

Diploma of Advanced Concrete Technology



- **Geology aggregates,
Classification and Prospecting**

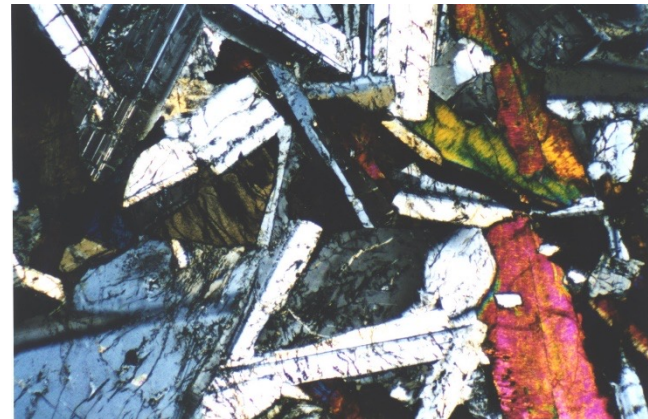
Section 3 – Rock Types, aggregate properties

- Type Igneous
- Name: Basalt
- Rock cycle extrusive
- Grainsize: Fine
- SG 2.5-2.9
- Occurrence: east and west seaboard
- Intraplate, back arc
- Deleterious minerals
 - Montmorillonite
 - Calcite
 - Volcanic glass
 - Zeolite
 - Iddingsite
 - Chlorite



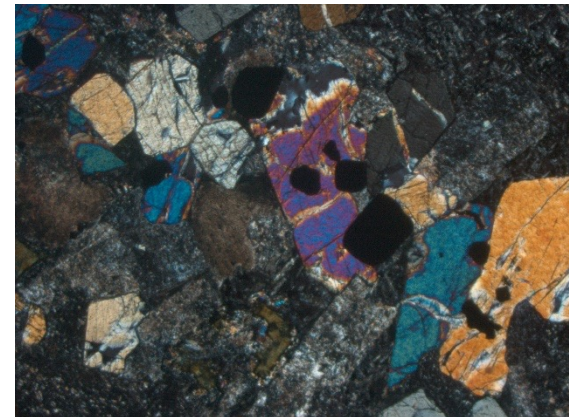
Section 3 – Rock Types, aggregate properties

- Type Igneous
- Name: Dolerite
- Rock cycle Sill/intrusive
- Grainsize: Fine
- SG 2.8-2.9
- Occurrence: mainly Tasmania
- Intraplate, in sills
- Deleterious minerals
 - Montmorillonite
 - Calcite
 - Chlorite
 - Zeolite



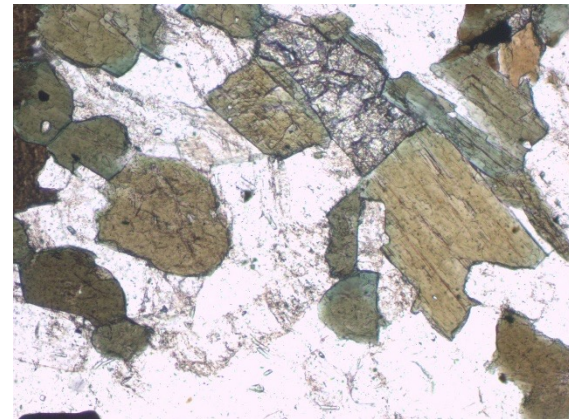
Section 3 – Rock Types, aggregate properties

- Type Igneous
- Name: Latite
- Rock cycle extrusive/sill
- Grainsize: Fine
- SG 2.5-2.7
- Occurrence: Sydney basin
- Intraplate
- Deleterious minerals
 - Calcite
 - Zeolite
 - Chlorite
 - Sericite
 - Kaolinite



