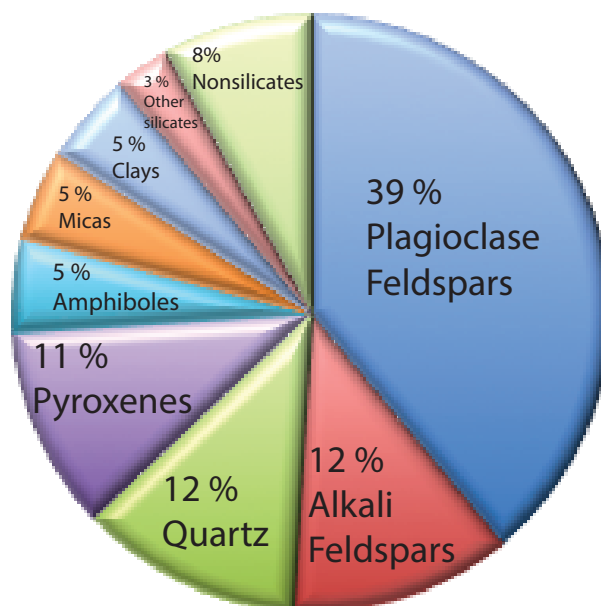


## Silicate minerals

The relative abundance of elements in the Earth's crust (see table 1 below) determines what minerals will form and what minerals will be common. Of the 92 naturally occurring elements, Oxygen and Silicon are the most abundant elements in the Earth's crust as a result the silicate minerals are the most common minerals in the Earth Crust (see chart below). Silicates are further divided into six groups (see table 2 below)

**Table 1. The most abundant (eight) elements in the Earth's crust**

Element	Proportion of Earth's Weight (%)	Volume %
Oxygen	45.2	94
Silicon	27.2	9
Aluminum	8.00	
Iron	5.8	
Calcium	5.06	
Magnesium	2.77	
Sodium	2.32	
Potassium	1.68	
Total	<b>98.03</b>	
Other elements	1.97	
Total	100	100



Estimated volume % of common minerals in the Earth's Crust. Modified after Minerals science, Klien and Dutrow

Table 2. Silicates are further subdivided into:  
TECTOSILICATES (FRAMEWORK SILICATES)

Anorthite	$\text{CaAl}_2\text{Si}_2\text{O}_8$
Albite	$\text{NaAlSi}_3\text{O}_8$
Sanidine	$\text{KAlSi}_3\text{O}_8$
Orthoclase	$\text{KAlSi}_3\text{O}_8$
Quartz	$\text{SiO}_2$
Cristobalite	$\text{SiO}_2$
Tridymite	$\text{SiO}_2$
Nepheline	$\text{NaAlSiO}_4$
Kalsilite	$\text{KAlSiO}_4$
Leucite	$\text{KAlSi}_2\text{O}_6$

PHYLLOSILICATES (SHEET SILICATES)

Muscovite	$\text{KAl}_3\text{Si}_3\text{O}_{10}(\text{OH})_2$
Biotite	$\text{K}(\text{Mg,Fe})_3\text{AlSi}_3\text{O}_{10}(\text{OH})_2$
Talc	$\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$
Chlorite	$(\text{Mg,Fe,Al})_6(\text{Si,Al})_4\text{O}_{10}(\text{OH})_8$
Serpentine	$\text{Mg}_3\text{Si}_2\text{O}_5(\text{OH})_4$
Kaolinite	$\text{Al}_2\text{Si}_2\text{O}_5(\text{OH})_4$

## NESOSILICATES (ORTHOSILICATES )

Forsterite	$\text{Mg}_2\text{SiO}_4$
Fayalite	$\text{Fe}_2\text{SiO}_4$
Zircon	$\text{ZrSiO}_4$
Sphene	$\text{CaTiSiO}_4$
Pyrope	$\text{Mg}_3\text{Al}_2\text{Si}_3\text{O}_{12}$
Almandine	$\text{Fe}_3\text{Al}_2\text{Si}_3\text{O}_{12}$
Grossularite	$\text{Ca}_3\text{Al}_2\text{Si}_3\text{O}_{12}$
Sillimanite	$\text{Al}_2\text{SiO}_5$
Kyanite	$\text{Al}_2\text{SiO}_5$
Andalusite	$\text{Al}_2\text{SiO}_5$
Staurolite	$(\text{Fe},\text{Mg})_2\text{Al}_9\text{Si}_4\text{O}_{22}(\text{OH})_2$
Topaz	$\text{Al}_2\text{SiO}_4(\text{OH})_2$

## INOSILICATES (CHAIN SILICATES)

Enstatite	$\text{MgSiO}_3$
Ferrosilite	$\text{FeSiO}_3$
Hypersthene	$(\text{Mg},\text{Fe})\text{SiO}_3$
Diopside	$\text{CaMgSi}_2\text{O}_6$
Augite	$(\text{Ca},\text{Na})(\text{Mg},\text{Fe},\text{Al})(\text{Si},\text{Al})_2\text{O}_6$
Hedenbergite	$\text{CaFeSi}_2\text{O}_6$

Acmite	$\text{NaFe}^{+3}\text{Si}_2\text{O}_6$
Jadeite	$\text{NaAlSi}_2\text{O}_6$
Wollastonite	$\text{CaSiO}_3$
Tremolite	$\text{Ca}_2\text{Mg}_5\text{Si}_8\text{O}_{22}(\text{OH})_2$
Actinolite	$\text{Ca}_2(\text{Mg,Fe})_5\text{Si}_8\text{O}_{22}(\text{OH})_2$
Hornblende	$(\text{Na,K})_{0-1}\text{Ca}_2(\text{Mg,Fe,Al})_5\text{Si}_6-7\text{Al}_2-1\text{O}_{22}(\text{OH,F})_2$

### SOROSILICATES

Lawsonite	$\text{CaAl}_2\text{Si}_2\text{O}_7(\text{OH})_2 \cdot \text{H}_2\text{O}$
Epidote	$\text{Ca}_2\text{Fe}^{+3}\text{Al}_2\text{Si}_3\text{O}_{12}(\text{OH})$
Clinzoisite	$\text{Ca}_2\text{Al}_3\text{Si}_3\text{O}_{12}(\text{OH})$

### CYCLOSILICATES

Beryl	$\text{Be}_3\text{Al}_2\text{Si}_6\text{O}_{18}$
Cordierite	$\text{Al}_4(\text{Mg,Fe})_2\text{Si}_5\text{O}_{18}$
Tourmaline	$(\text{Na,Ca})(\text{Mg,Li,Al,Fe}^{2+})_3 \text{Al}_6 \text{B}_3 \text{Si}_6 (\text{OH})_4$