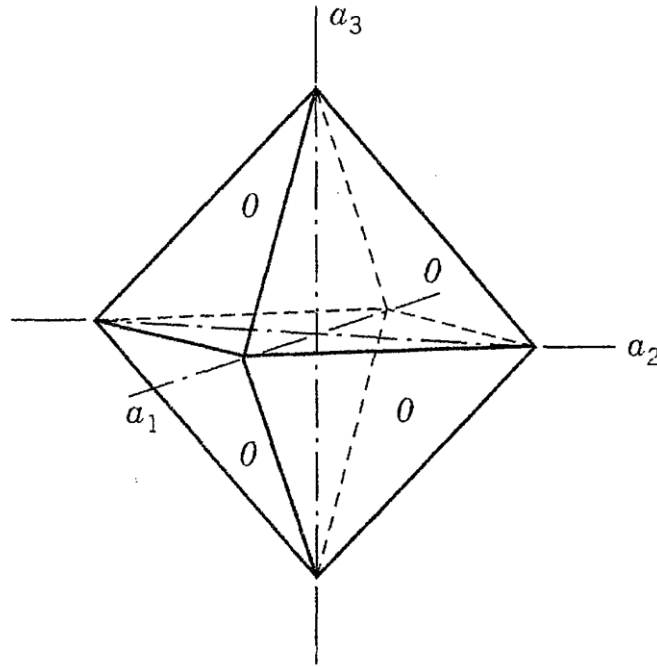
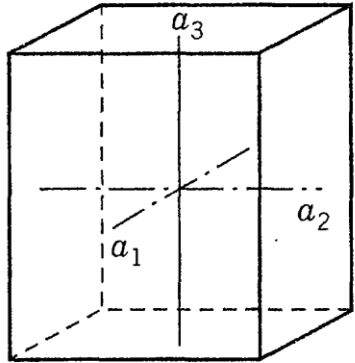


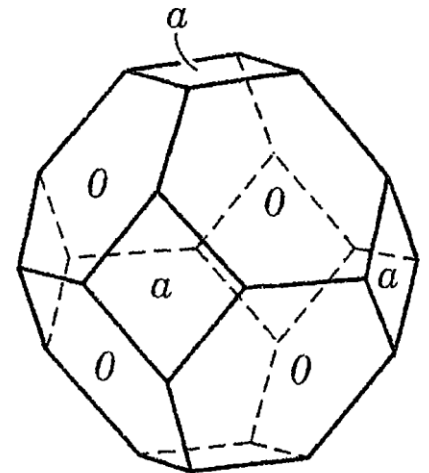
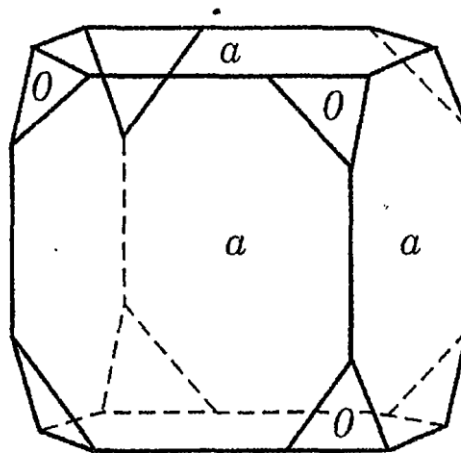
# Mineralogy