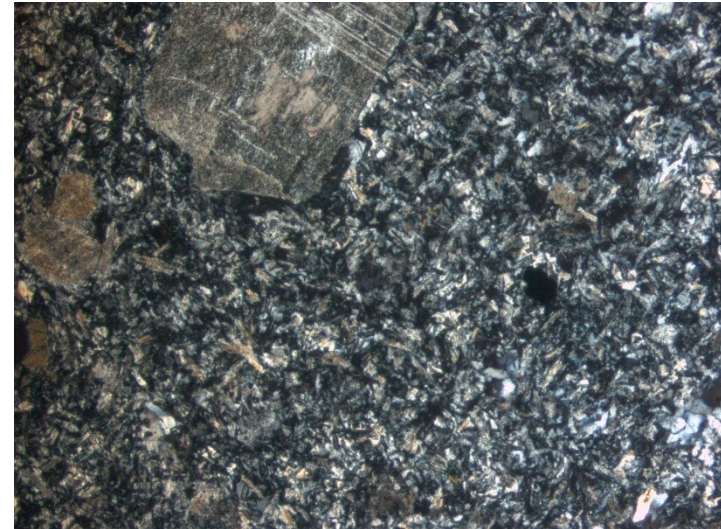
Section 3 – Rock Types, aggregate properties

- Type Igneous
- Name: Granite
- Rock cycle intrusive
- Grainsize: medium to coarse
- SG 2.67
- Occurrence: widespread
- Subduction zones
- Deleterious minerals
 - Calcite
 - Zeolite
 - Strained quartz
 - Biotite (affects concrete strength)
 - Kaolinite



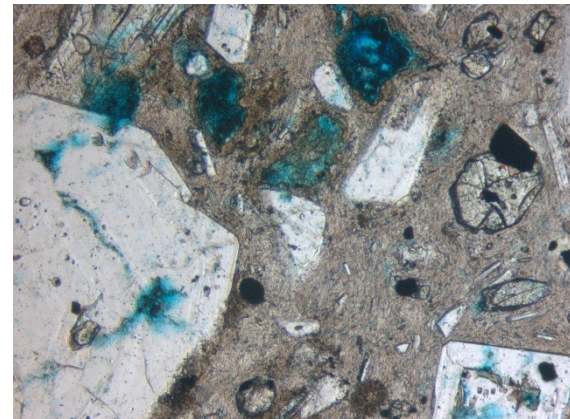
Section 3 – Rock Types, aggregate properties

- Type Igneous
- Name: Rhyolite
- Rock cycle extrusive
- Grainsize: Fine
- SG 2.5-2.67
- Occurrence: east and west sea
- Intraplate
- Deleterious minerals
 - Calcite
 - Epidote
 - Zeolite
 - Sericite
 - Glass shards
 - Strained quartz/Tridymite
 - Kaolinite



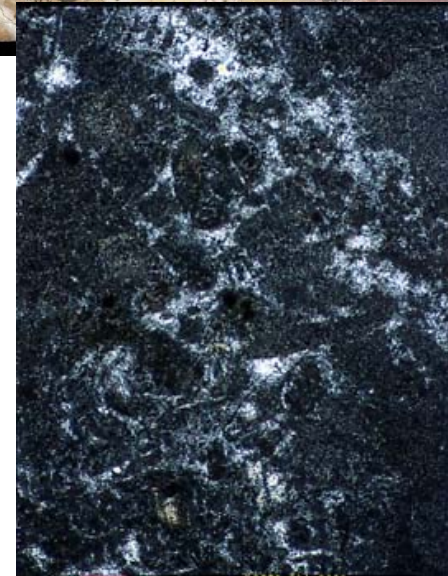
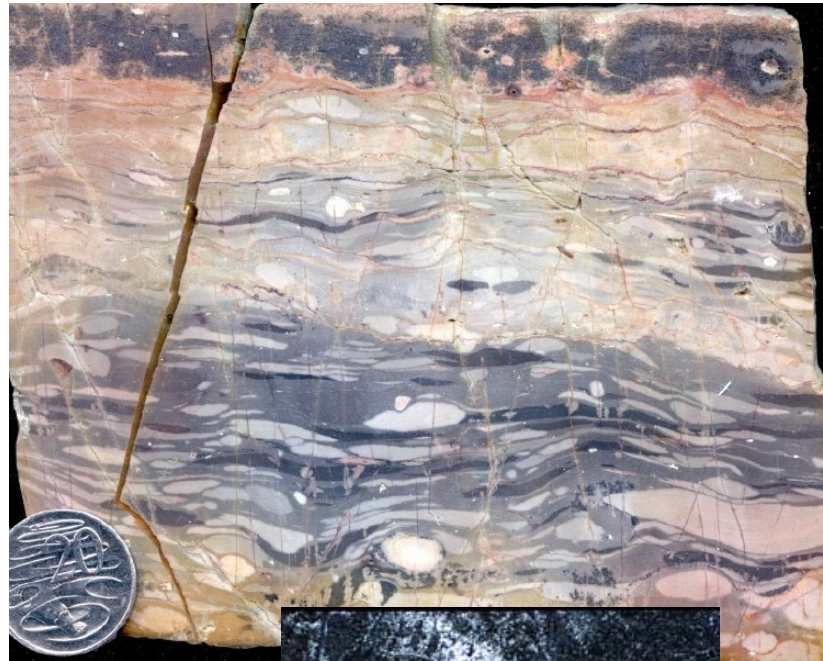
Section 3 – Rock Types, aggregate properties

