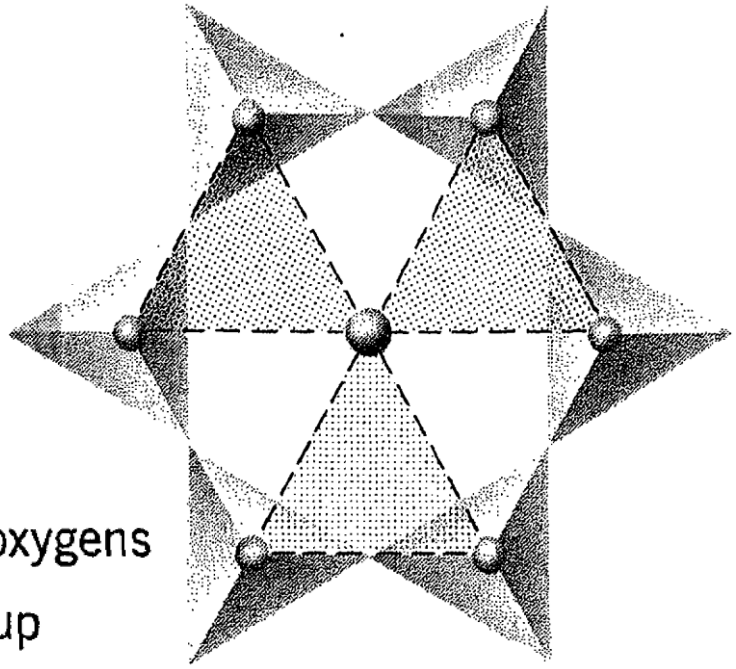


Inosilicates (double ~~chain~~)

Phyllosilicates

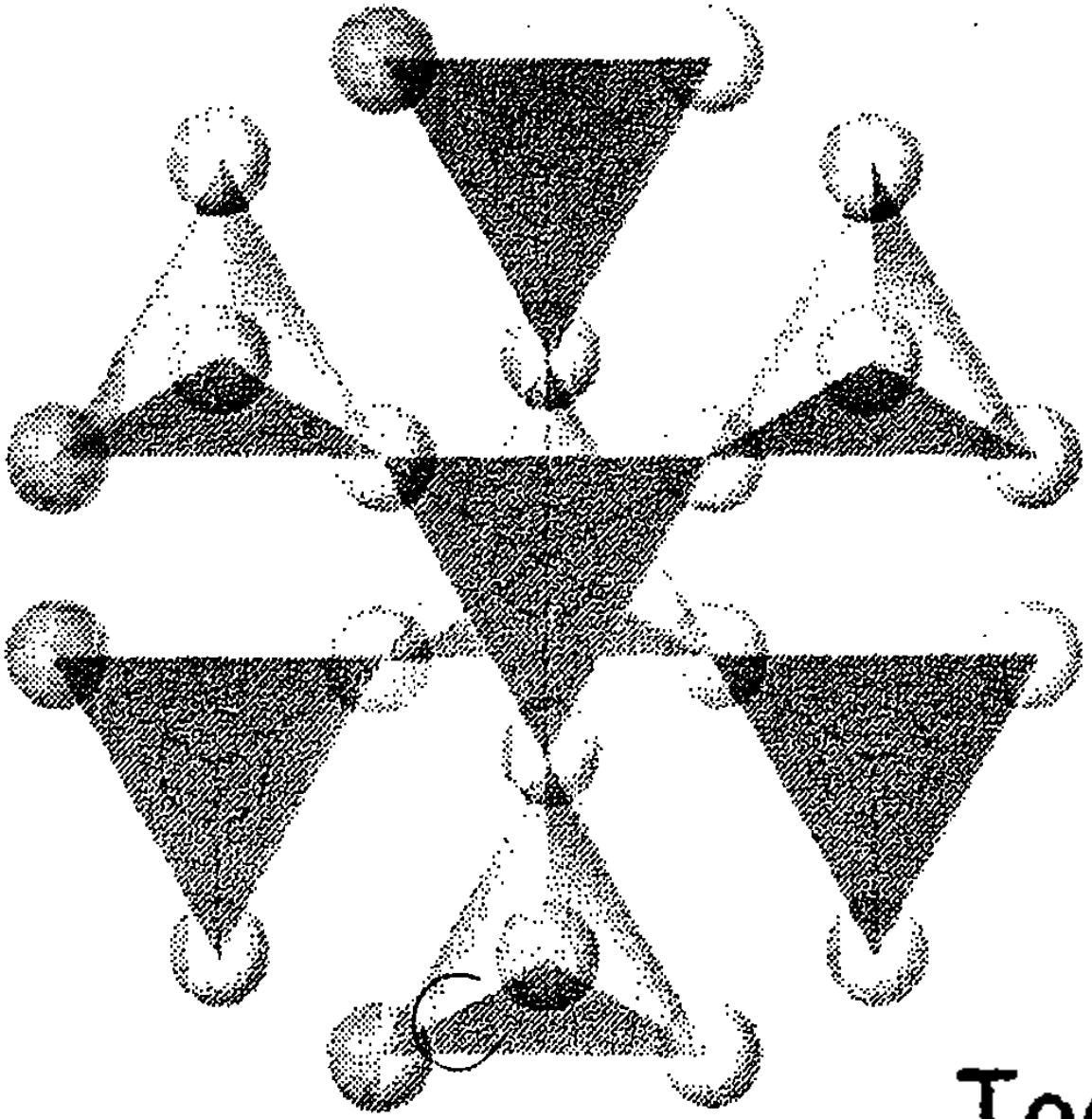
$(Si_2O_5)^{2-}$





Apical oxygens

OH group



$(SiO_2)^0$

Tectosilicates