**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**

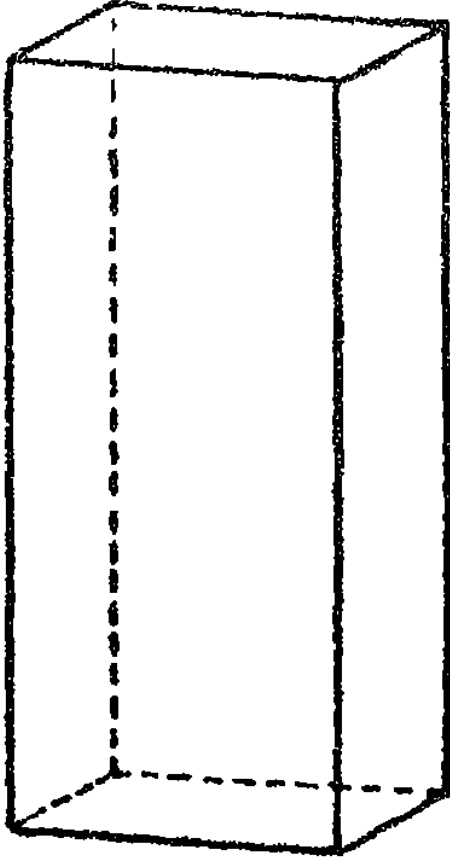
# Crystal Habit



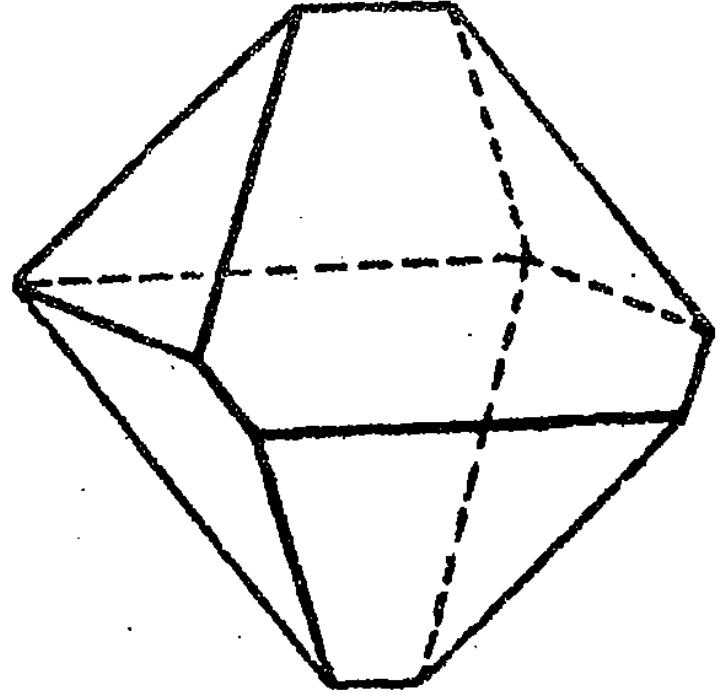
The regular geometric shape



In Reality

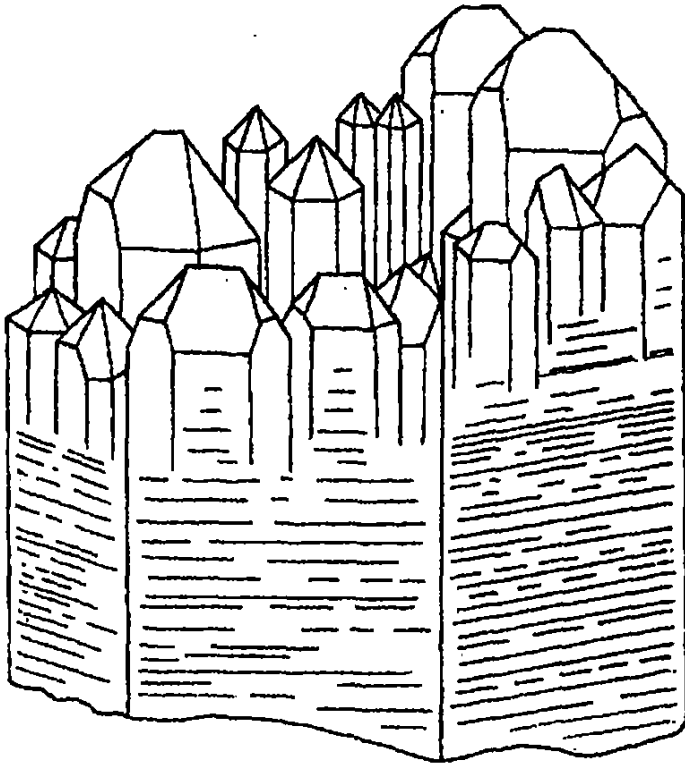


Malformed Cube

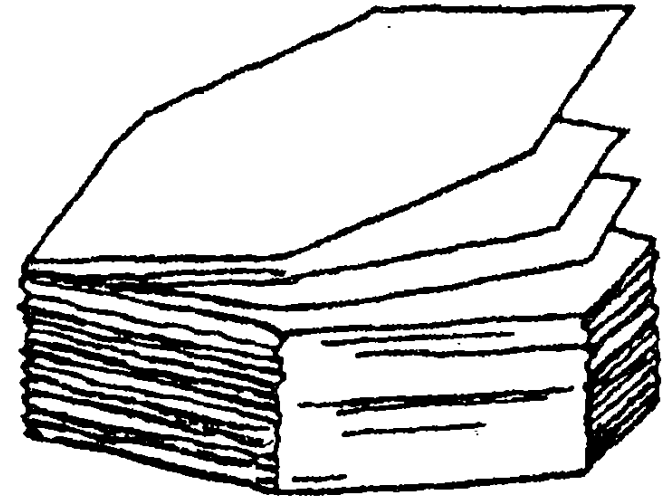


Asymmetric  
Octahedron

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

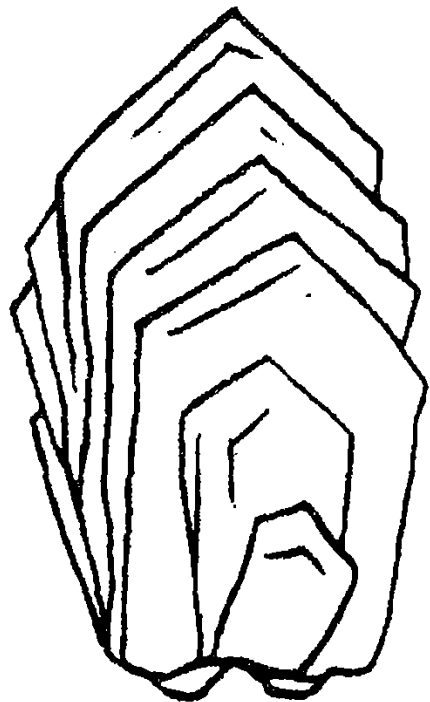


Parallel growth in  
quartz

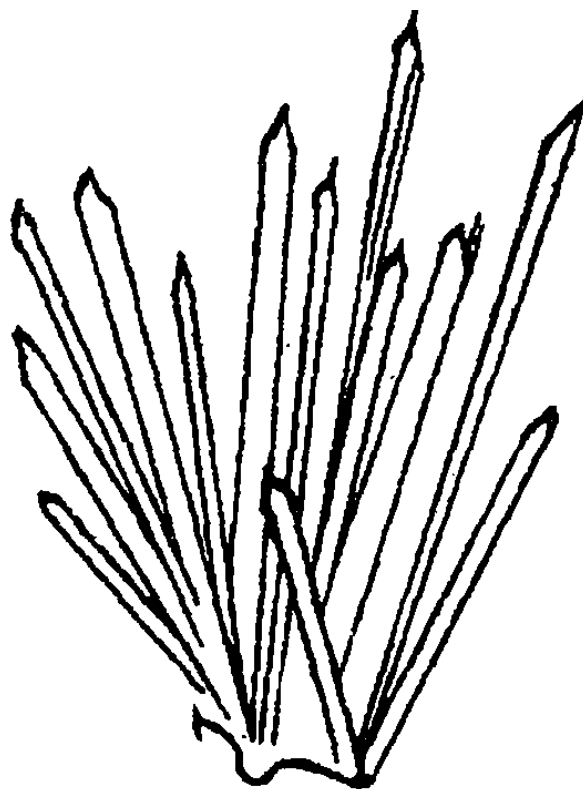


Lamellar, foliated,  
micaceous, as in mica





**Bladed as in  
stibnite**



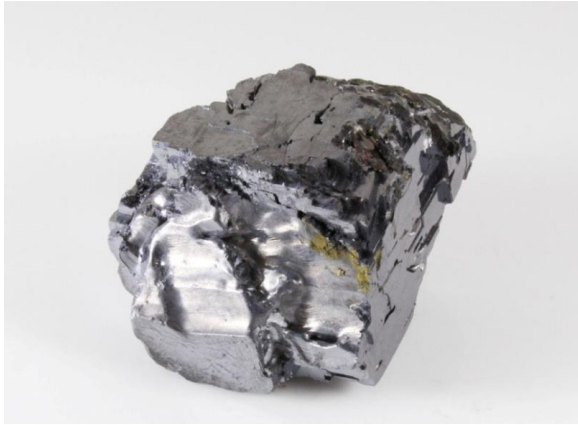
**Acicular, radiating  
as in millerite**

