

Chapter 4, Figure 4-1

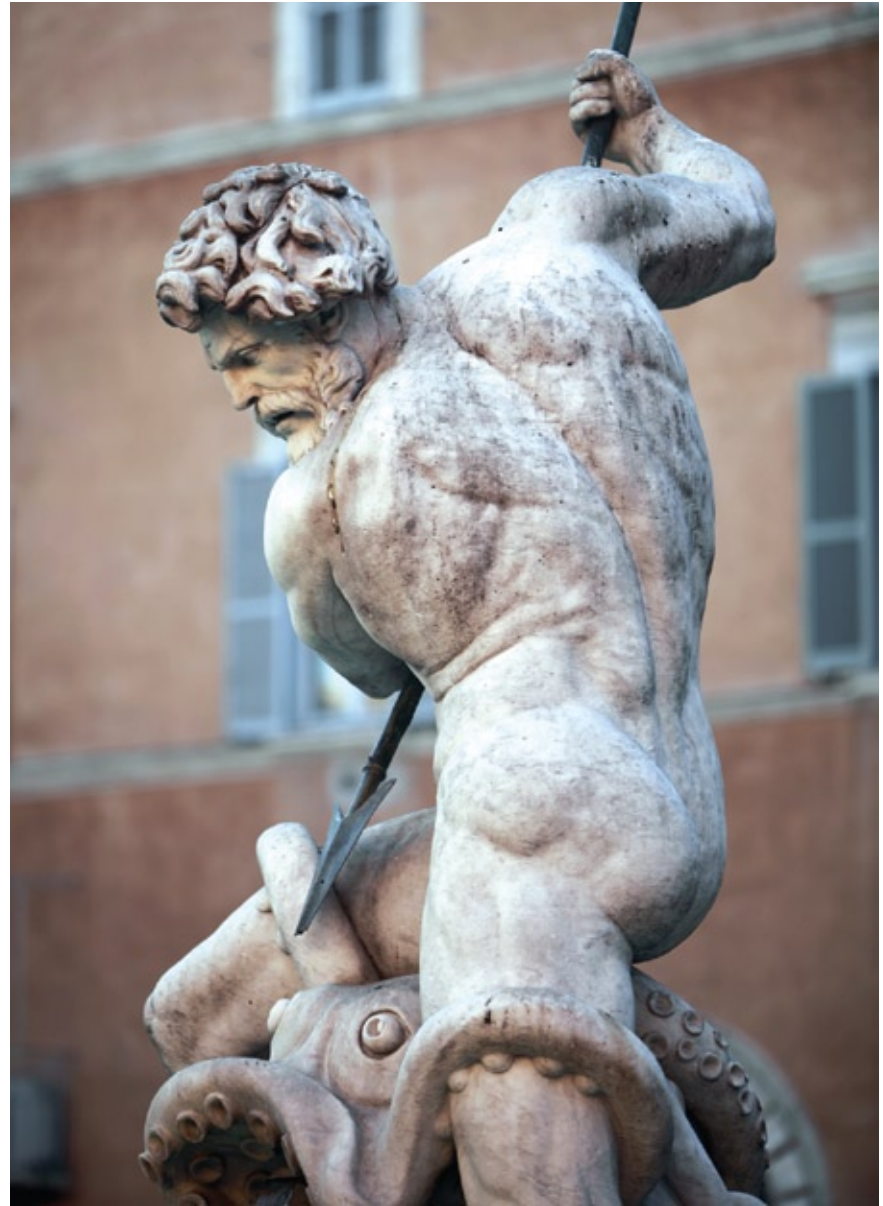
French green clay has been found to have anti-bacterial properties



Chapter 4, Figure 4-2
People's interactions with rocks



(a)



(b)



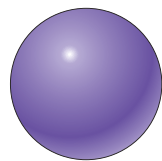
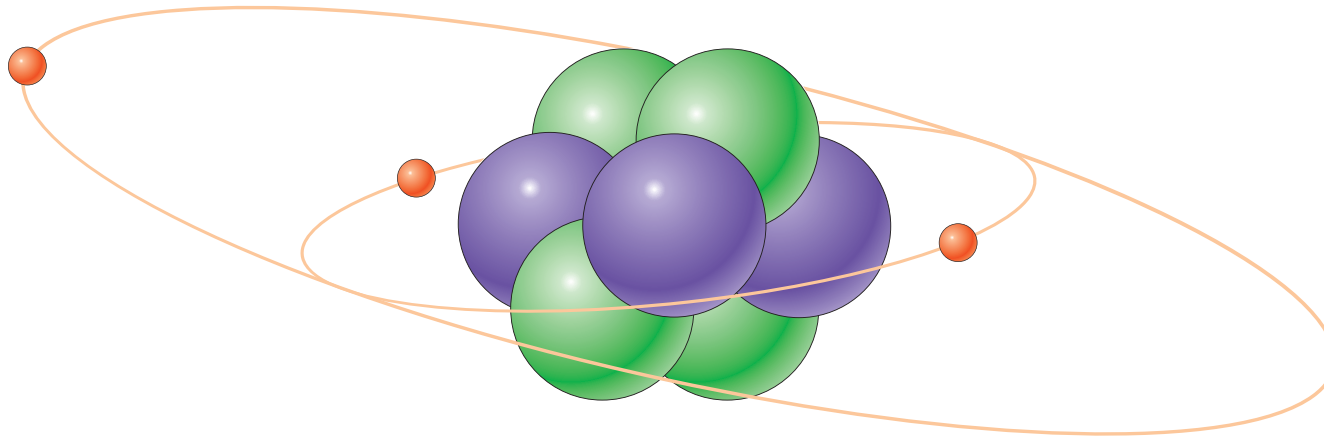
(a)



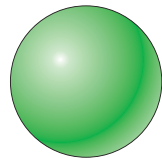
(b)