- Type Igneous
- Name: Andesite
- Rock cycle extrusive
- Grainsize: Fine-medium
- SG 2.5-2.67
- Occurrence: east and west seaboard
- Intraplate
- Deleterious minerals
 - Calcite
 - Epidote
 - Zeolite
 - Sericite
 - Kaolinite



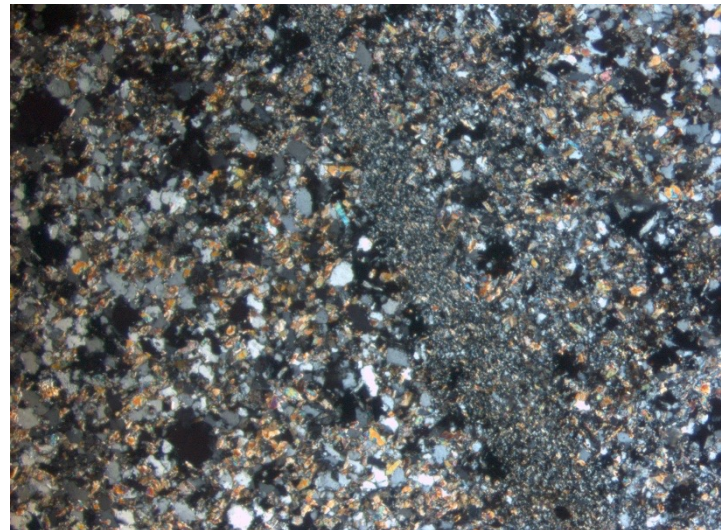
Section 3 – Rock Types, aggregate properties

- Type sedimentary
- Name: chert
- Rock cycle: chemical deposition
- Grainsize: Very Fine
- SG 2.5-2.67
- Occurrence: east and west seaboard
- Lagoonal deposition
- Deleterious minerals
 - Zeolite
 - Sericite
 - Fine amorphous silica



Section 3 – Rock Types, aggregate properties

- Type sedimentary
- Name: sandstone (arenite)
- Rock cycle extrusive
- Grainsize: Fine-medium
- SG 2.5-2.67
- Occurrence: east and west seaboard
- Sedimentary basins and near shore
- Deleterious minerals
 - Calcite
 - Zeolite
 - Sericite
 - Kaolinite