**Dendritic as in  
manganese  
oxide minerals**



# Luster: General appearance of minerals in reflected light

**Metallic**  
(Galena, Pyrite,  
Chalcopyrite)

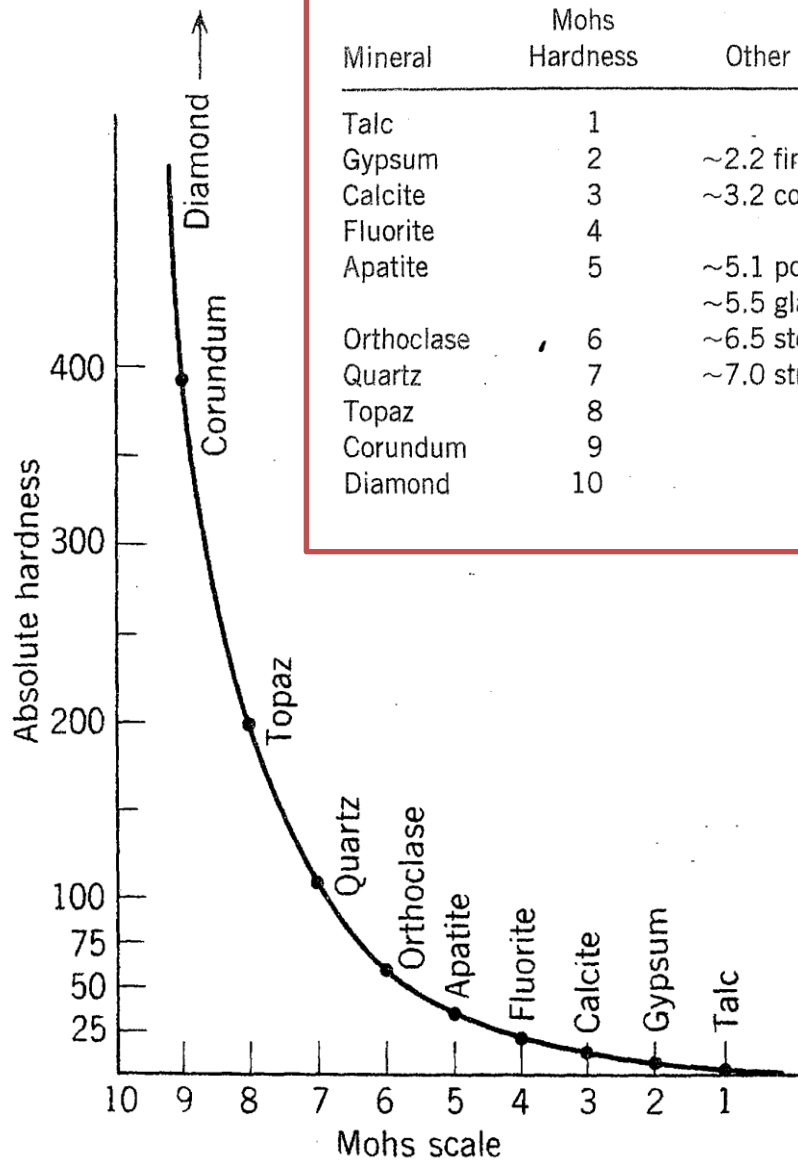


**Non-metallic**

- 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**





**Tenacity:** 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



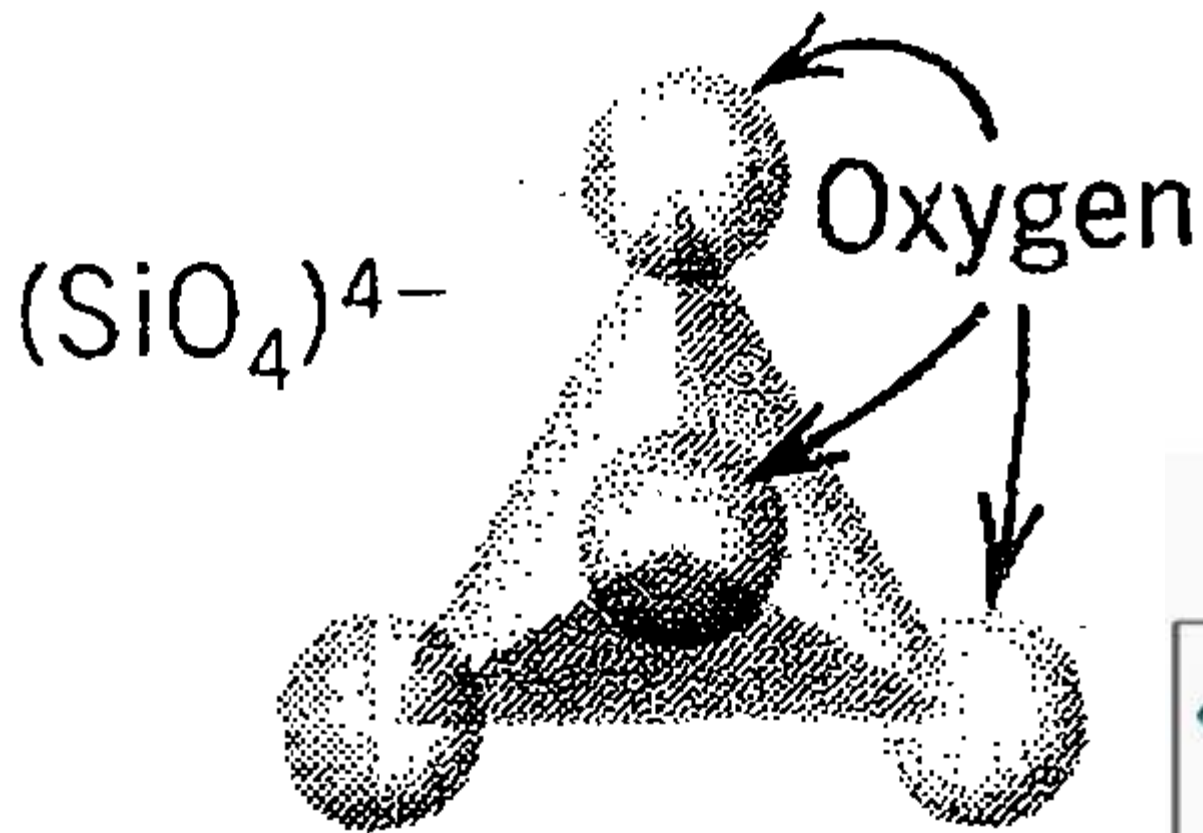