Chapter 4, Figure 4-3

Diagram of the Atomic Structure of Lithium



PROTON – Positively charged

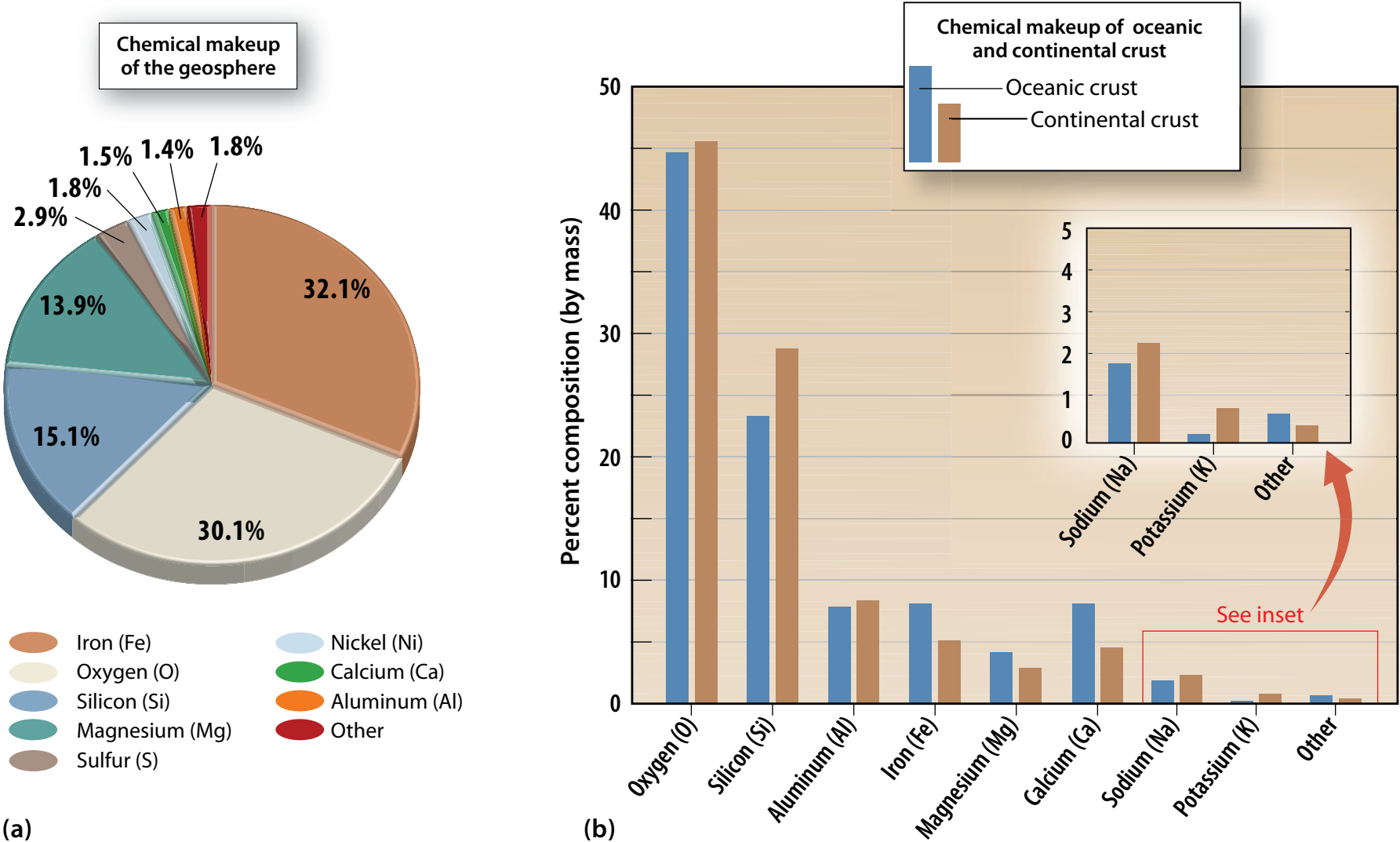


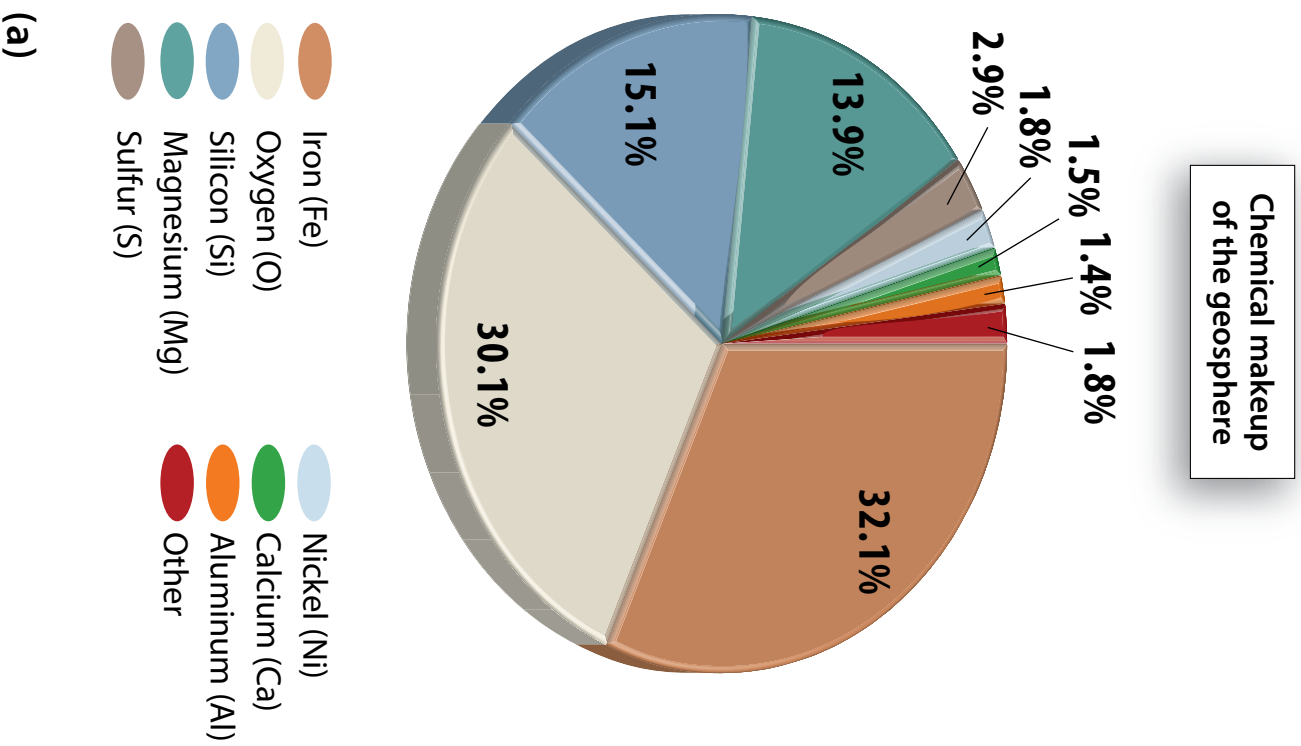
NEUTRON – Uncharged



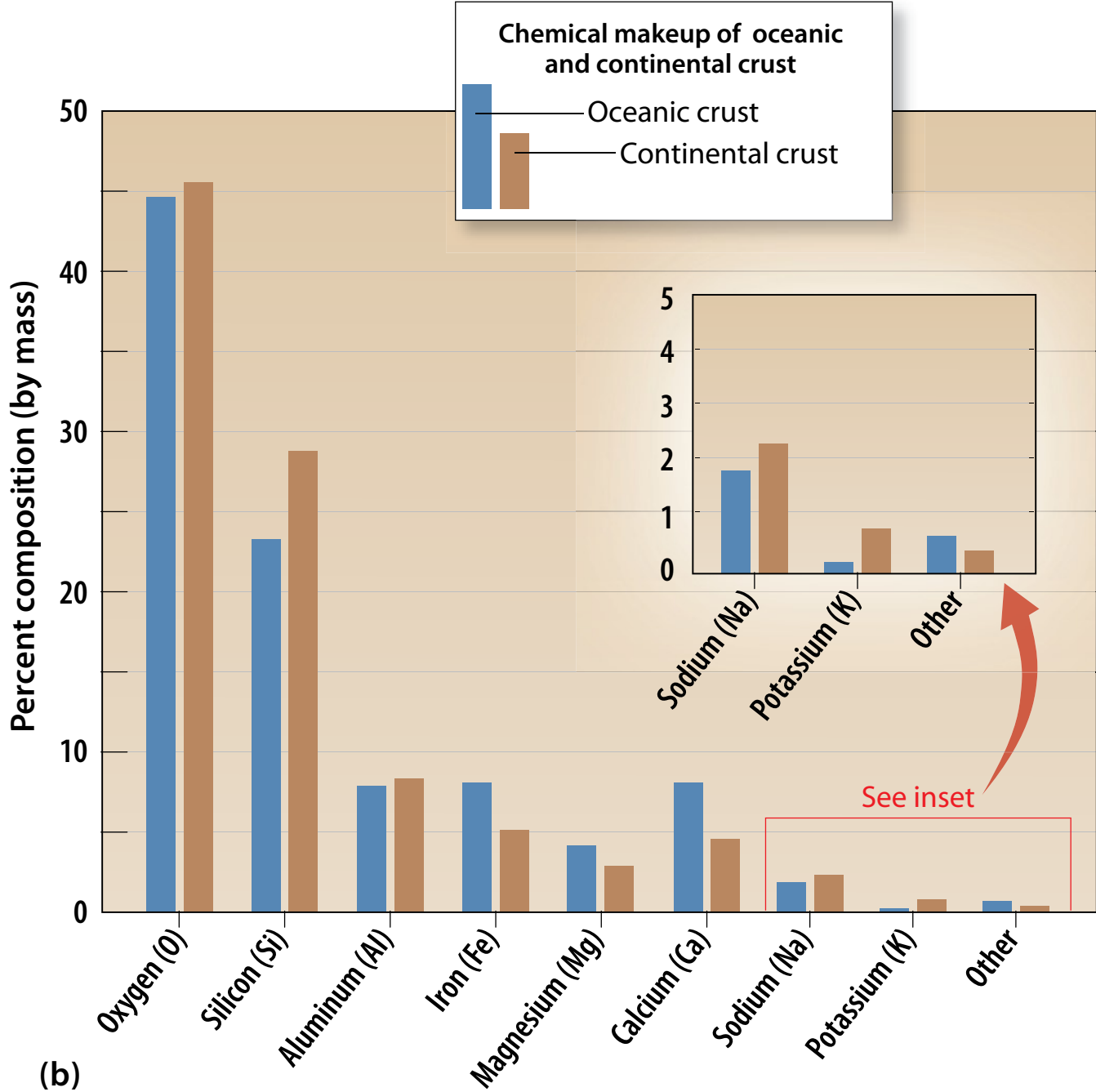
ELECTRON – Negatively charged

Chapter 4, Figure 4-4
 Average Chemical Composition of the Geosphere and Crust

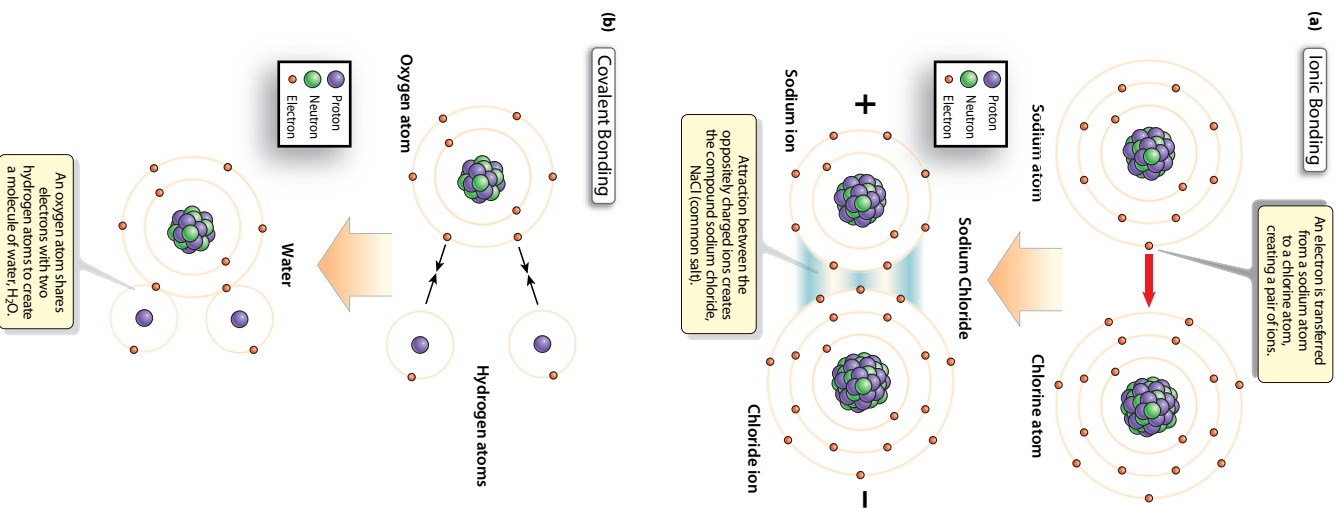


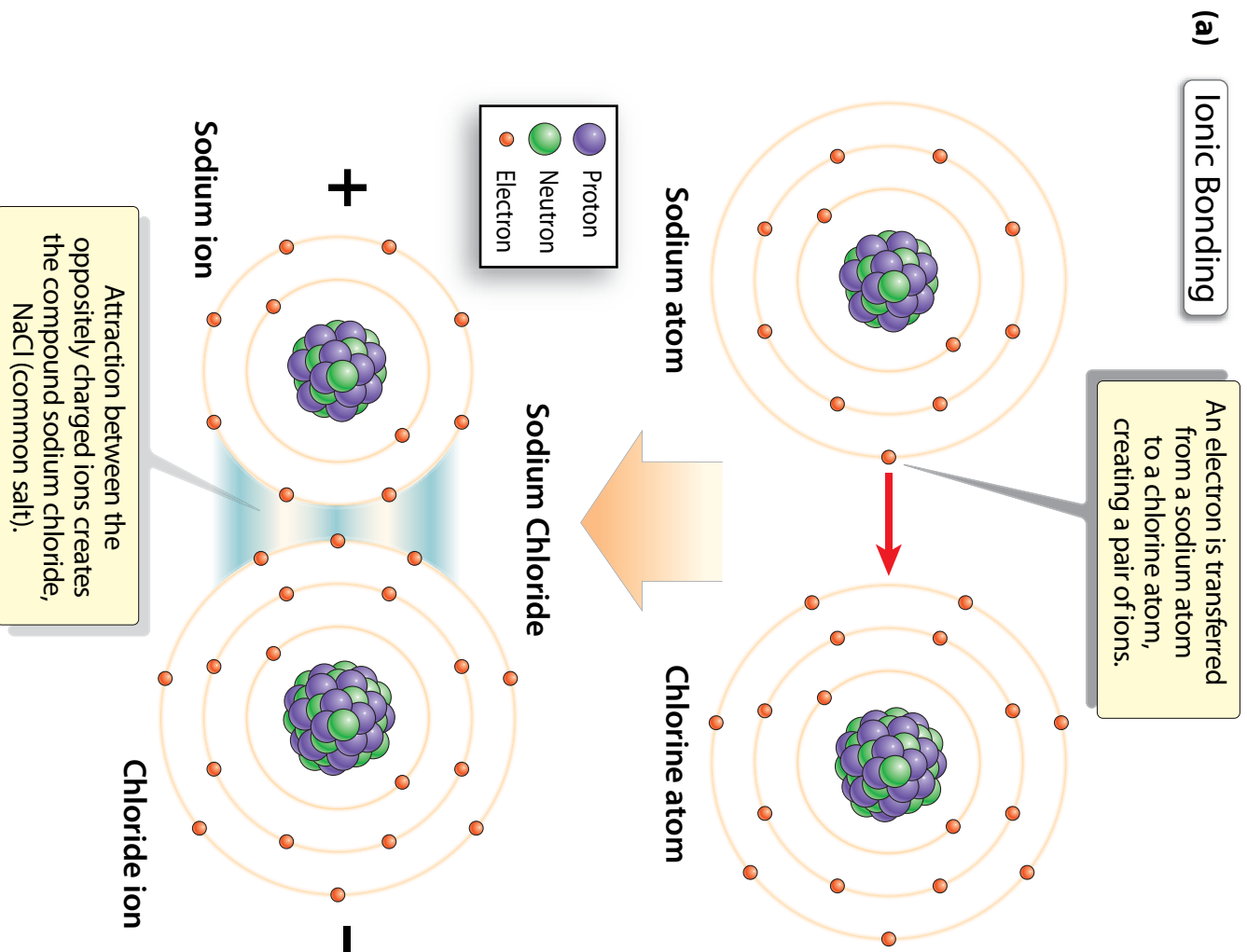


Chapter 4, Figure 4-4b

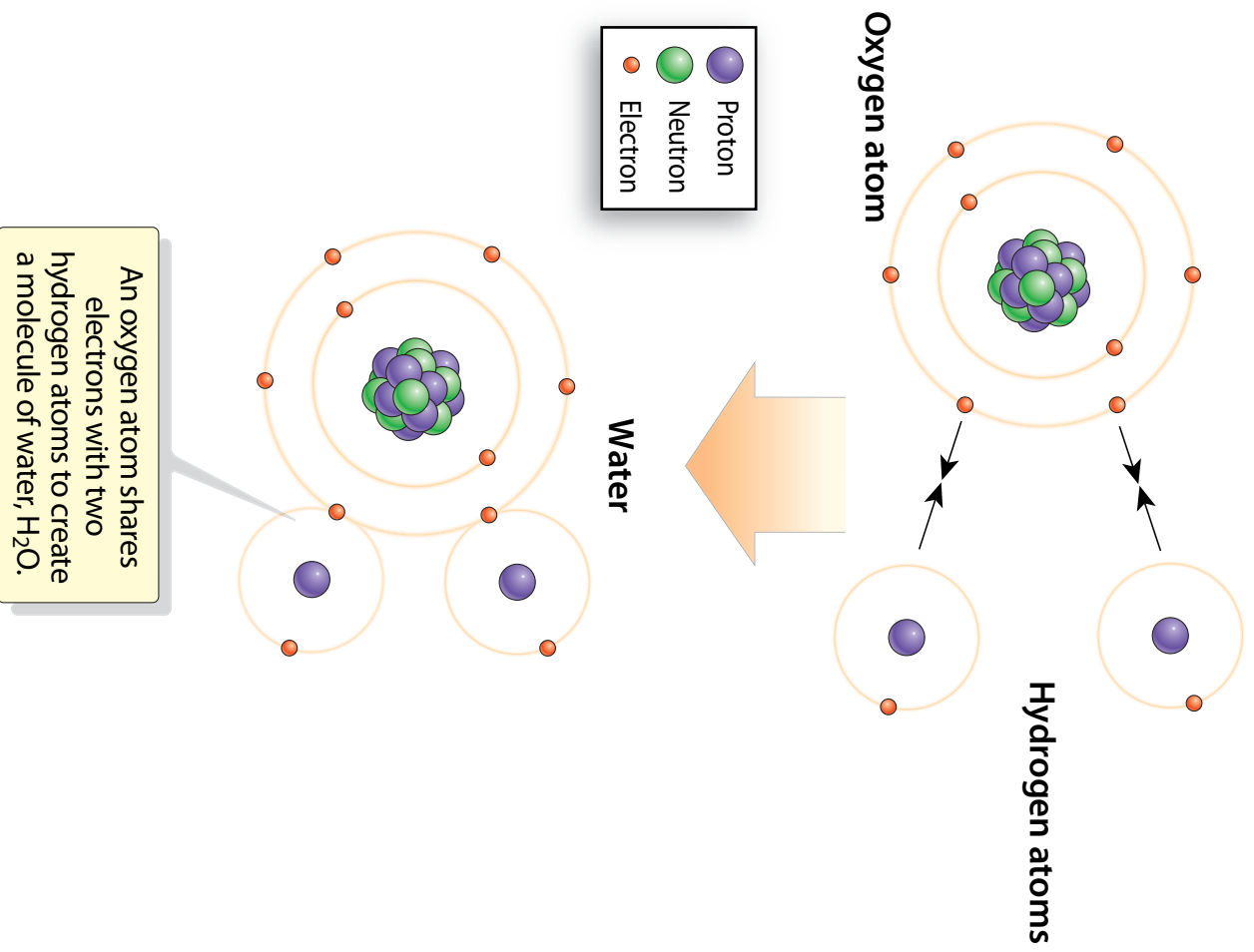


Chapter 4, Figure 4-5 Elements Bond Together by Transferring or Sharing Electrons



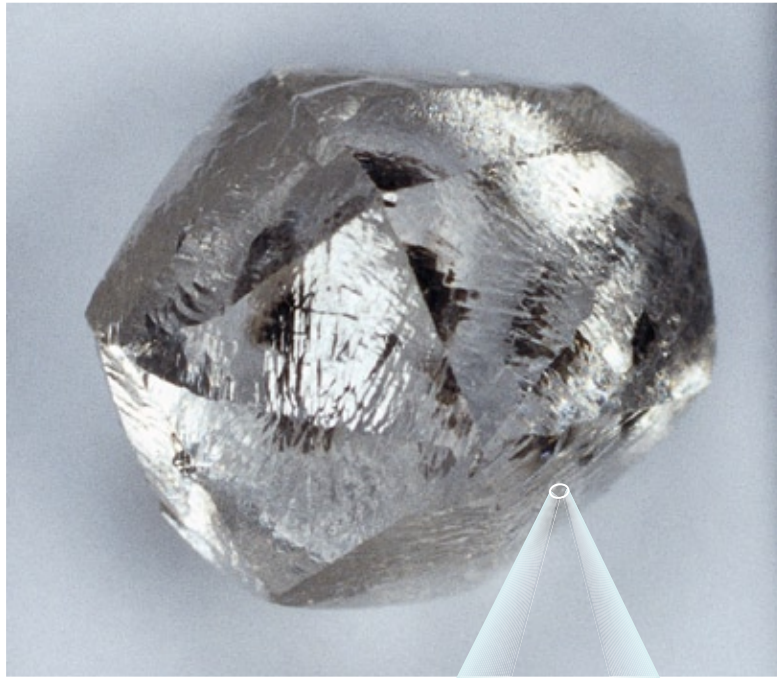


(b) Covalent Bonding



Chapter 4, Figure 4-6

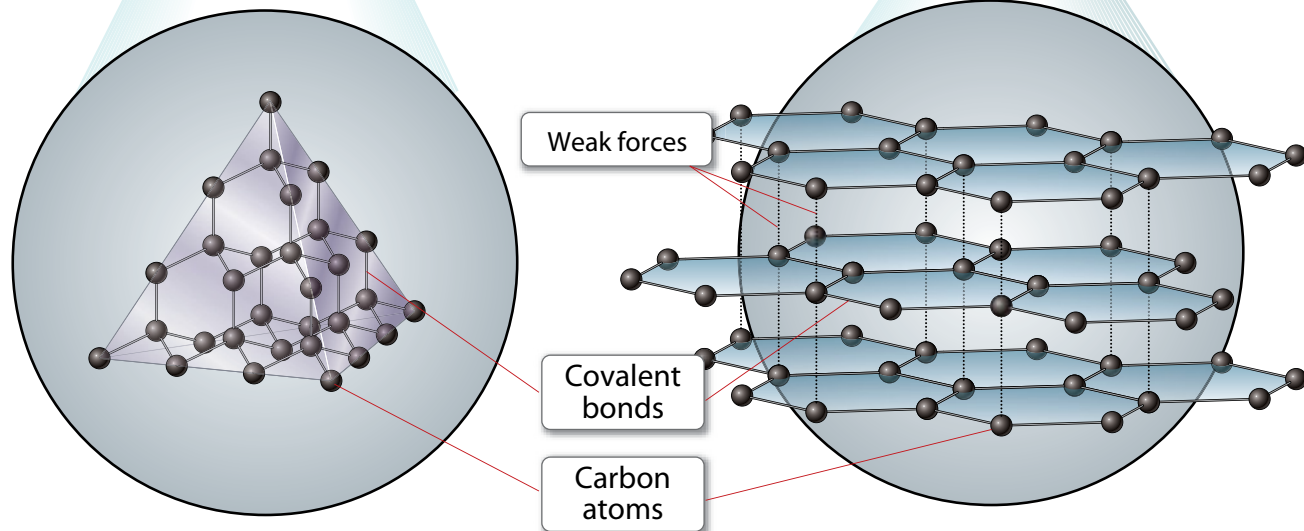
The atomic structure of diamond and graphite, both made of carbon atoms



(a)



(b)



Chapter 4, Figure 4-6a



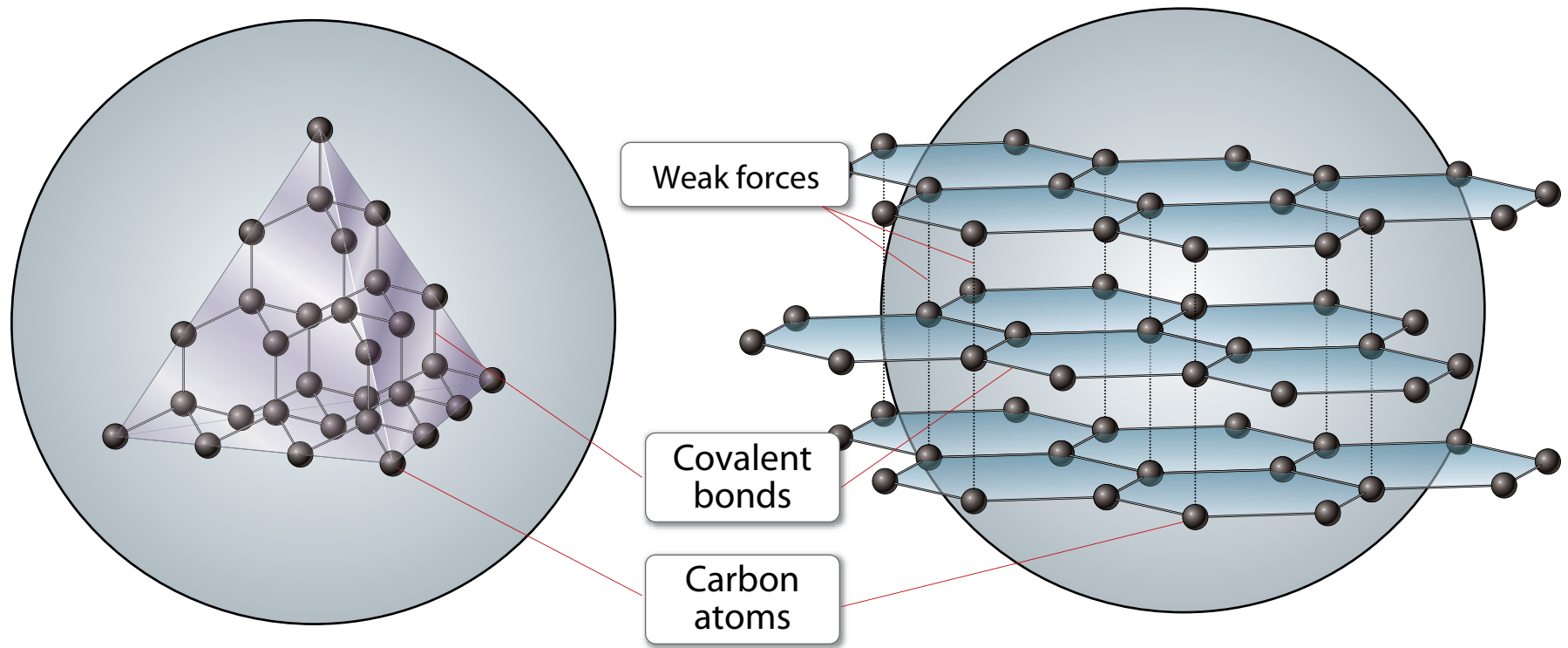
(a)