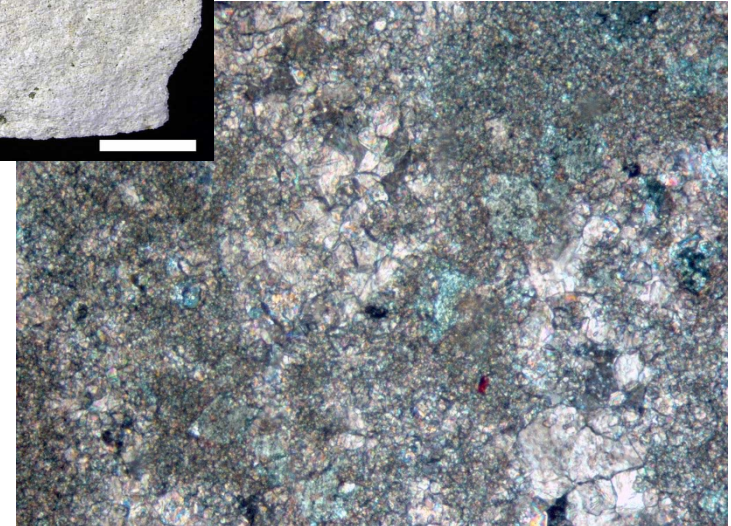
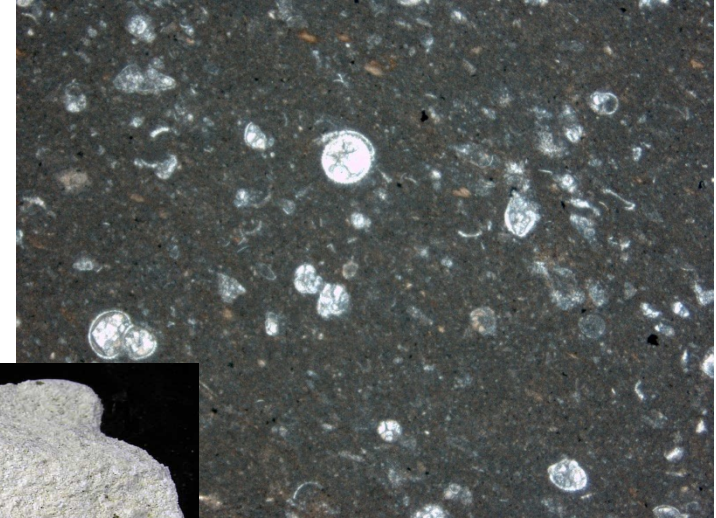
Section 3 – Rock Types, aggregate properties

- Type Sedimentary
- Name: Greywacke
- Rock cycle:
- Grainsize: Fine-medium
- SG 2.5-2.67
- Occurrence: east seaboard
- Deep water deposition
- Deleterious minerals
 - Calcite
 - Zeolite
 - Sericite
 - Kaolinite



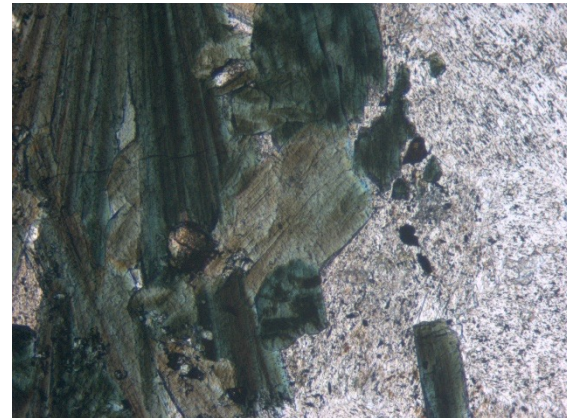
Section 3 – Rock Types, aggregate properties

- Type Sedimentary
- Name: Limestone/Dolomite
- Rock cycle: Chemical biological deposition
- Grainsize: Fine-medium
- SG 2.72
- Occurrence: Australia Wide
- Deep water deposition
- Deleterious minerals
 - Calcite
 - Zeolite
 - Sericite



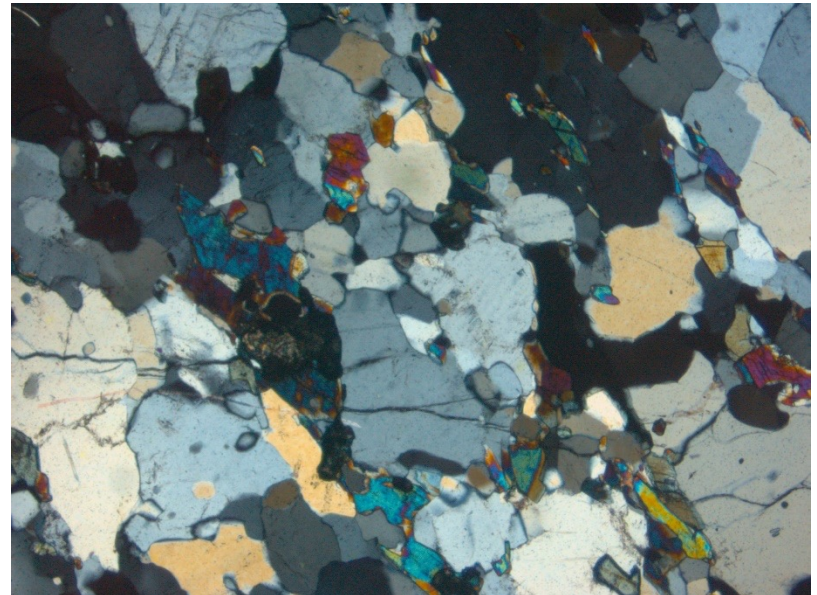
Section 3 – Rock Types, aggregate properties