Diamond- the best example for the variability of color



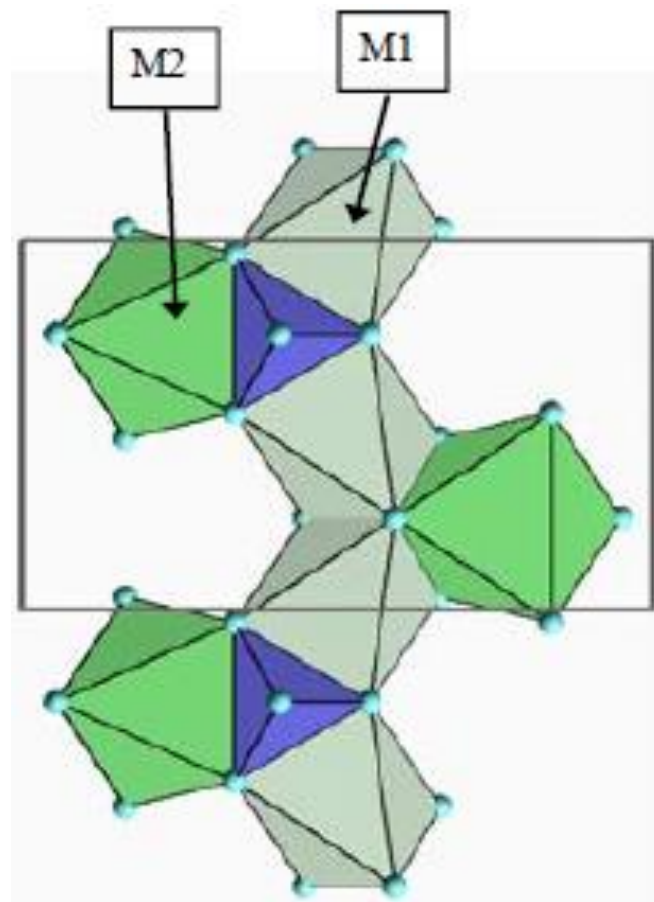
Members of orthopyroxene series (Enstatite to Ferrosilite) range from light beige to darker brown

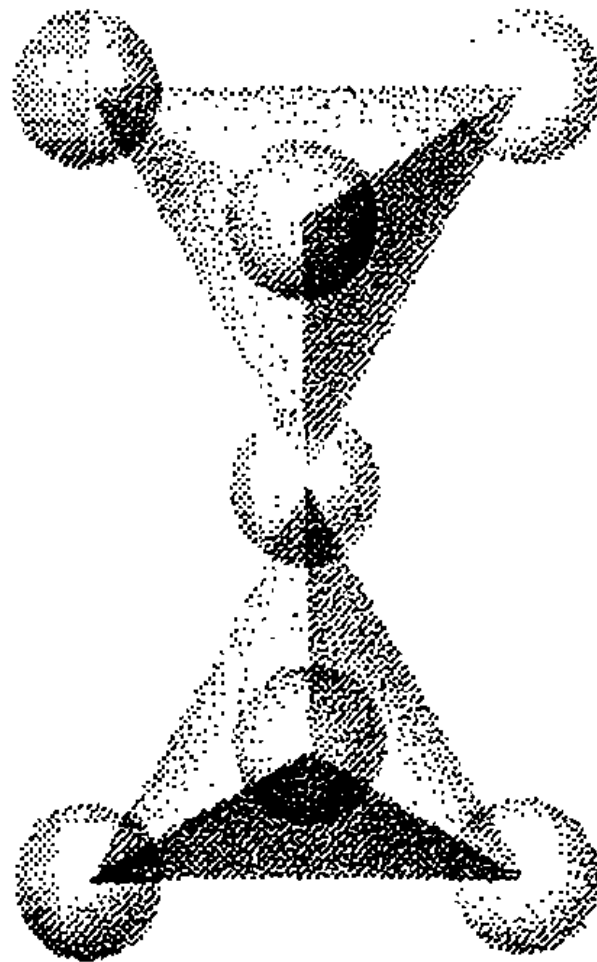
Members of plagioclase feldspar series range from pure white in Albite through light gray to darker gray towards Anorthite end-member