Chapter 4, Figure 4-6b

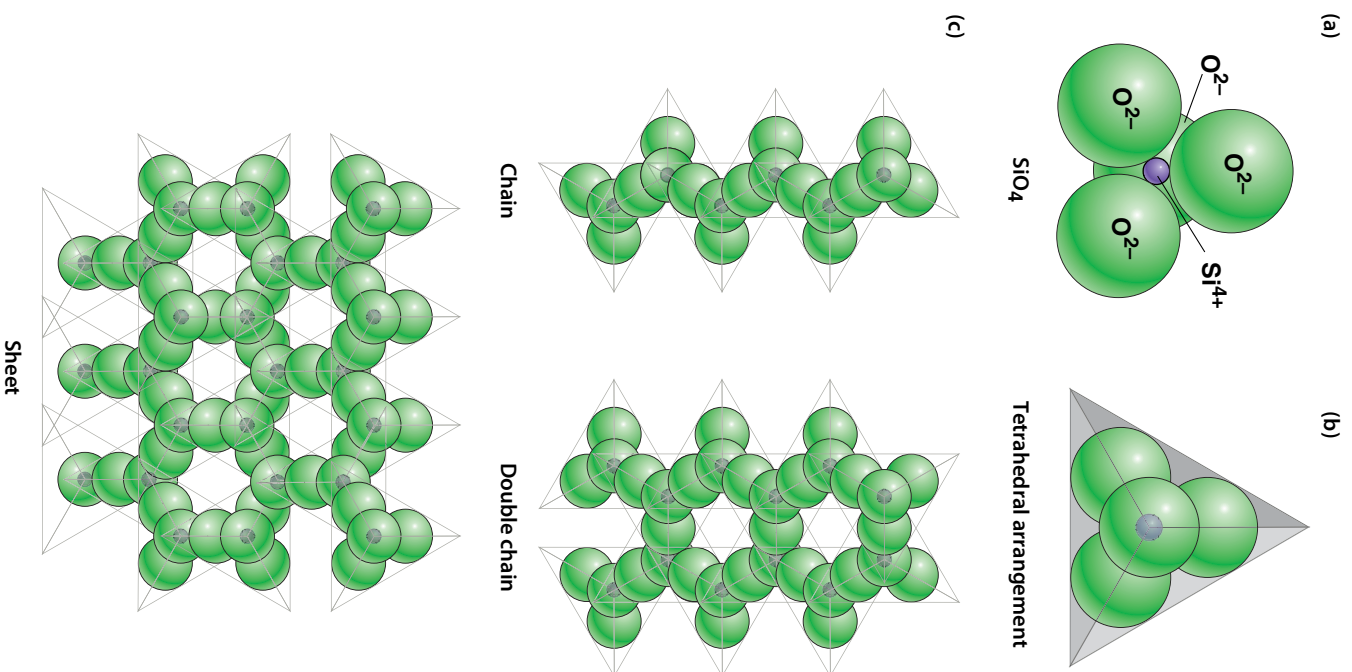


(b)

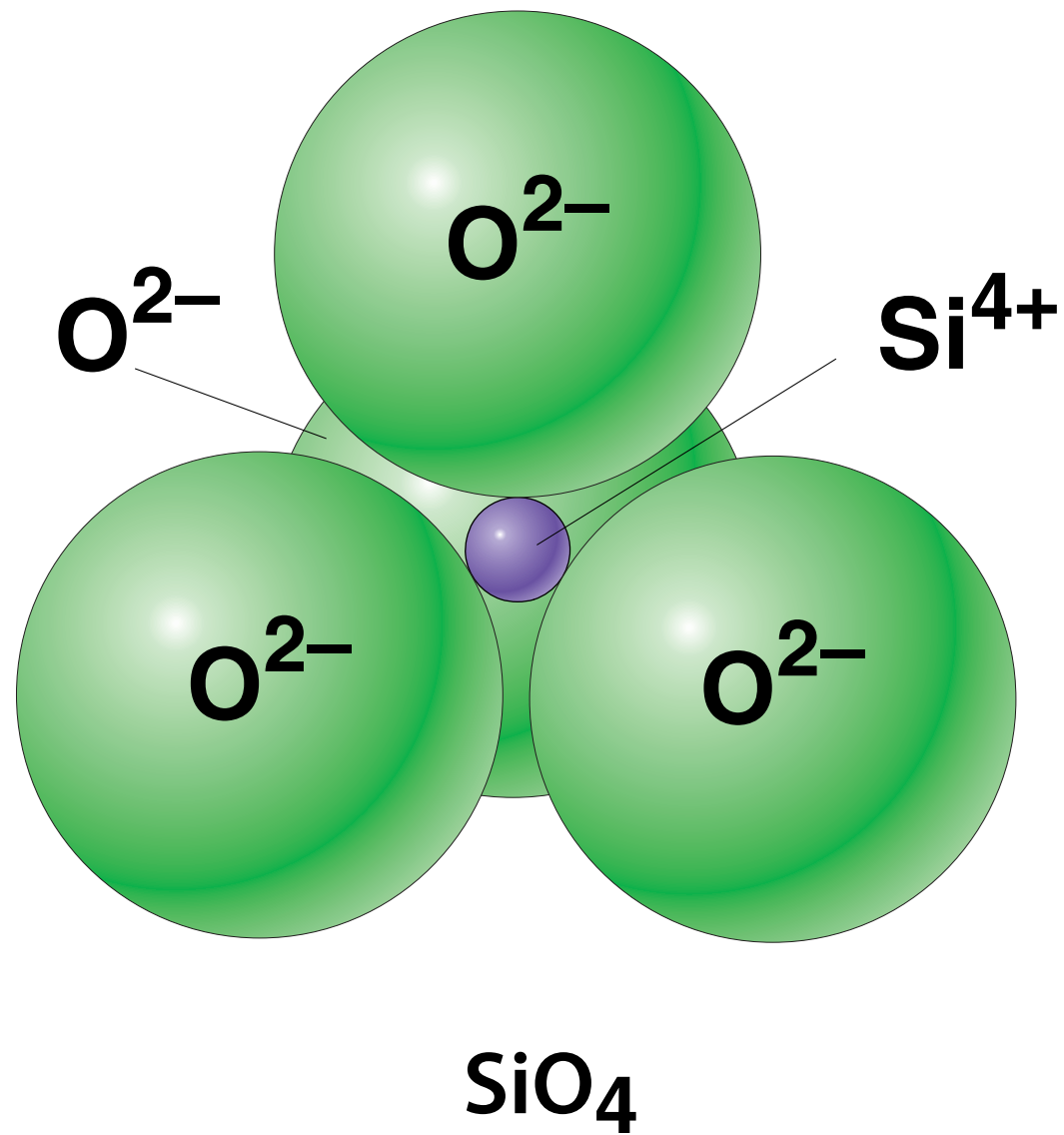
Chapter 4, Figure 4-6c



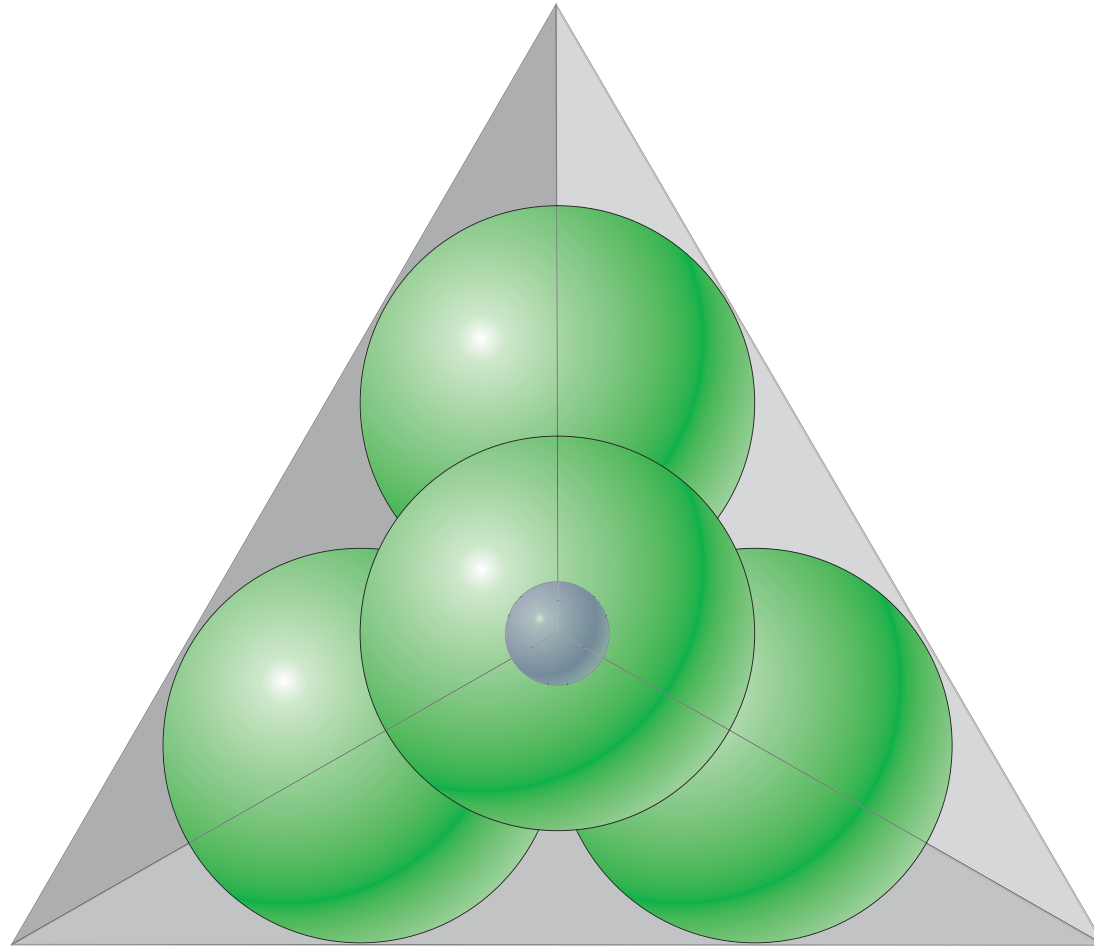
Chapter 4, Figure 4-7
Silicon and Oxygen Combine to Form a Tetrahedral Shaped Ion



(a)

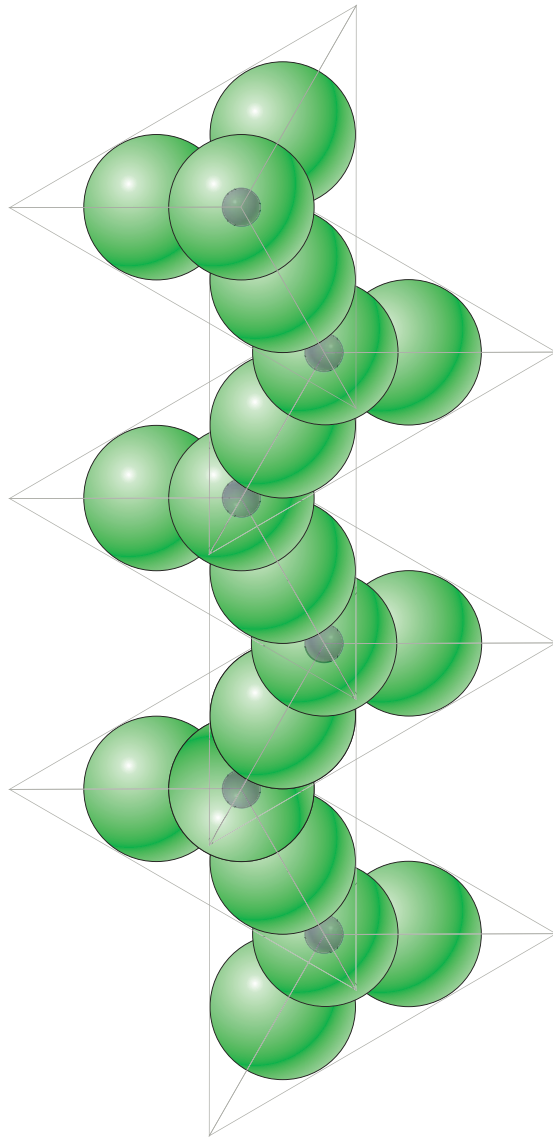


(b)

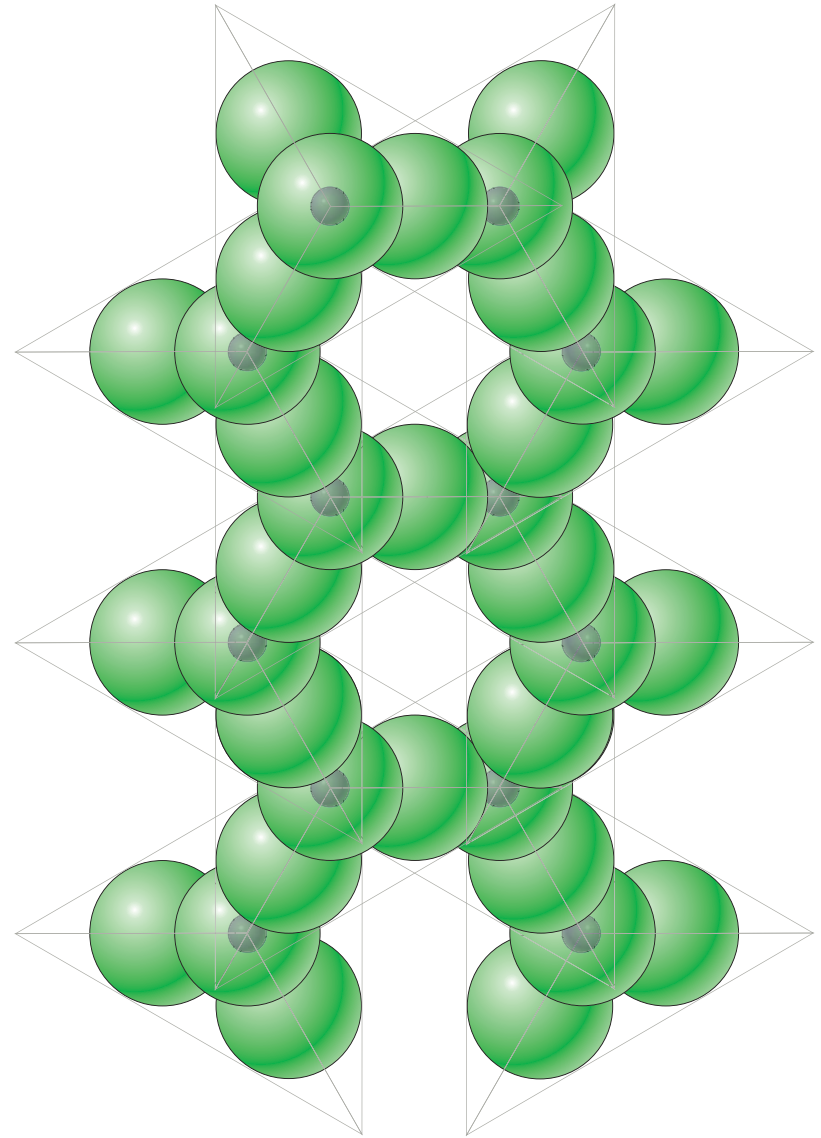


Tetrahedral arrangement

(c)