- Type Metamorphic
- Name: Hornfels
- Rock cycle changed sediments
- Grainsize: Fine-medium
- SG 2.5-2.67
- Occurrence: east and west seaboard
- Contact with granite
- Deleterious minerals
 - Calcite
 - Sericite
 - chlorite



Section 2 – Rock Types, aggregate properties

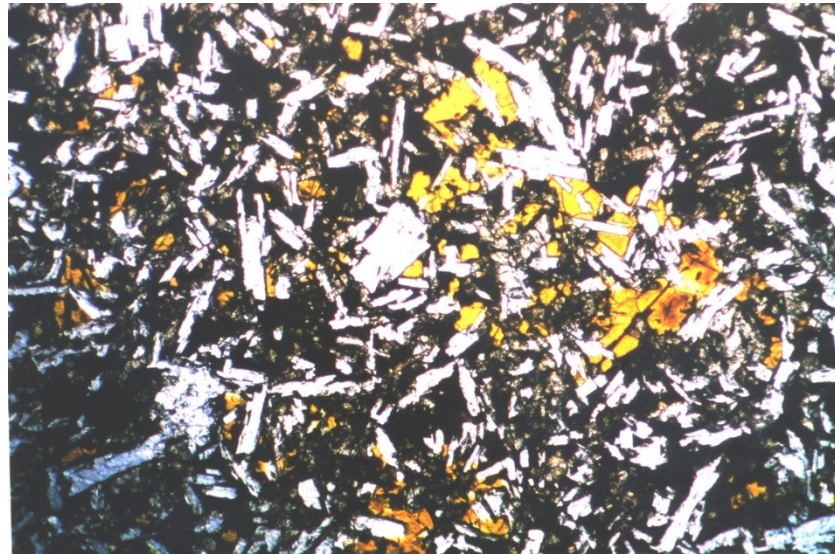
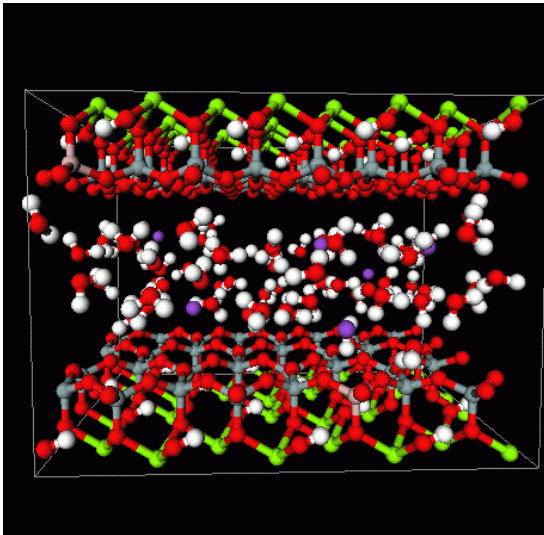
- Type Metamorphic
- Name: Gneiss
- Rock cycle crustal melt
- Grainsize: Fine-medium sometimes banded
- SG 2.5-2.67
- Occurrence: east and west seaboard
- Subduction zone regional metamorphism
- Deleterious minerals
 - Calcite
 - Epidote
 - Sericite
 - Chlorite