# **Rock-Forming Minerals**

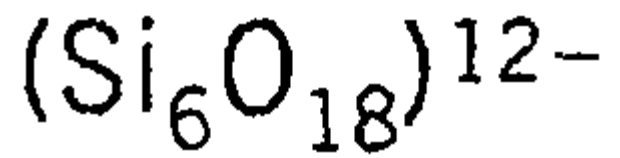
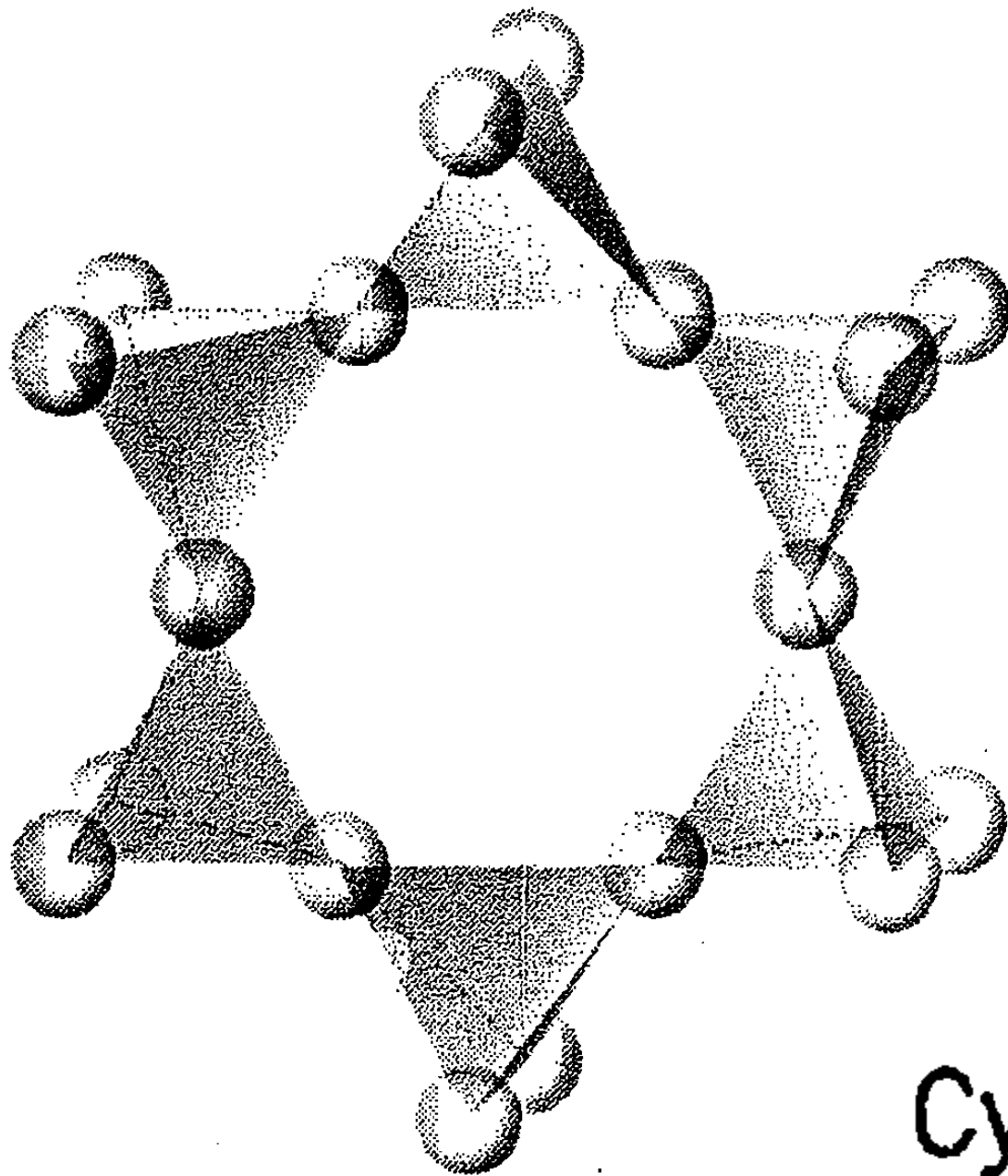