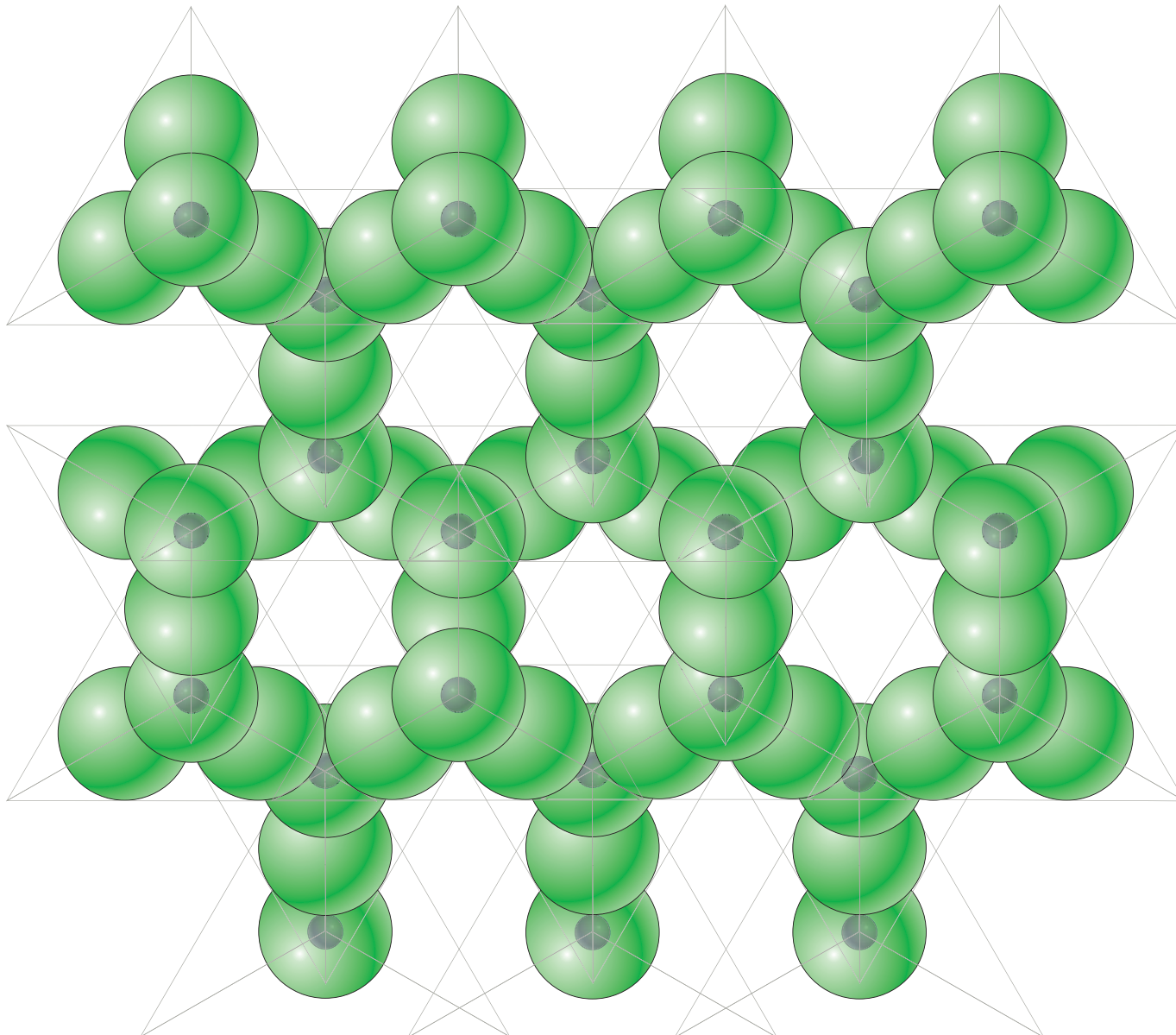


Chain



Double chain

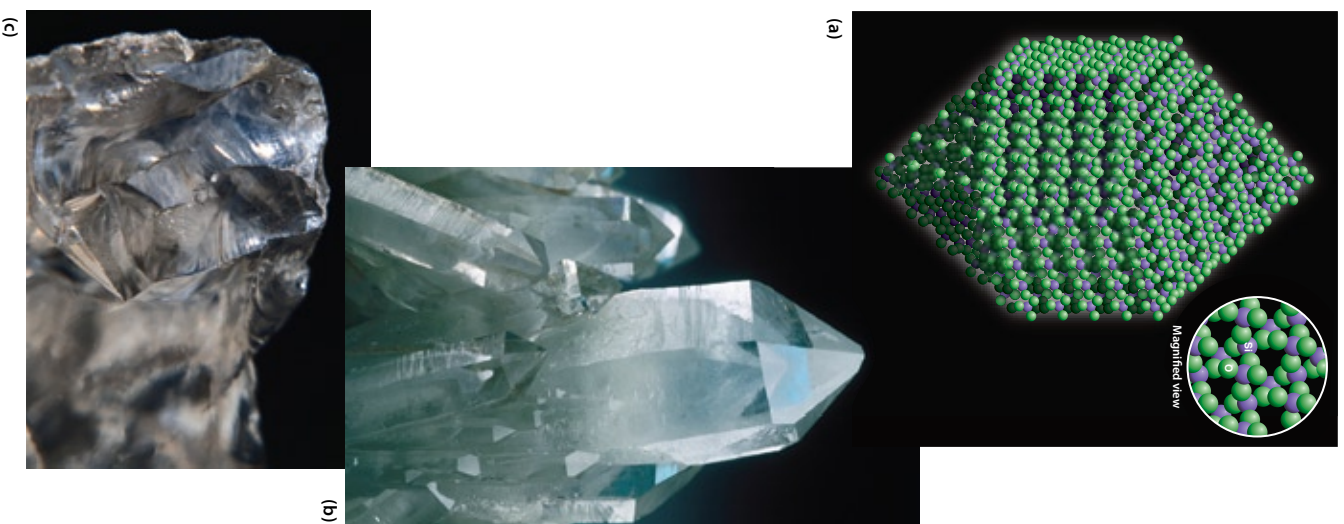
Chapter 4, Figure 4-7d



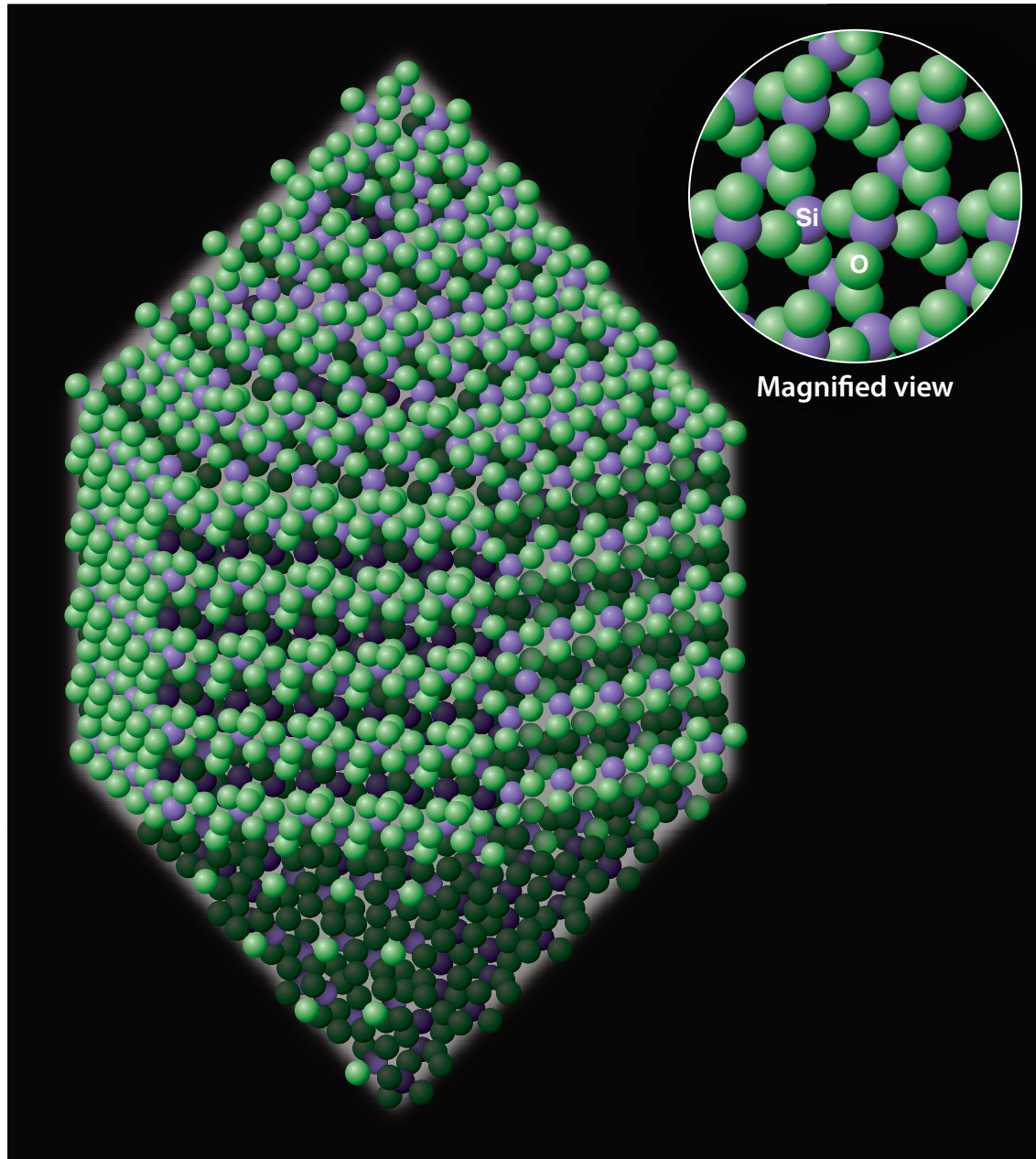
Sheet

Chapter 4, Figure 4-8

The Atomic Structure of Quartz



Chapter 4, Figure 4-8a

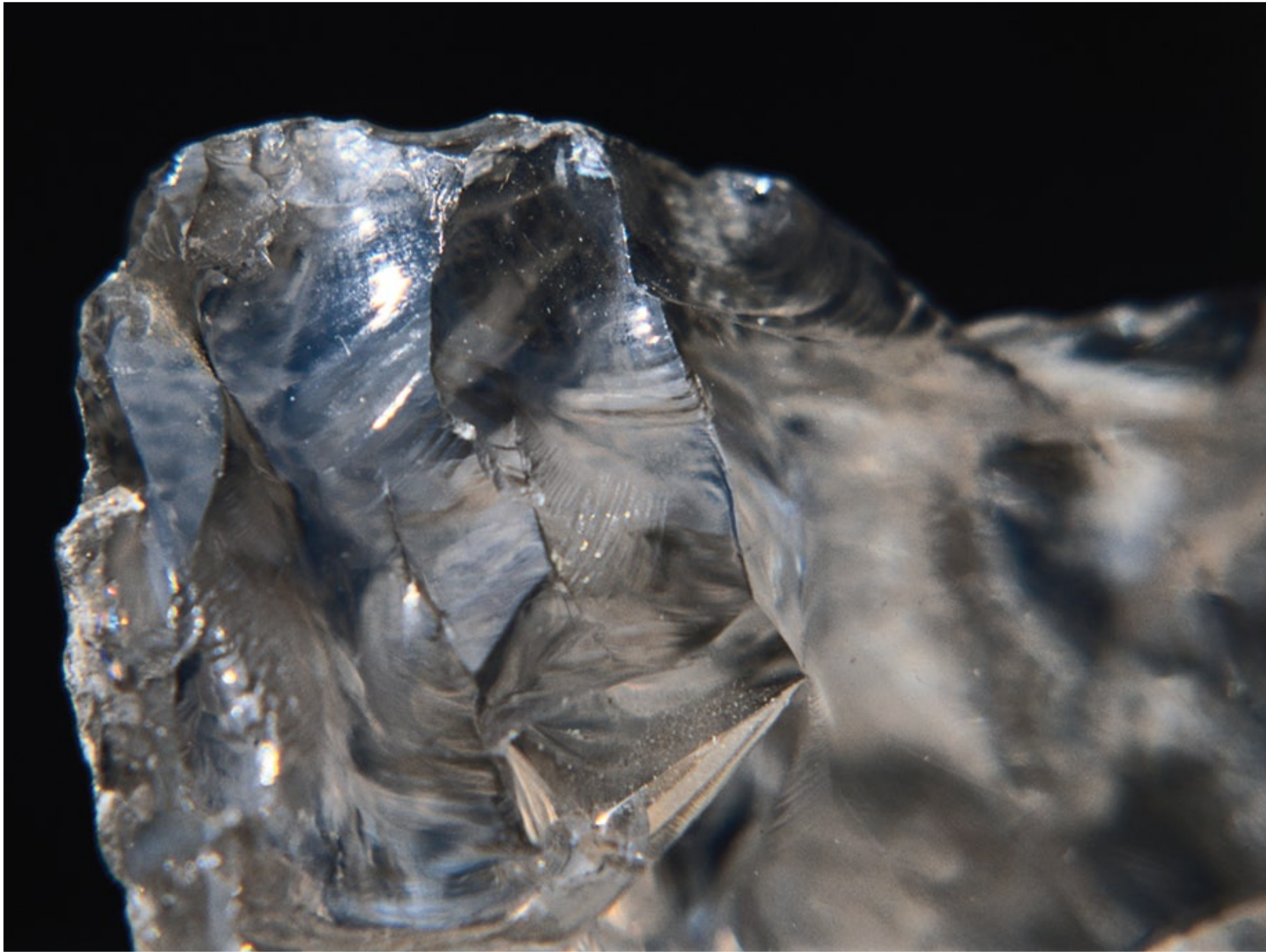


(a)

Chapter 4, Figure 4-8b



(b)



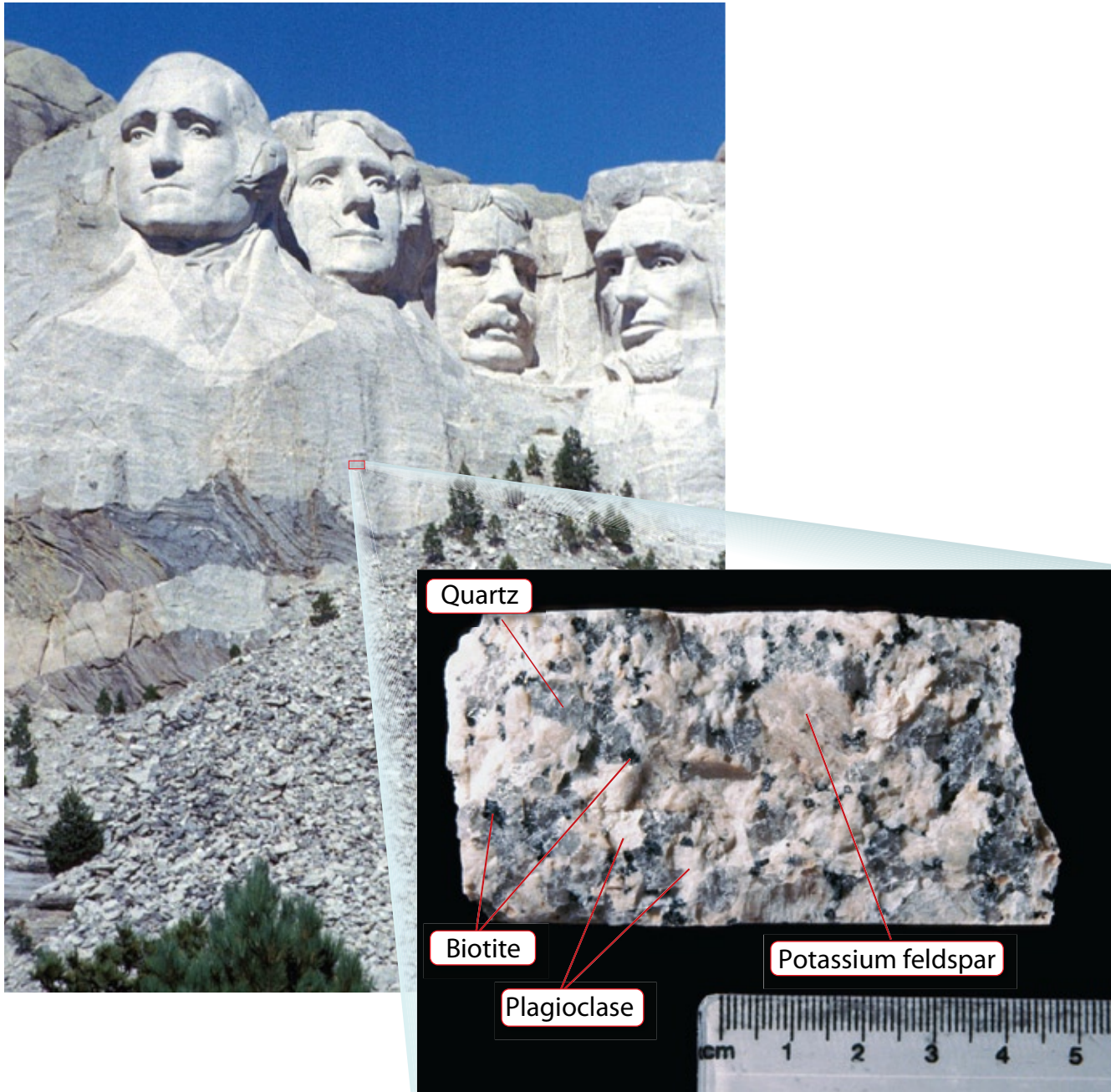
(c)