Section 3 – Deleterious minerals

Montmorillonite

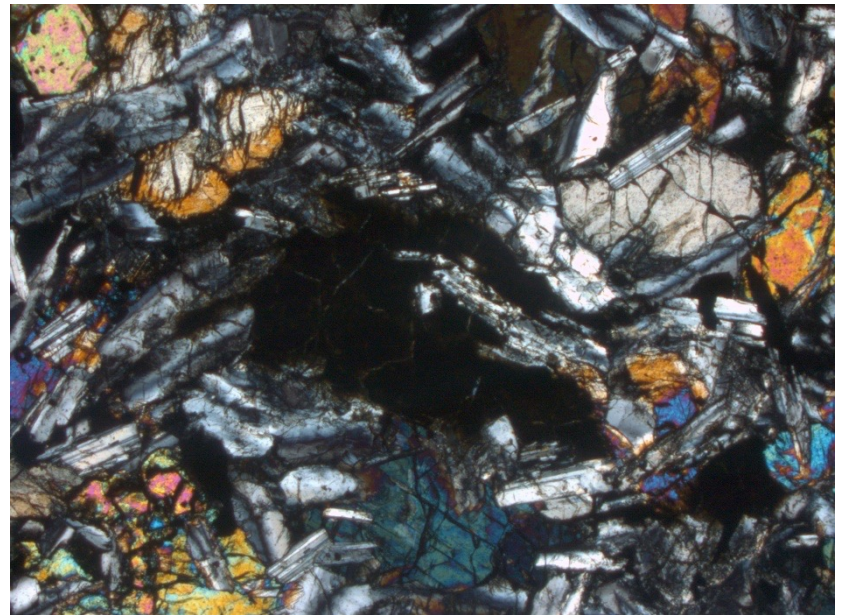
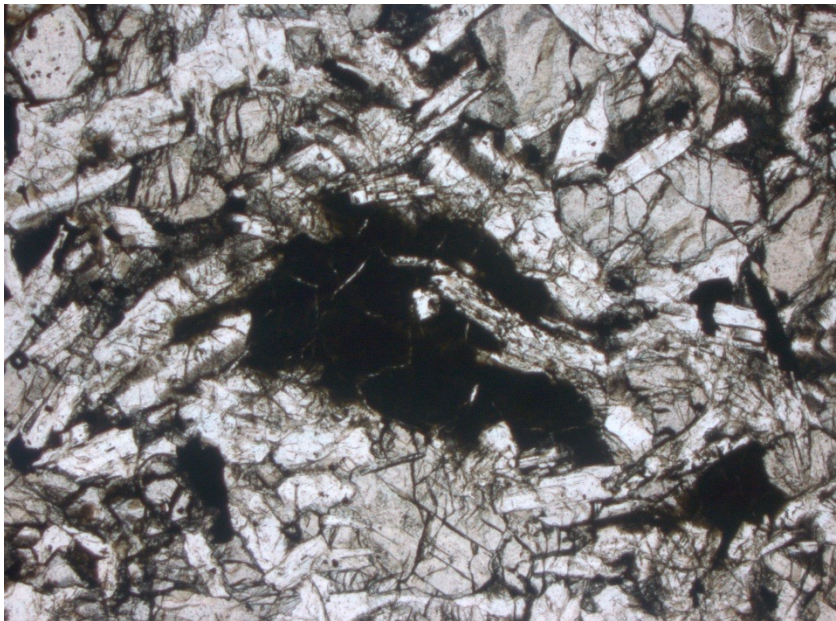
- Formula $(0.5\text{Ca},\text{Na})_{0.7}(\text{Al},\text{Mg},\text{Fe})_4[(\text{Si},\text{Al})_8\text{O}_{20}](\text{OH})_4 \cdot n\text{H}_2\text{O}$
- Layered mineral sheets of Al between SiO_2 tetrahedra
- Sodium types absorb more water
- Main alteration mineral in basalts