Nesosilicates



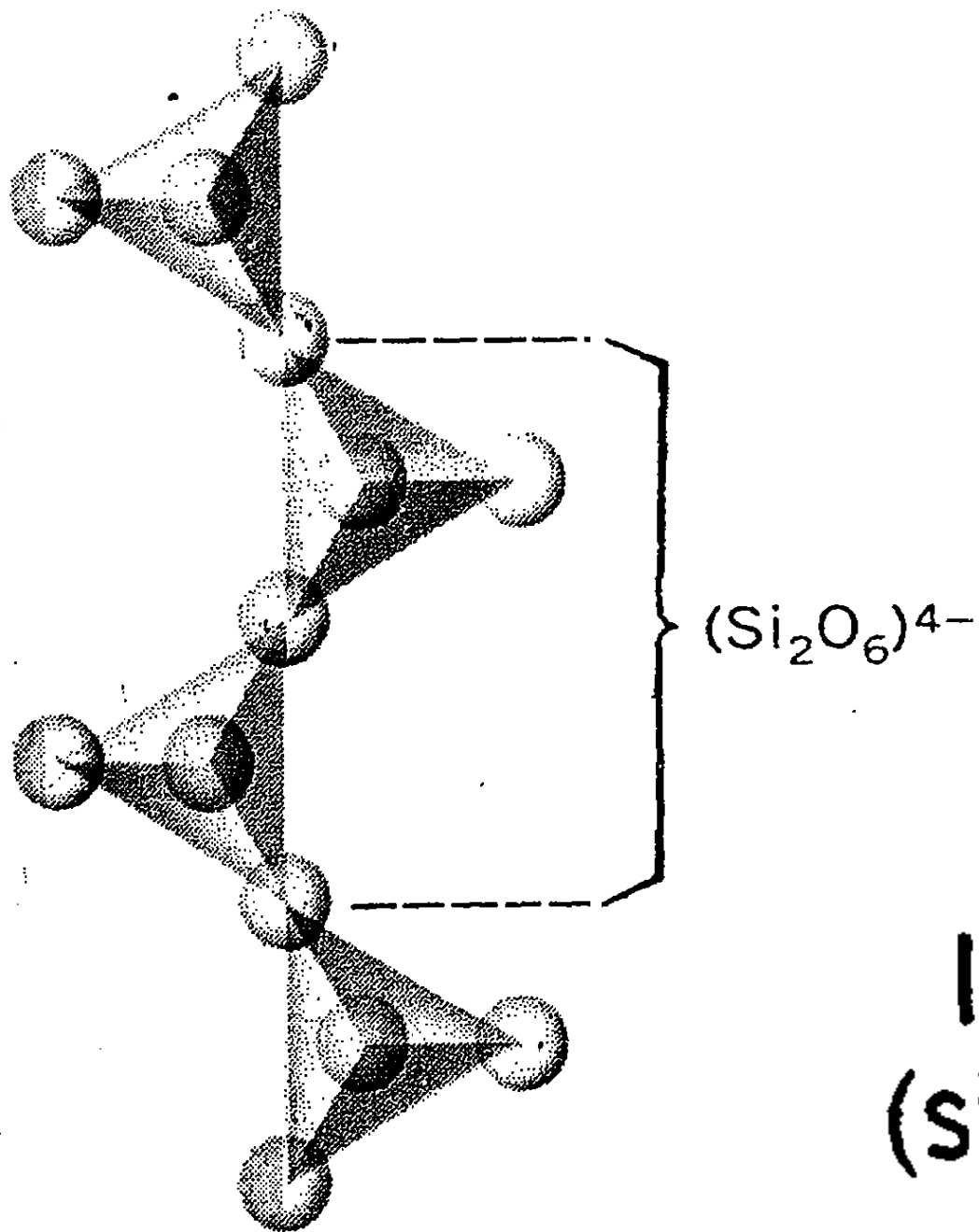


Sorosilicates

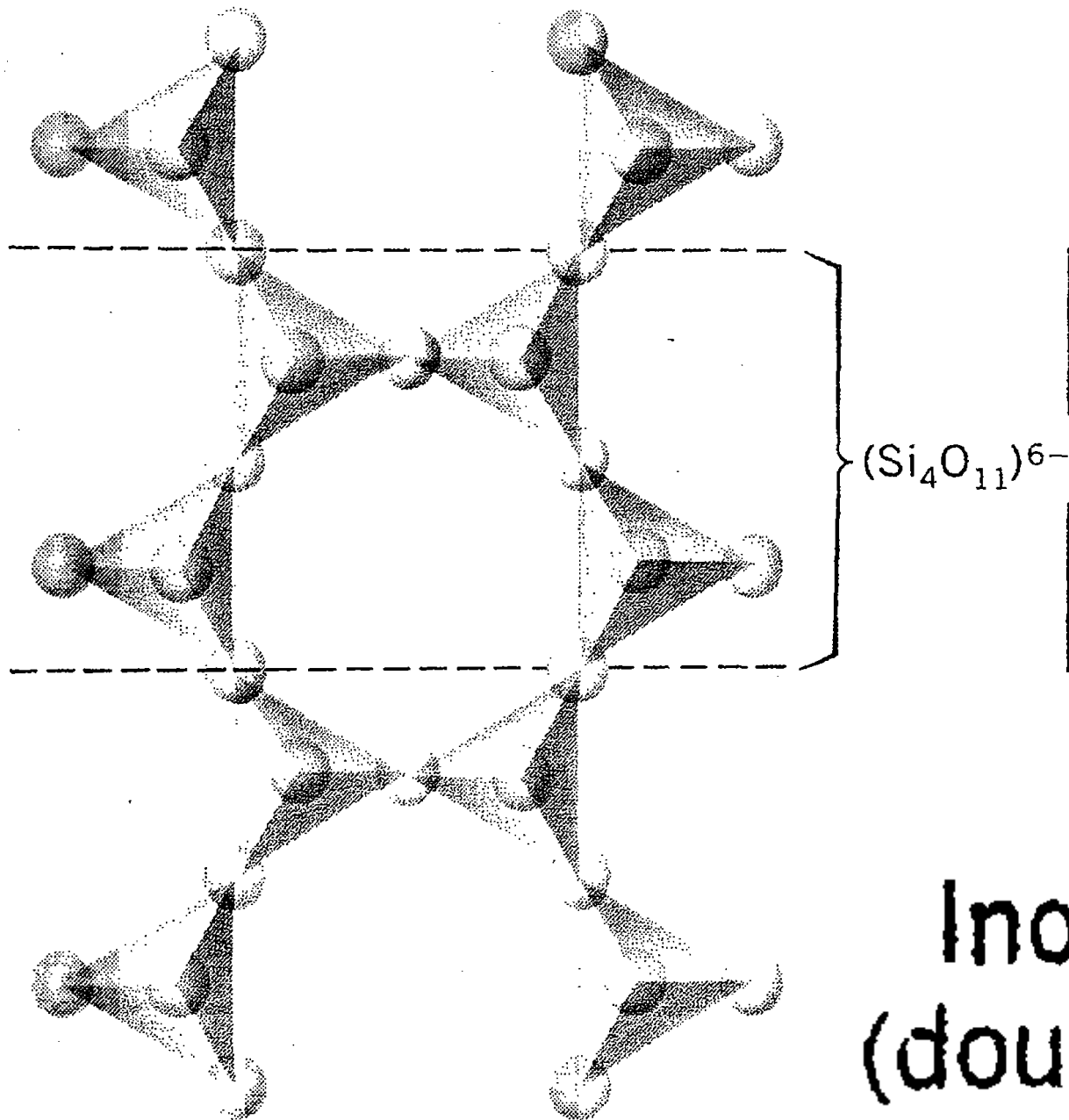


Cyclosilicates