TABLE 4-1 PHYSICAL PROPERTIES OF SOME COMMON MINERALS

Mineral	Composition	Color	Luster	Hardness (1–10)	Density (g/cm ³)	Photo
Quartz	SiO ₂	Colorless (if pure)	Glassy	7.0	2.62	Fig. 4-8
Plagioclase	(Na,Ca)(Si,Al) ₄ O ₈	White	Glassy	6–6.5	2.68	Fig. 4-11
Biotite	K(Mg,Fe) ₃ AlSi ₃ O ₁₀ (OH) ₂	Black	Pearly	2.5–3	2.8–3.4	Fig. 4-13
Olivine	(Mg,Fe) ₂ SiO ₄	Olive green	Glassy	6.5–7	3.3	Fig. 4-15
Pyrite	FeS ₂	Brassy yellow	Metallic	6.5	5.0	Fig. 4-19

Chapter 4, Figure 4-9

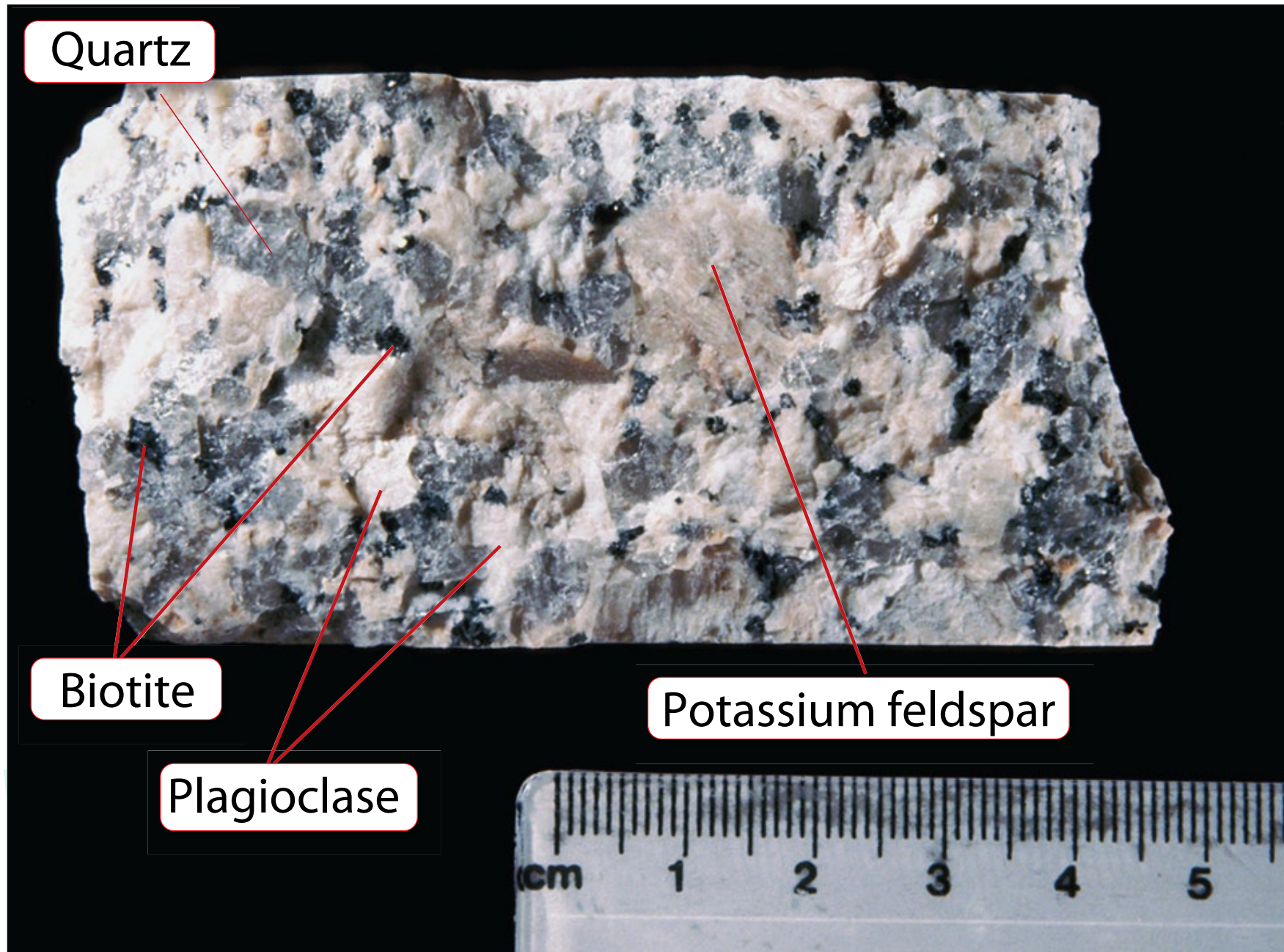
Mr. Rushmore was carved out of granite; an aggregate of quartz, potassium feldspar, plagioclase, and biotite



Chapter 4, Figure 4-9a



Chapter 4, Figure 4-9b



Chapter 4, Figure 4-10
The Hawk's Nest Tunnel



Chapter 4, Figure 4-11

A. Potassium feldspar B. Plagioclase



(a)



(b)

Chapter 4, Figure 4-11a



(a)

Chapter 4, Figure 4-11b



(b)

Chapter 4, Figure 4-12
Building on Clay



Chapter 4, Figure 4-13
Micas



Chapter 4, Figure 4-14
Mt. Rainier



Chapter 4, Figure 4-15
A. Olivine B. Pyroxene



(a)



(b)



(a)

Chapter 4, Figure 4-15b



(b)

Chapter 4, Figure 4-16
Chrysotile





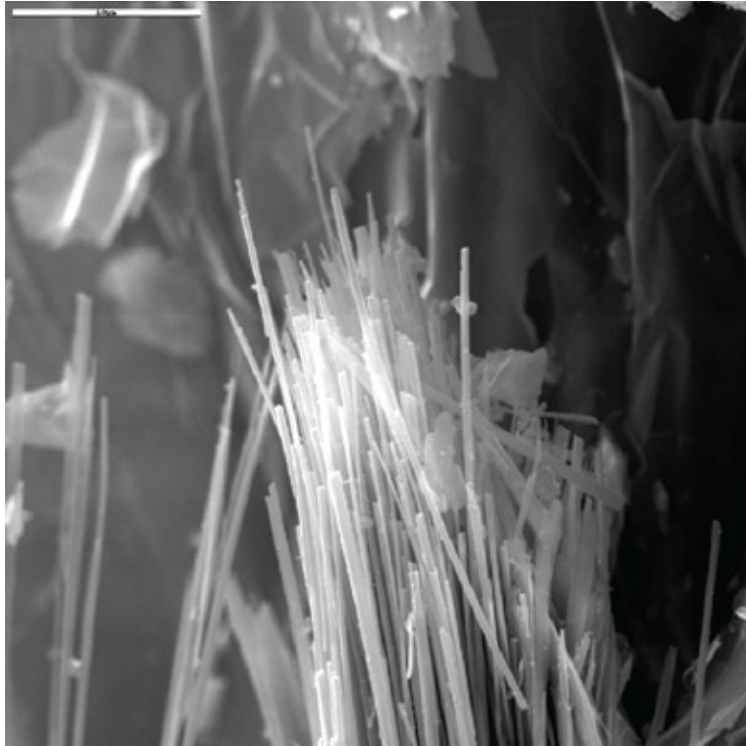
Chapter 4, Figure 4-17

Amphiboles: Common Ferromagnesium Minerals in Continental Crust



Chapter 4, Figure 4-18

A. The elongate fibrous crystals of the amphibole mineral tremolite B. A warning sign for asbestos in Libby, Montana

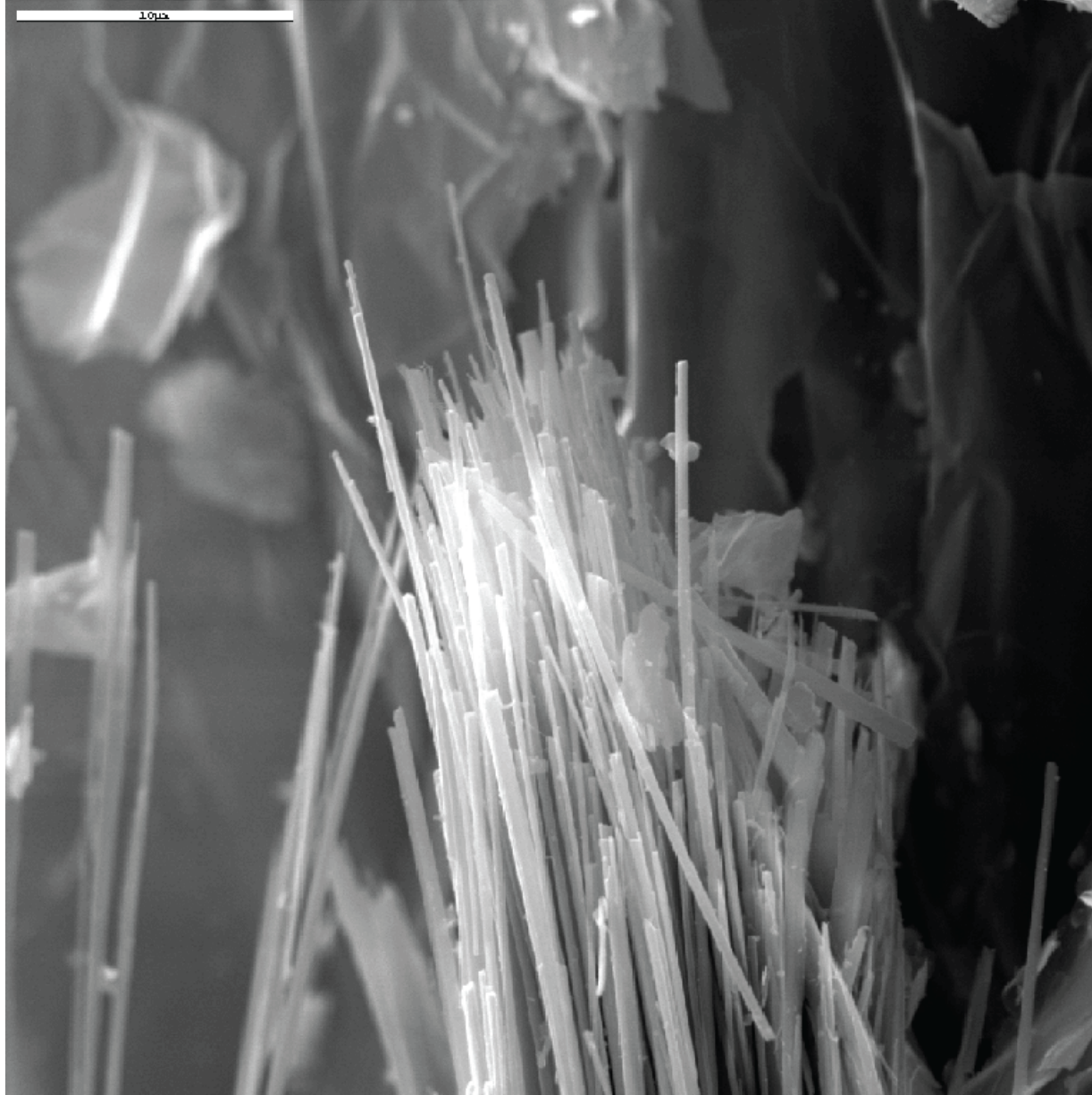


(a)



(b)

Chapter 4, Figure 4-18a



(a)



(b)

Chapter 4, Figure 4-19
Pyrite



Chapter 4, Figure 4-20

The oxidation of pyrite and other iron-bearing minerals gives rocks and soils a rusty orange color



Chapter 4, Figure 4-21
A. Calcite B. Dolomite



(a)



(b)

Chapter 4, Figure 4-21a



(a)

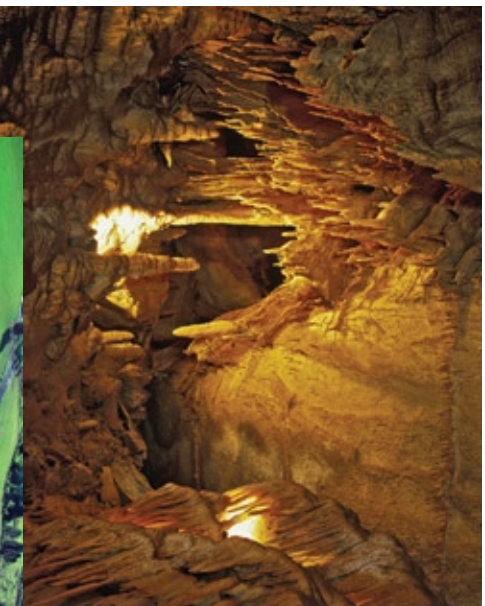
Chapter 4, Figure 4-21b



(b)

Chapter 4, Figure 4-22

Dissolution of the Geosphere Produces Karst Terrain: A. Mammoth Cave B. Hummocky landscapes C. A sinkhole



(a)



(b)



(c)

Chapter 4, Figure 4-22a



(a)

Chapter 4, Figure 4-22b



(b)

Chapter 4, Figure 4-22c



(c)

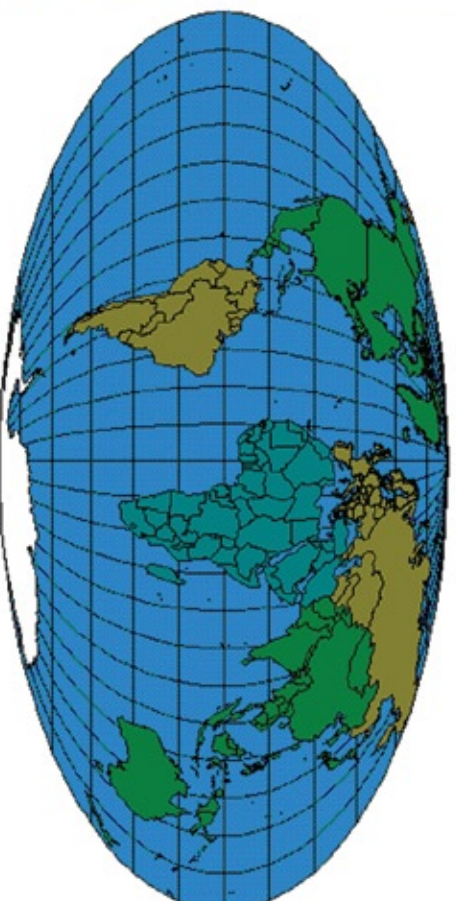


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Chapter 4, Figure 4-23
A. Basalt B. Gabbro

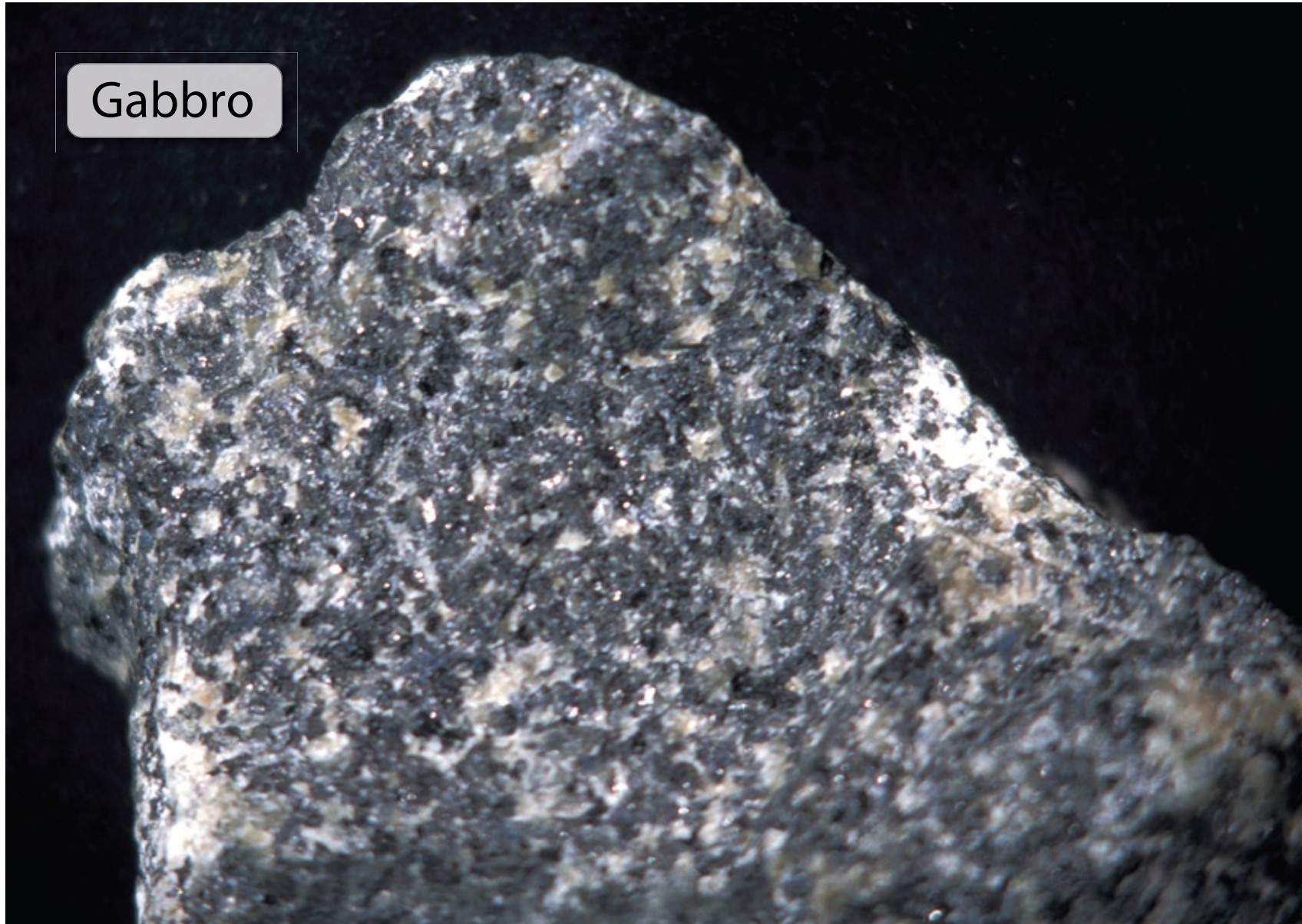




(a)