Section 3 – Deleterious minerals

Epidote

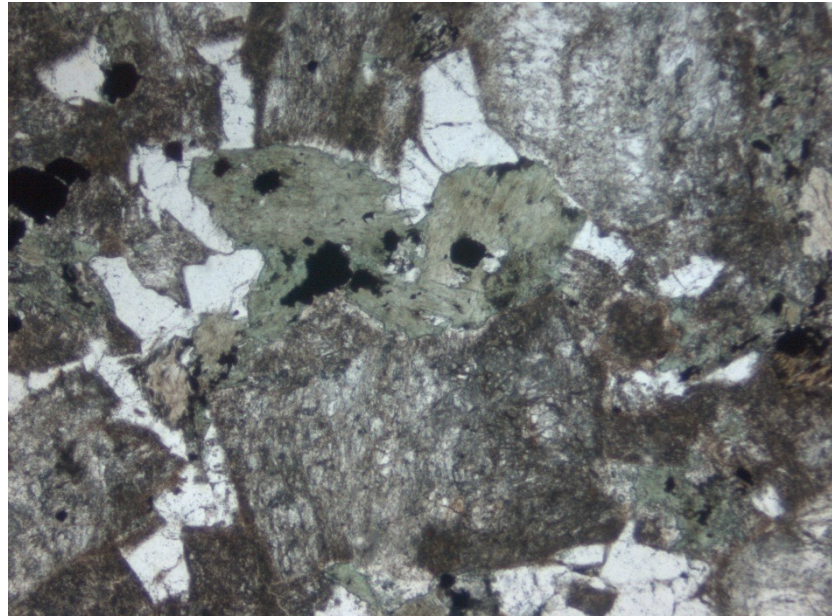
- Formula $\text{Ca,Fe}^{3+}\text{Al}_2\text{O.OH}[\text{Si}_2\text{O}_7][\text{SiO}_4]$
- Main alteration mineral in basic igneous rocks and retrograde metamorphism and hydrothermal alteration



Section 3 – Deleterious minerals

Chlorite

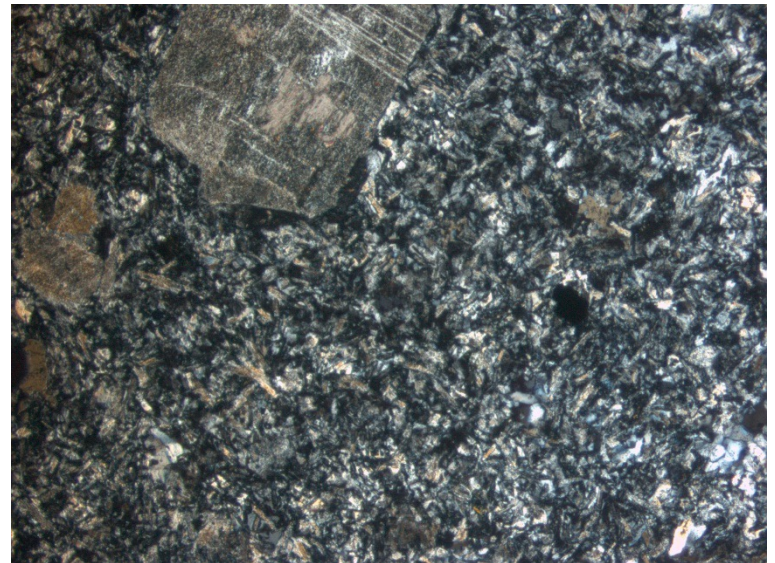
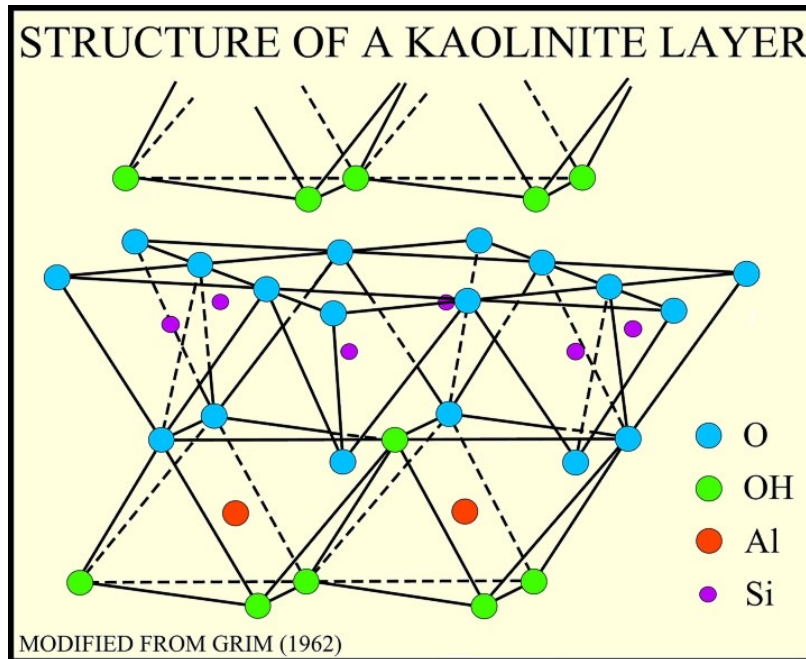
- Formula $(\text{Mg,Al,Fe})_{12} [(\text{Si,Al})_8\text{O}_{20}](\text{OH})_{16}$
- Layered mineral sheets.
- Does not absorb water
- Alteration mineral in igneous and metamorphic rocks