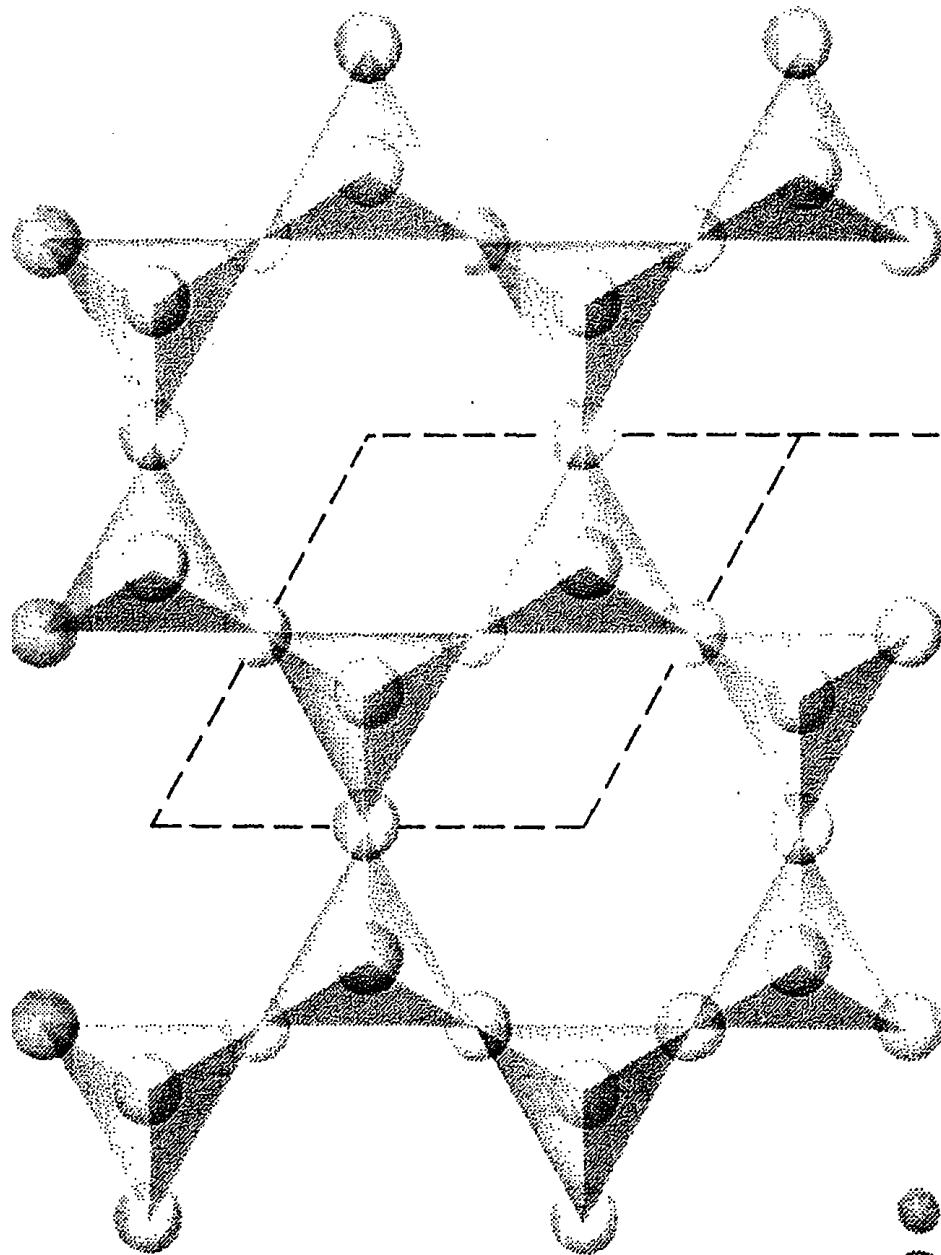
**Inosilicates  
(single chain)**



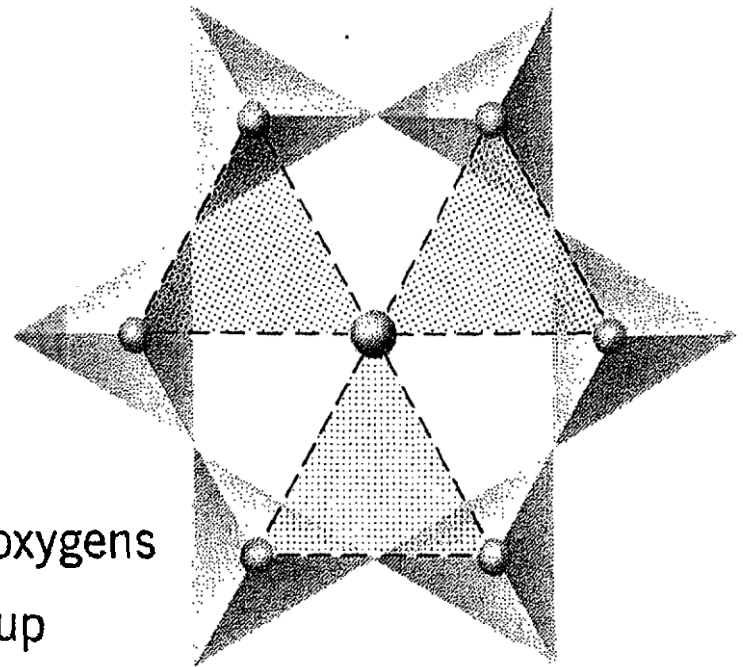
**Inosilicates  
(double-chain)**