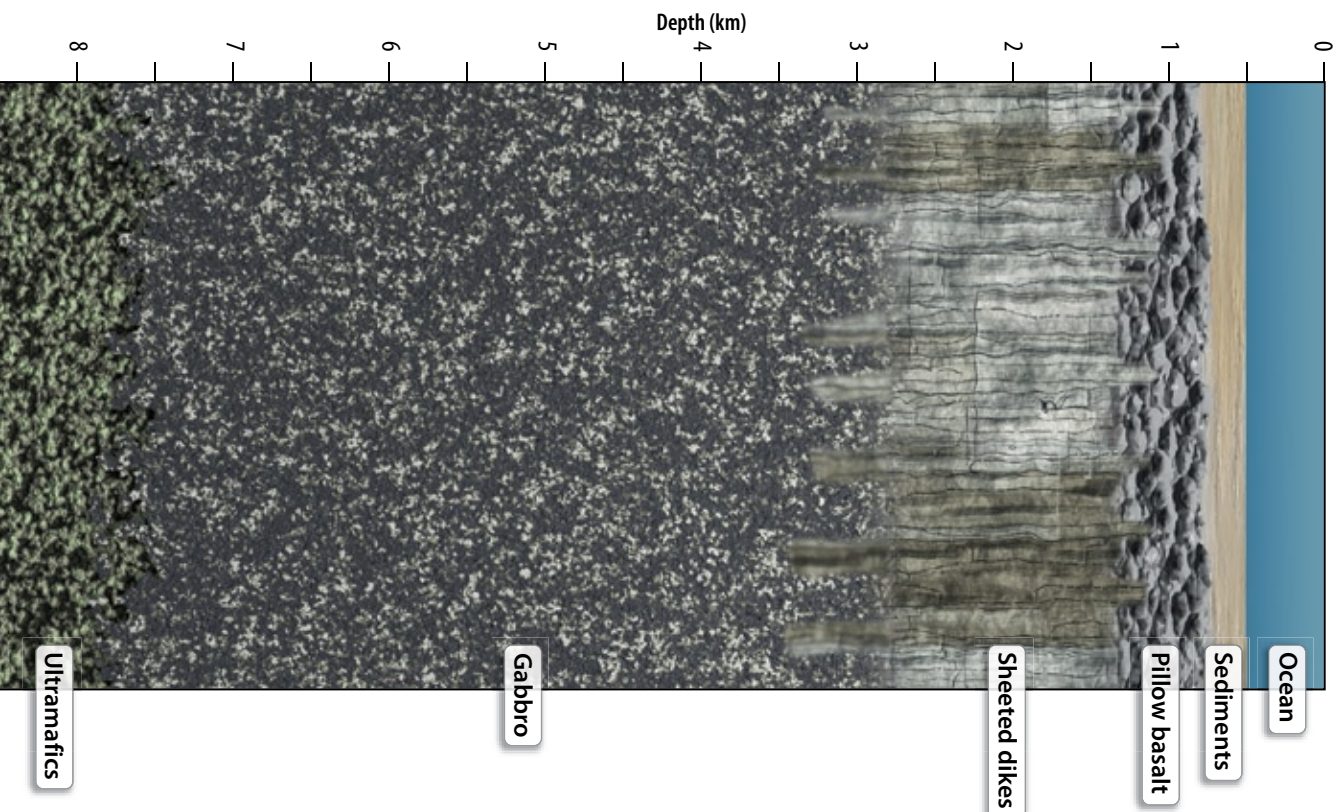
Chapter 4, Figure 4-23b



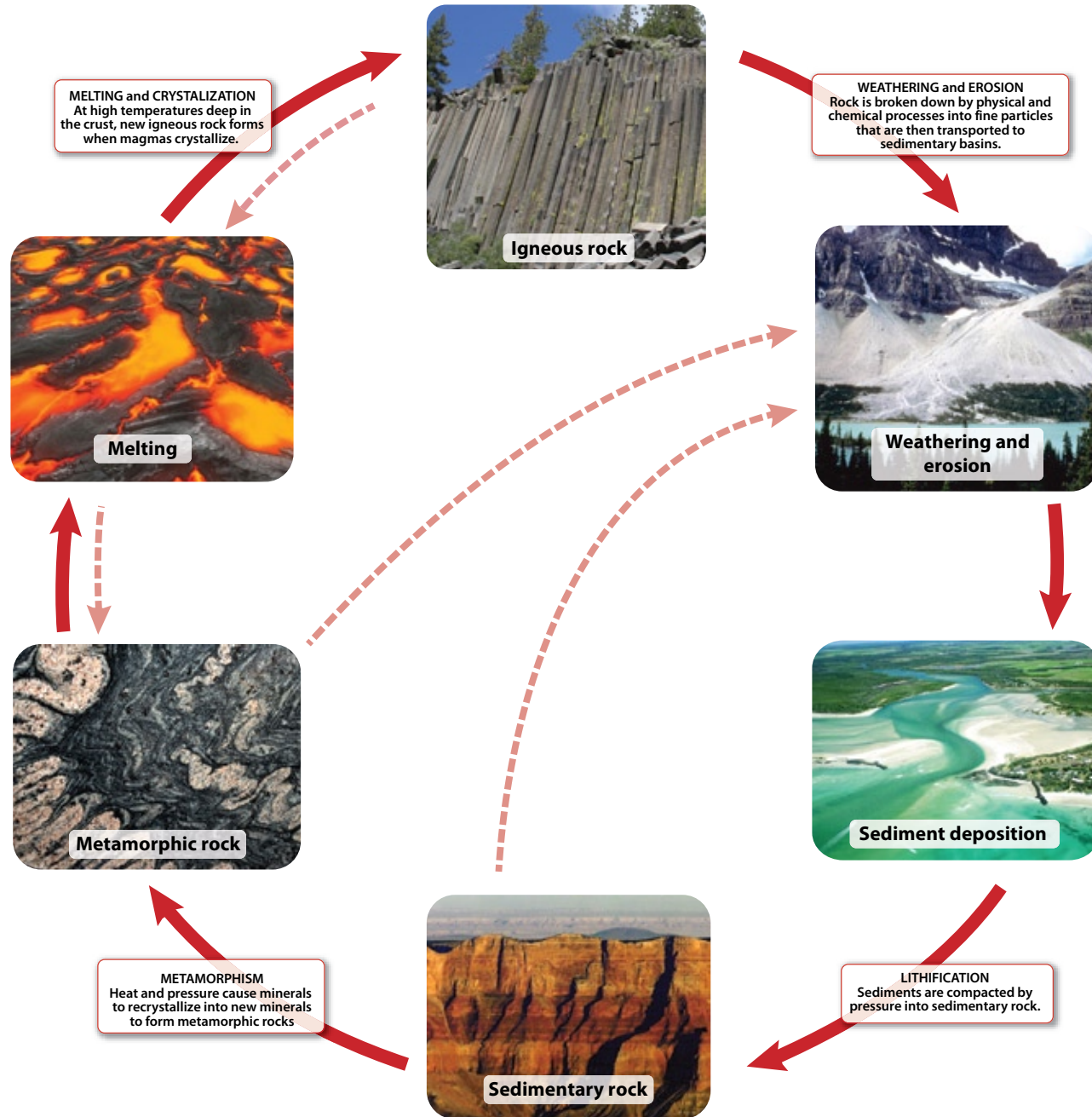


(b)

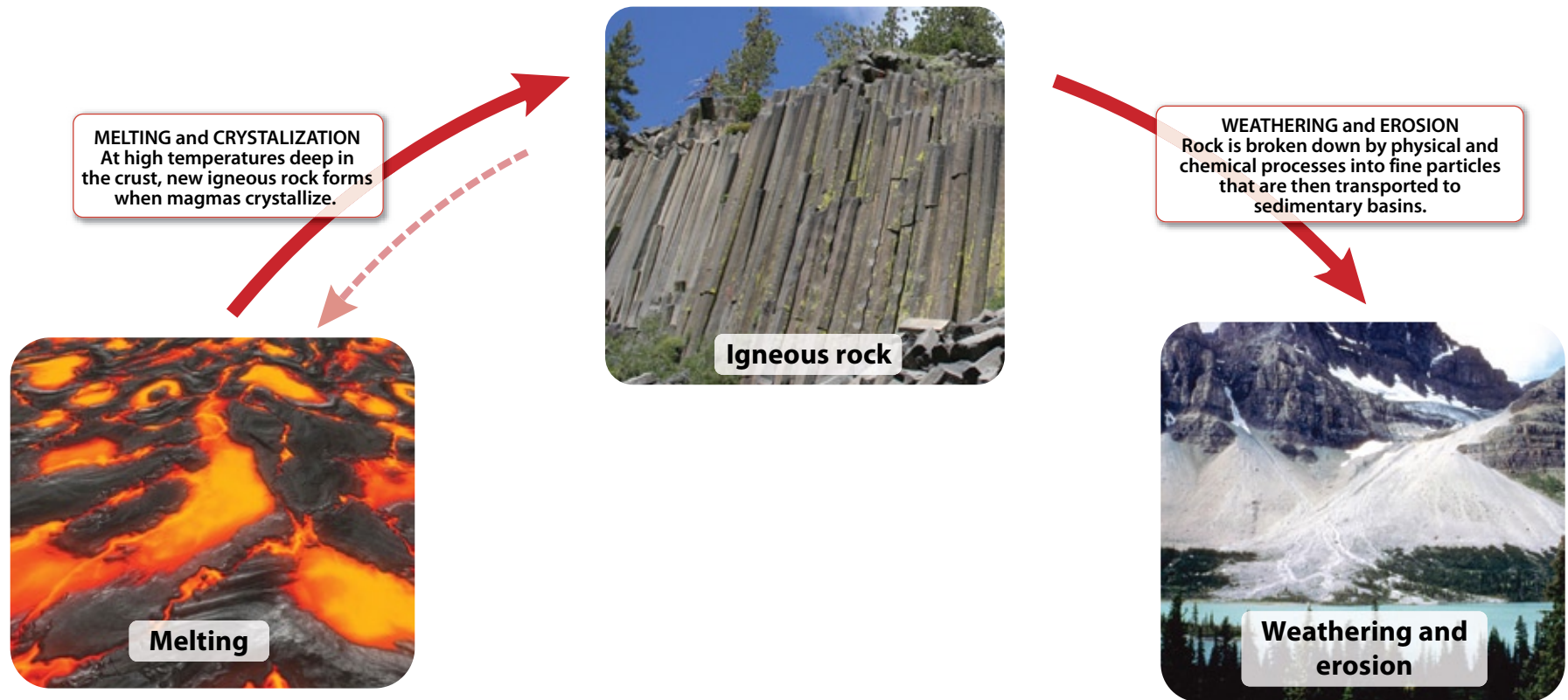
Chapter 4, Figure 4-24
Oceanic Crust Has a Well-Defined Internal Structure