Section 3 – Deleterious minerals

Kaolinite

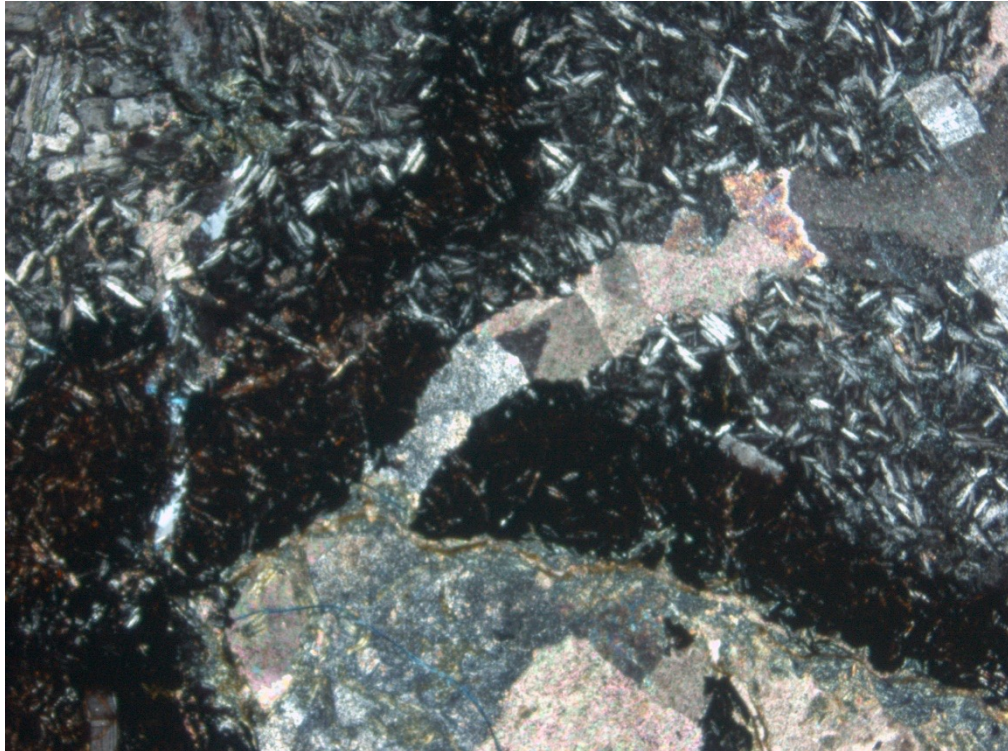
- Formula $Al_4 [(Si_4O_{10})(OH)_8]$
- Layered mineral sheets.
- Does not absorb water
- Hydrothermal alteration mineral in high silica igneous rocks



Section 3 – Deleterious minerals

Calcite

- Formula CaCO_3
- Hydrothermal alteration mineral in igneous rocks



Section 3 – Deleterious minerals

Silica

- Formula SiO_2
- Amorphous silica if present is problem
- Strained quartz may be contributor