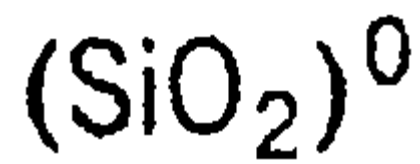
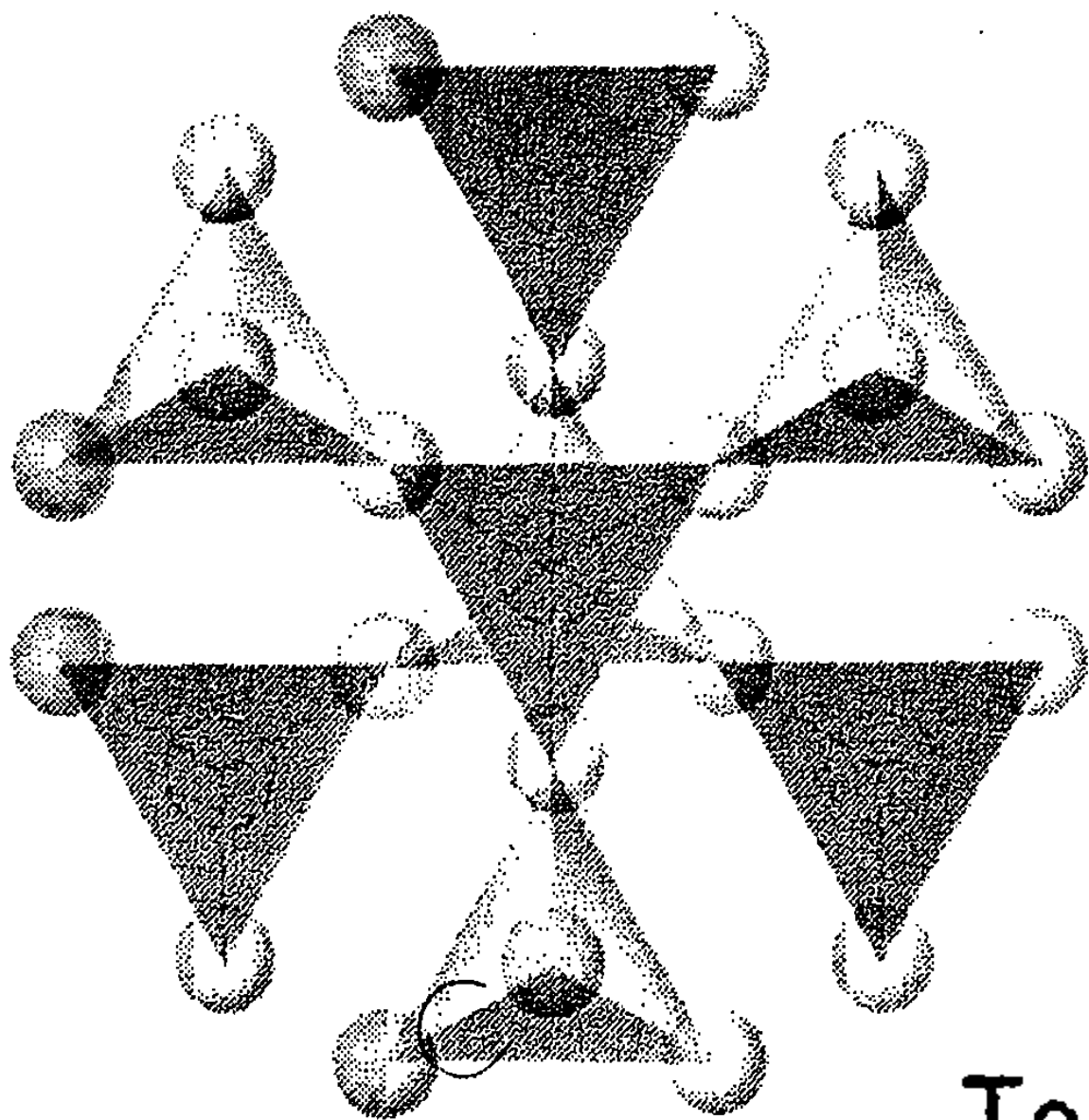


# Phyllosilicates



- Apical oxygens
- OH group





Tectosilicates