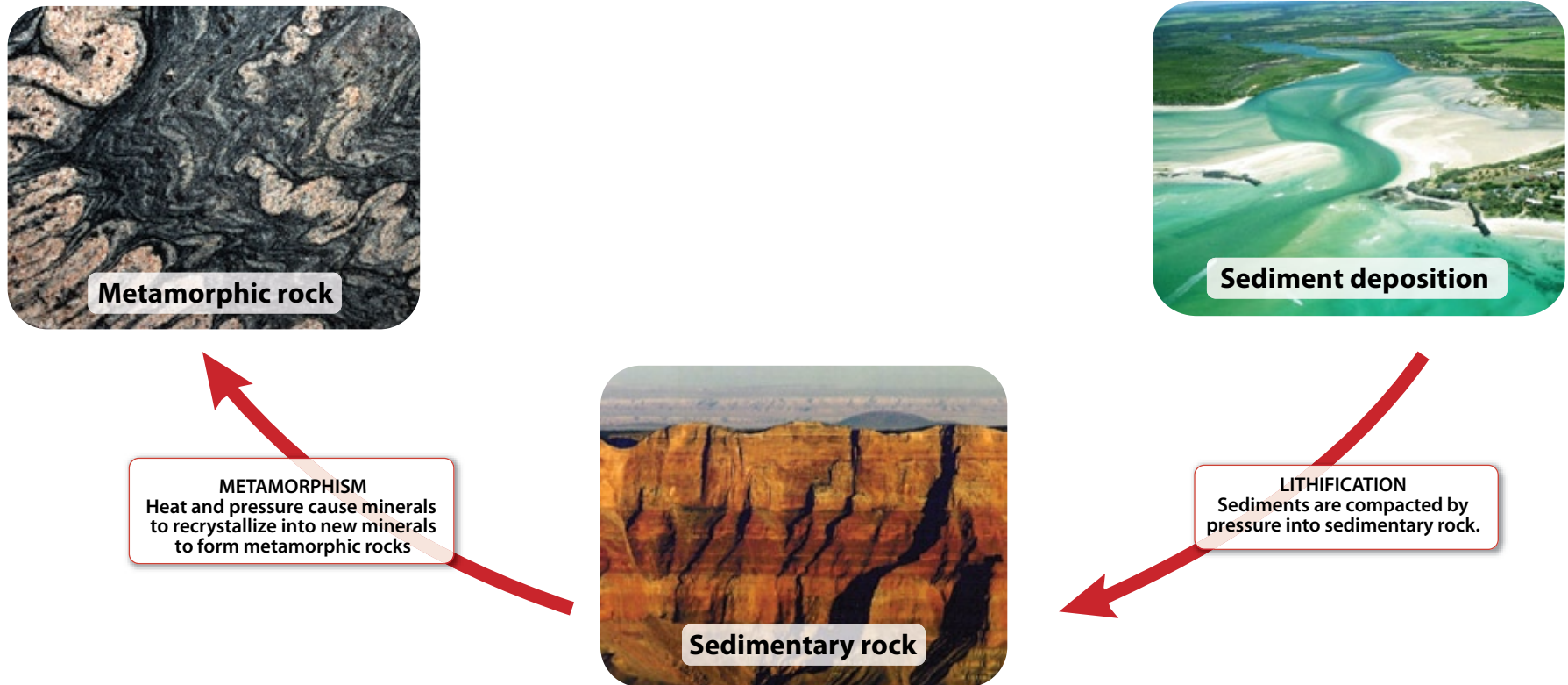
Chapter 4, Figure 4-25
The Rock Cycle

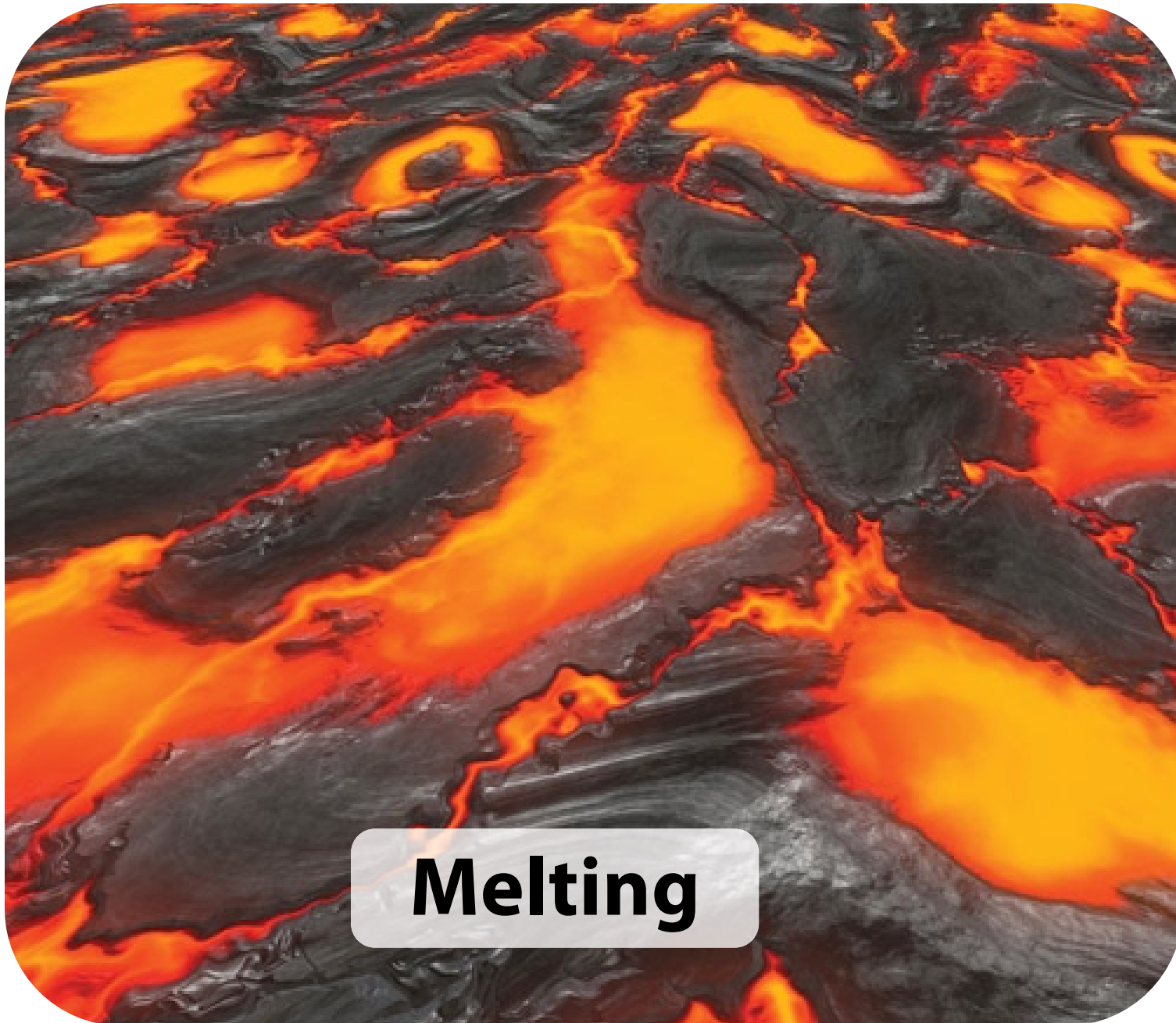


Chapter 4, Figure 4-25a



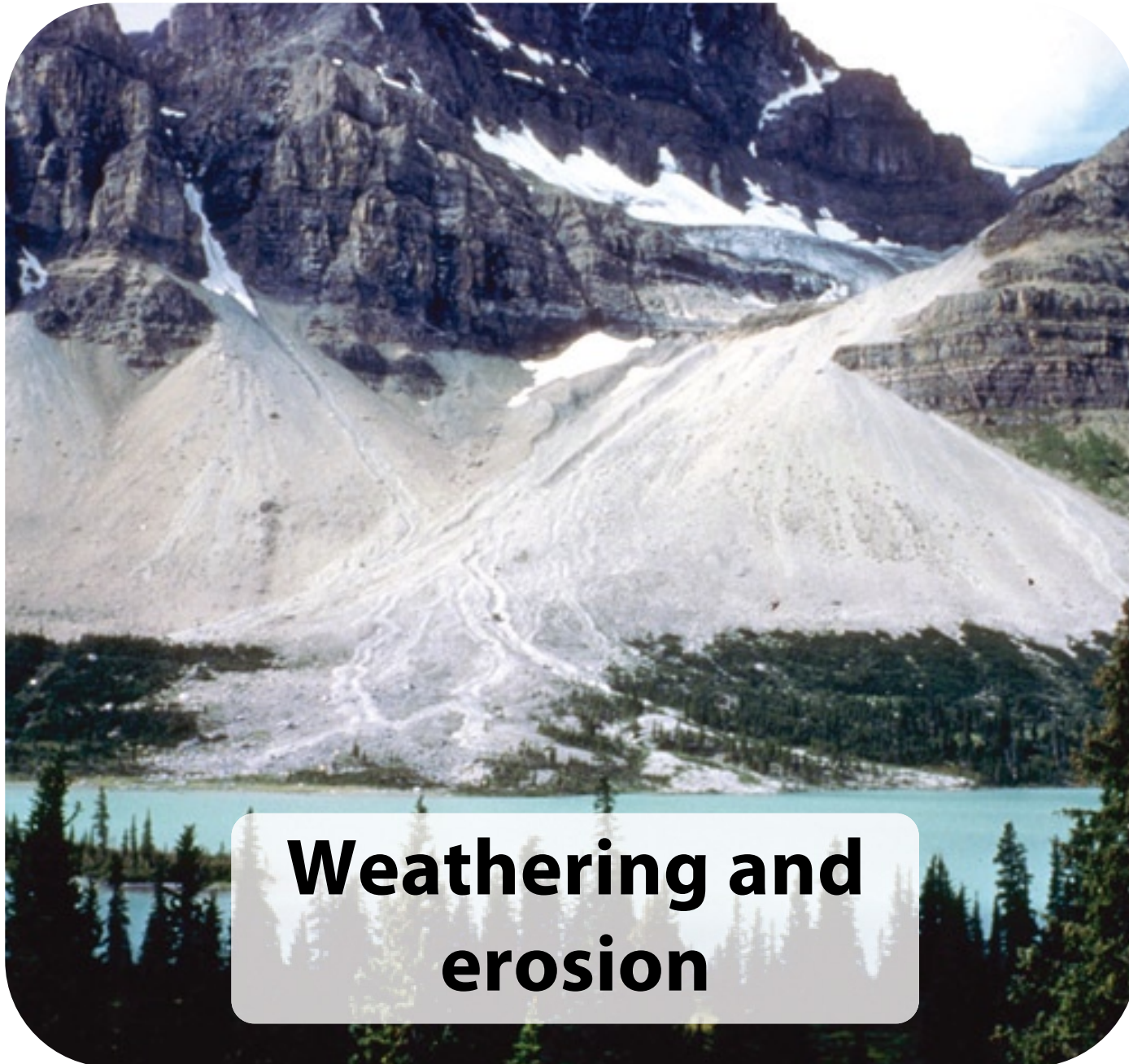
Chapter 4, Figure 4-25b







Igneous rock

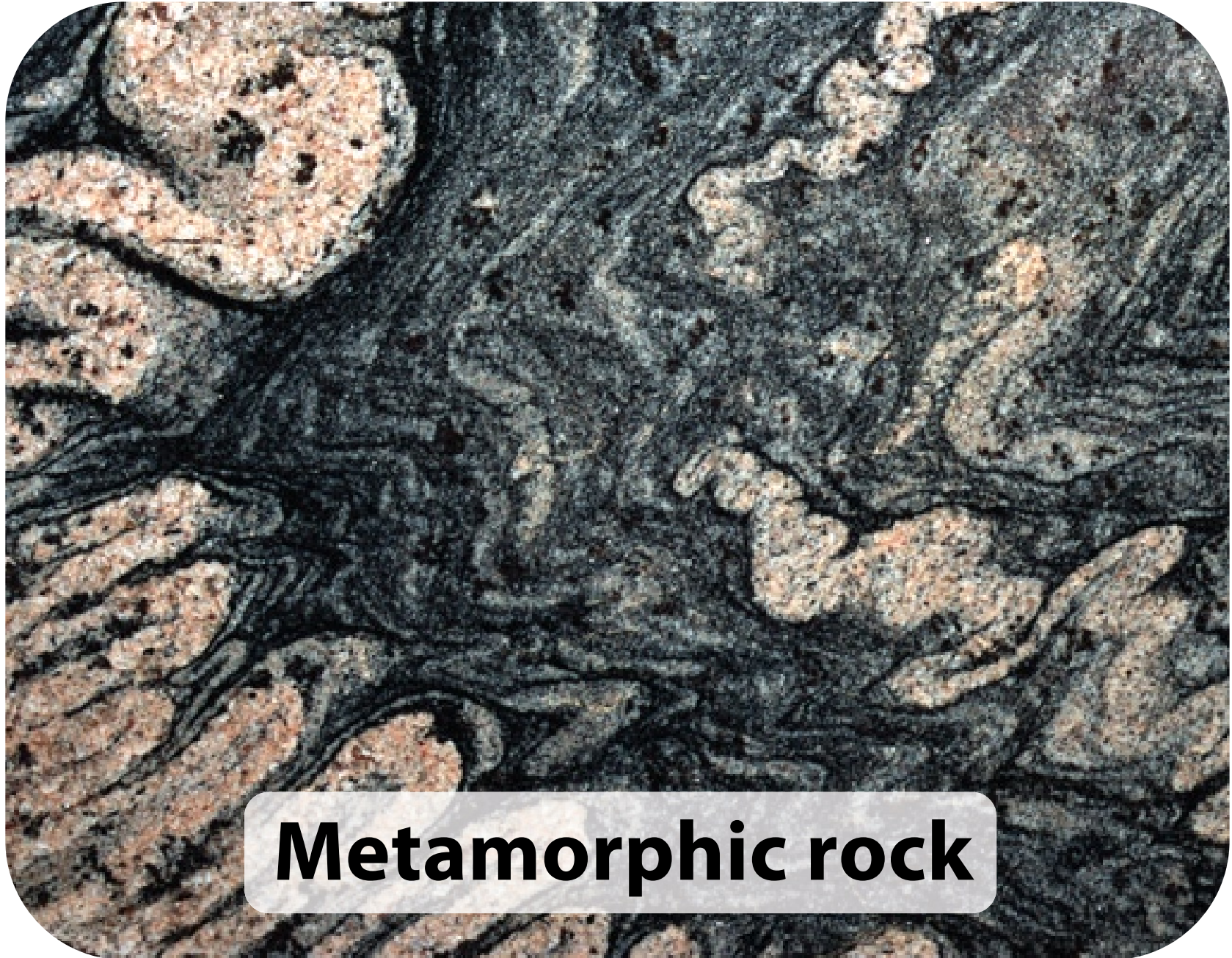


Weathering and erosion



Sediment deposition





Metamorphic rock

Chapter 4, Figure 4-26
A Jointed Granite Outcrop



Chapter 4, Figure 4-27

A. Frost wedging B. Root wedging C. Chemical weathering



(a)



(b)



(c)

Chapter 4, Figure 4-27a



(a)

Chapter 4, Figure 4-27b



(b)

Chapter 4, Figure 4-27c



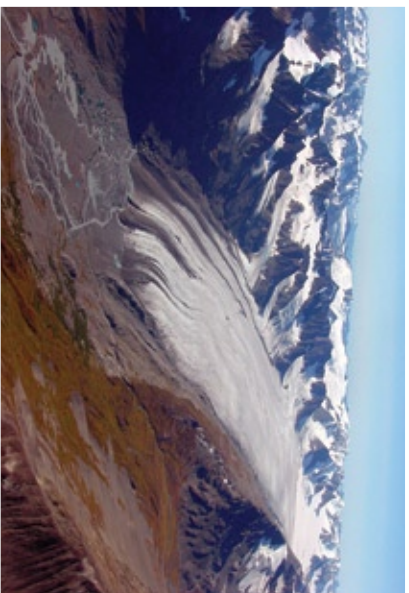
(c)

Chapter 4, Figure 4-28

Three types of erosion: A. Sediment transport with rocks falling in steep terrain B. Glaciers deeply eroding mountains C. Fast-moving streams carrying and abrading larger rocks



(a)



(b)



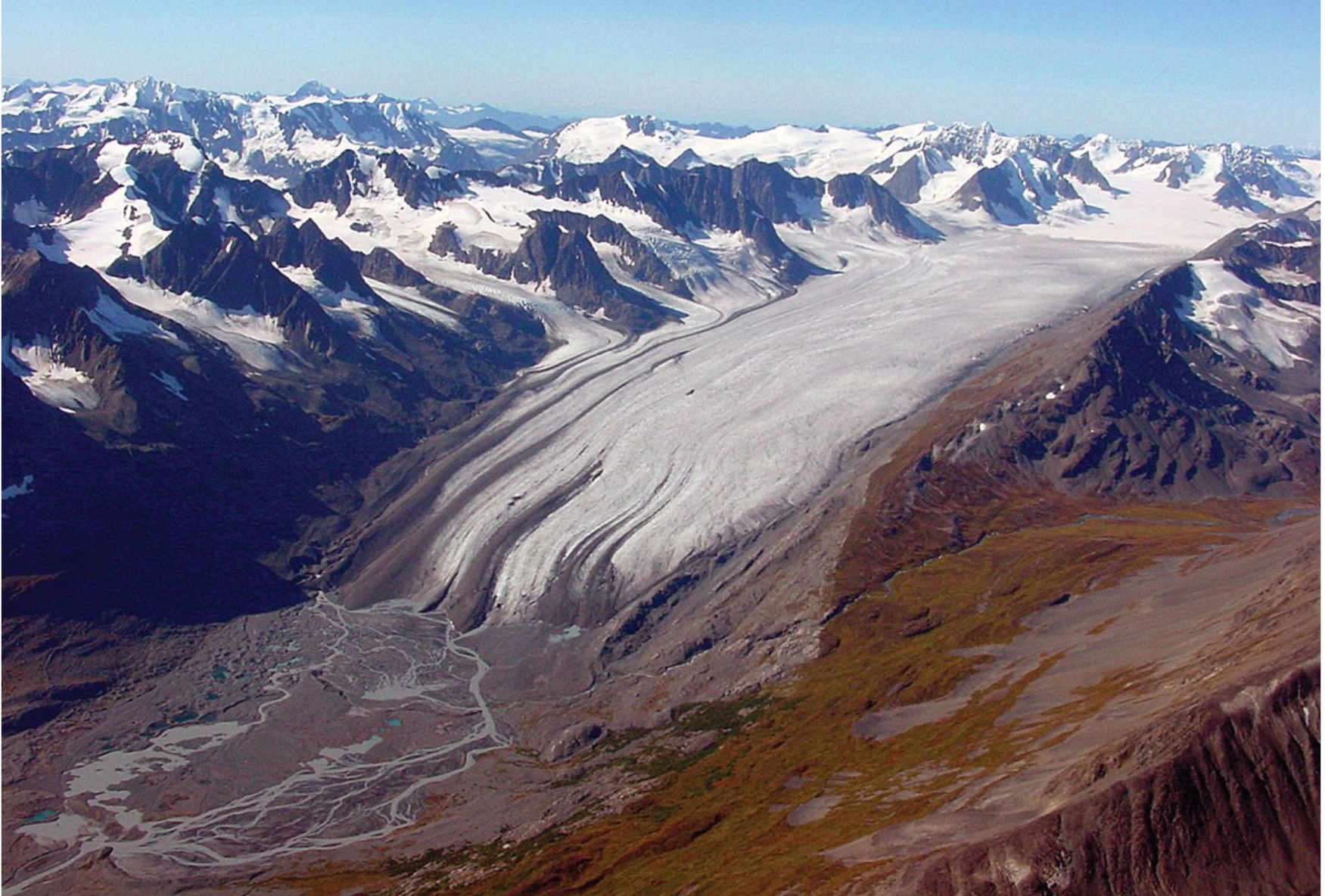
(c)

Chapter 4, Figure 4-28a



(a)

Chapter 4, Figure 4-28b



(b)

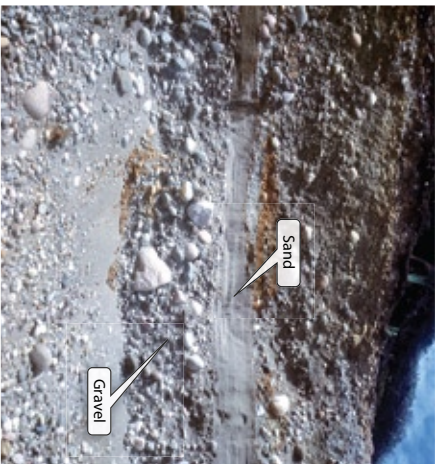
Chapter 4, Figure 4-28c



(c)

Chapter 4, Figure 4-29

Sedimentation: A. Clastic sediments range in size from tiny clay particles to sand and gravel
B. Rivers carry sediment to the coast C. Thick sedimentary sections develop in basins



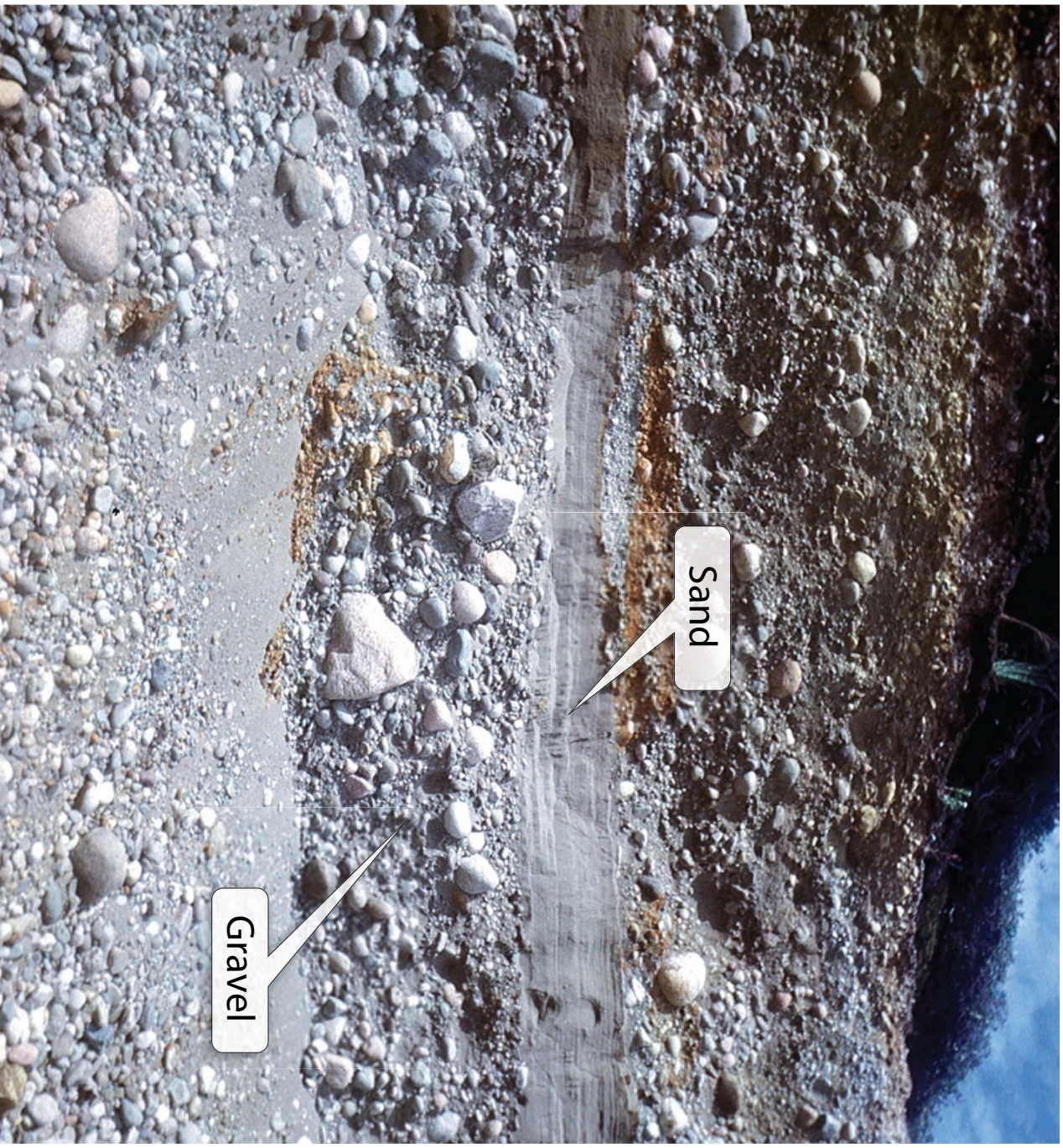
(a)



(b)



(c)



(a)



(b)

Chapter 4, Figure 4-29c



(c)

Chapter 4, Figure 4-30

Clastic Sedimentary Rocks: A. Shale B. Sandstone C. Conglomerate



(a)



(b)



(c)

Shale



(a)

Sandstone



(b)



Conglomerate

(c)

Chapter 4, Figure 4-31

Limestone: A Marine Sedimentary Rock

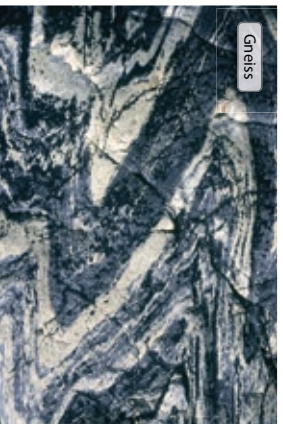


Chapter 4, Figure 4-32

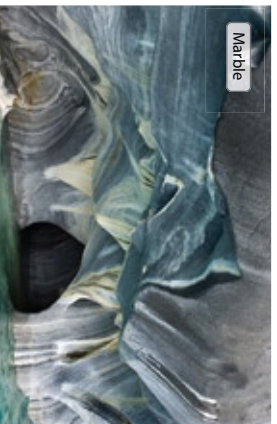
Metamorphic Rocks: A. Schist B. Gneiss C. Marble D. Metamorphism, in this example, leads to melting



(a)



(b)



(c)



(d)



(a)



(b)

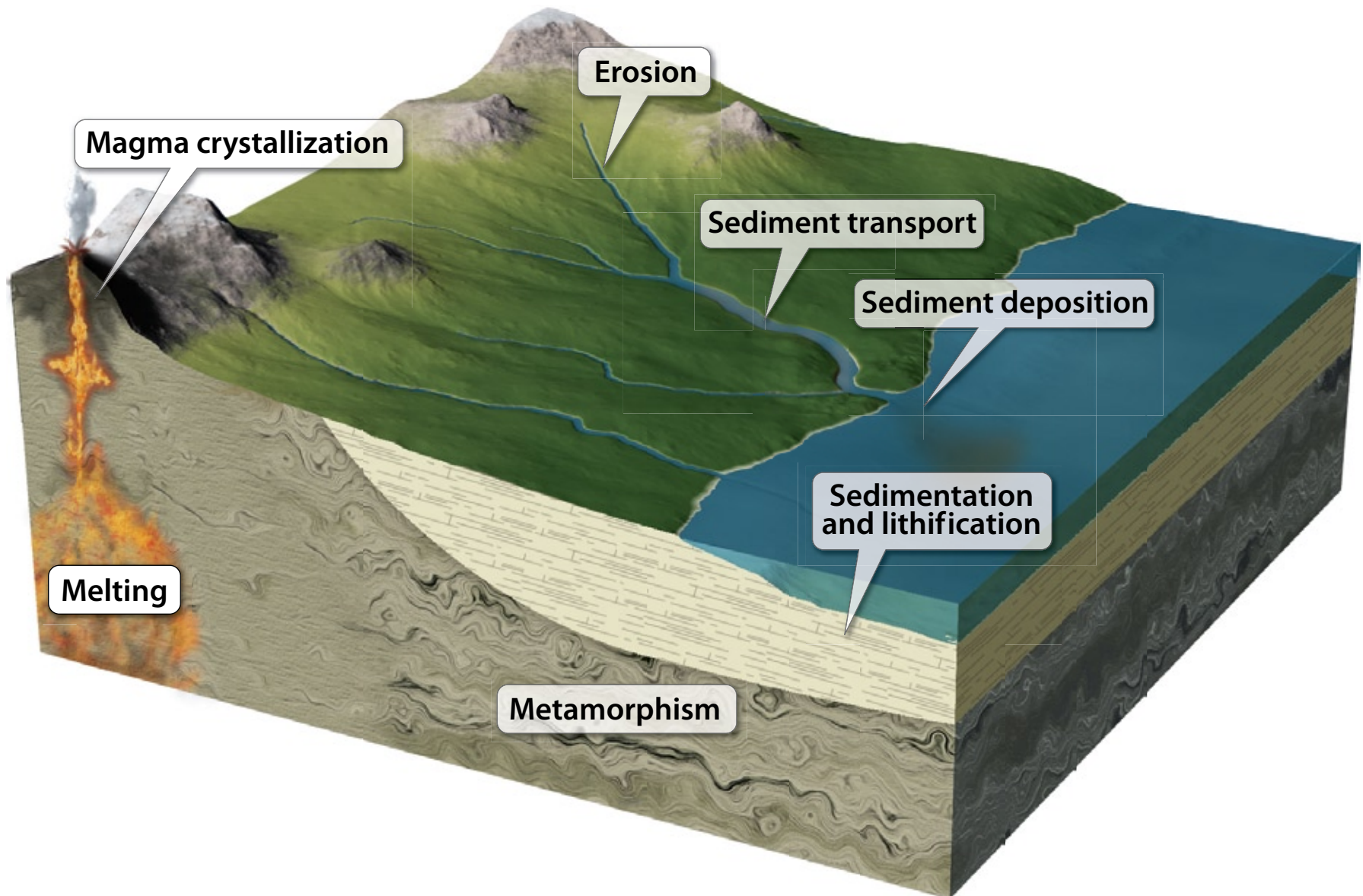


(c)



(d)

Chapter 4, Figure 4-33
The Rock Cycle



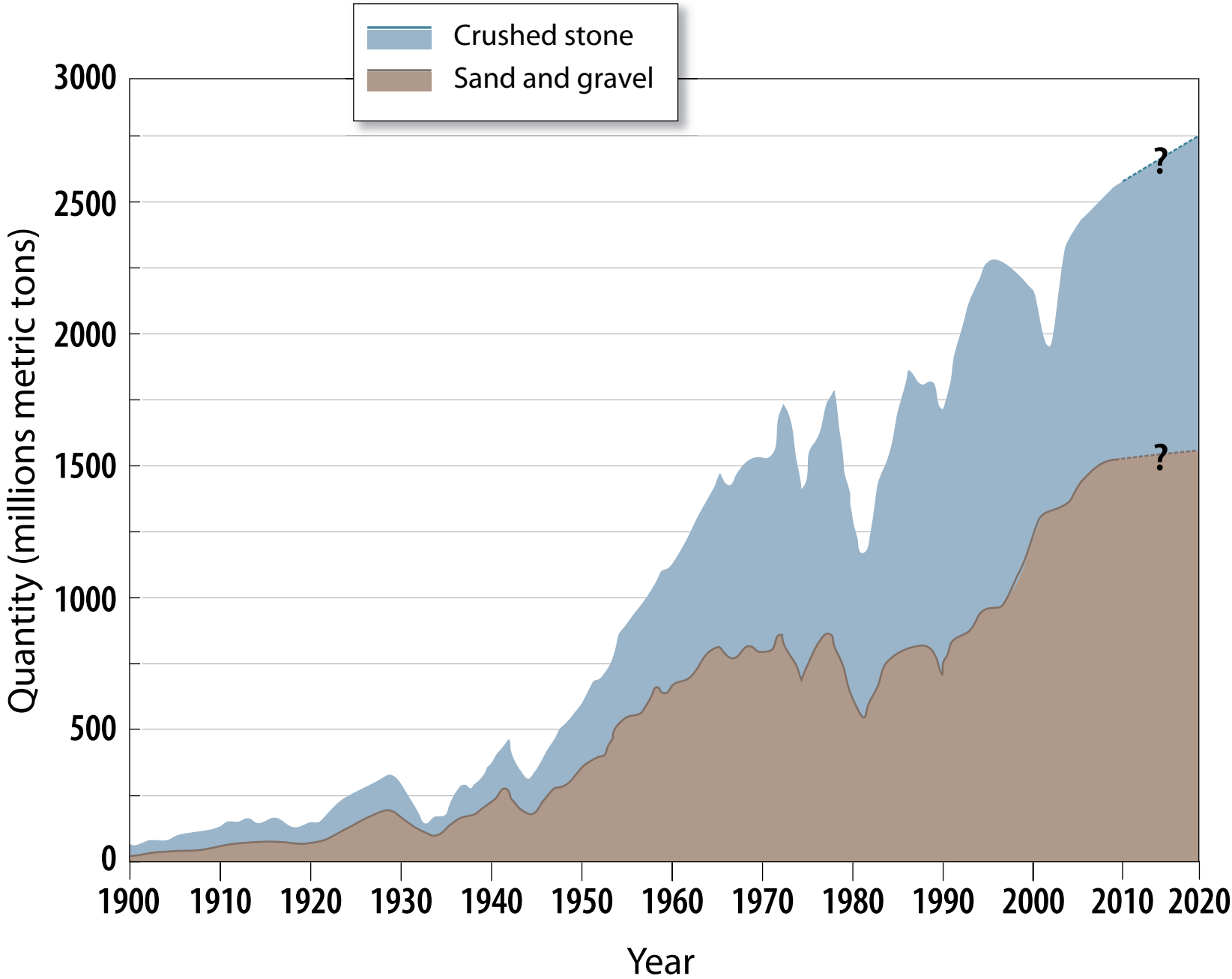
Chapter 4, Figure 4-34

The National Cathedral, made of Indiana limestone

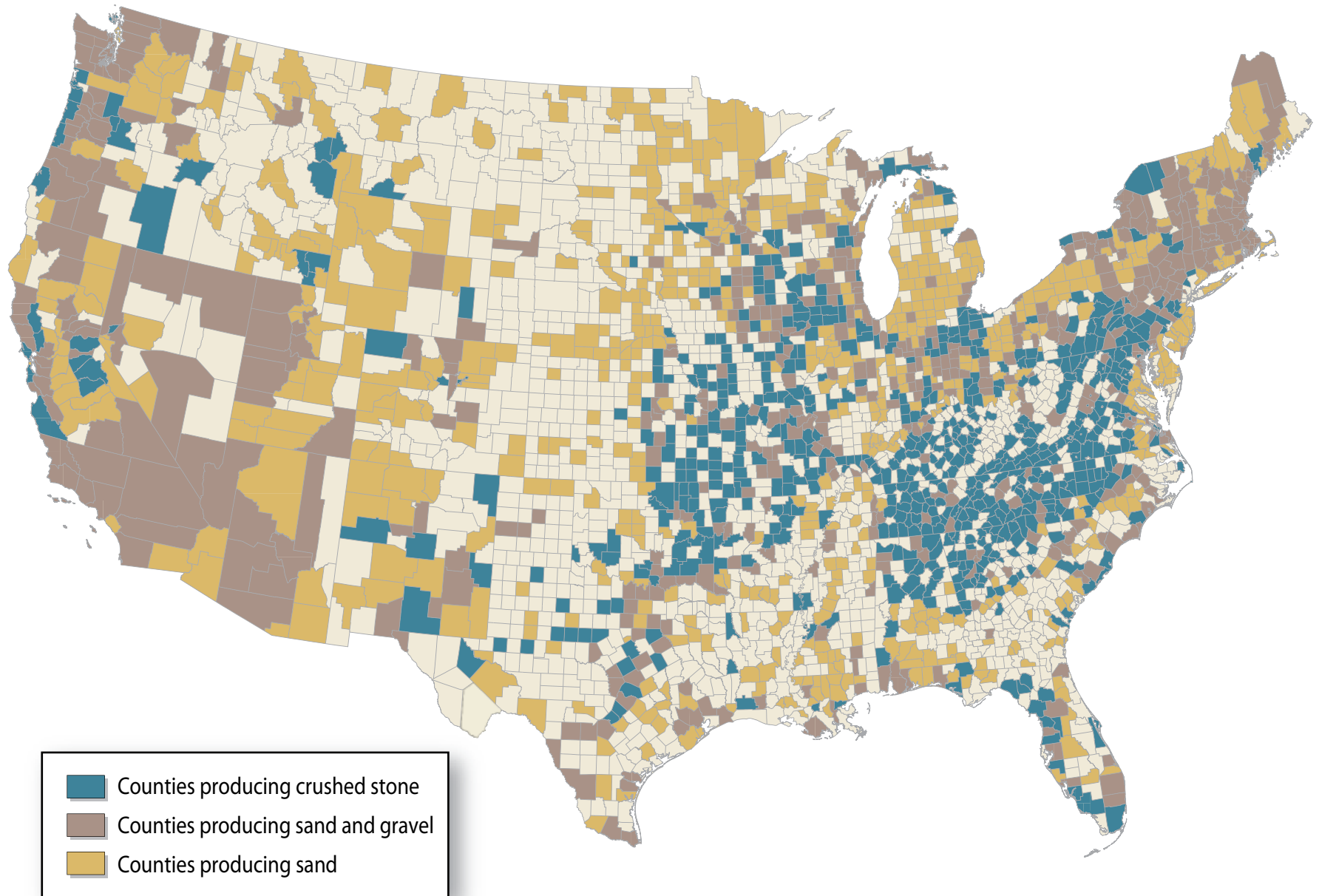




Chapter 4, Figure 4-35
Use of aggregate



Chapter 4, Figure 4-36
Distribution of Aggregate Mining



Chapter 4, Figure 4-37
Aggregate Mining



Chapter 4, Figure 4-38

Reclamation of a rock quarry: Vancouver Island: A. How it looked over 100 years ago B. How it looks presently



(a)



(b)

Chapter 4, Figure 4-38a



(a)

Chapter 4, Figure 4-38b



(b)

Chapter 4, Figure 4-39
Aggregate Transport



(a)



(b)

Chapter 4, Figure 4-39a



(a)

Chapter 4, Figure 4-39b



(b)