Feltkurs 1

Sjekk at du er med på listen.

Start kl 10:15 PTS (S.P. Andersens veg 15A)

Ha med mat, hammer, dagbok eller kartmappe og penn/blyant.

Kom til PTS innen kl 10:10 (ring Krill på 91897197 hvis du er seint)

(Hvis du kommer til PTS med AtB-rutebuss, sjek søndags-ruter at den kjører tidlig nok.)

Hvorfor er det 1% Ar gass i atmosfæren? **(radioaktiv K blir til Ar)**

FIGURE a.3 The modern periodic table of the elements. The columns group elements with related properties. For example, inert gases are listed in the column on the right. Metals are found in the central and left parts of the chart.

Alkali metals

Symbol — Atomic number — Name — Atomic weight

He 2 Helium 4.002

atomisk nummer er lik antall protoner

Inert gases

Nonmetals

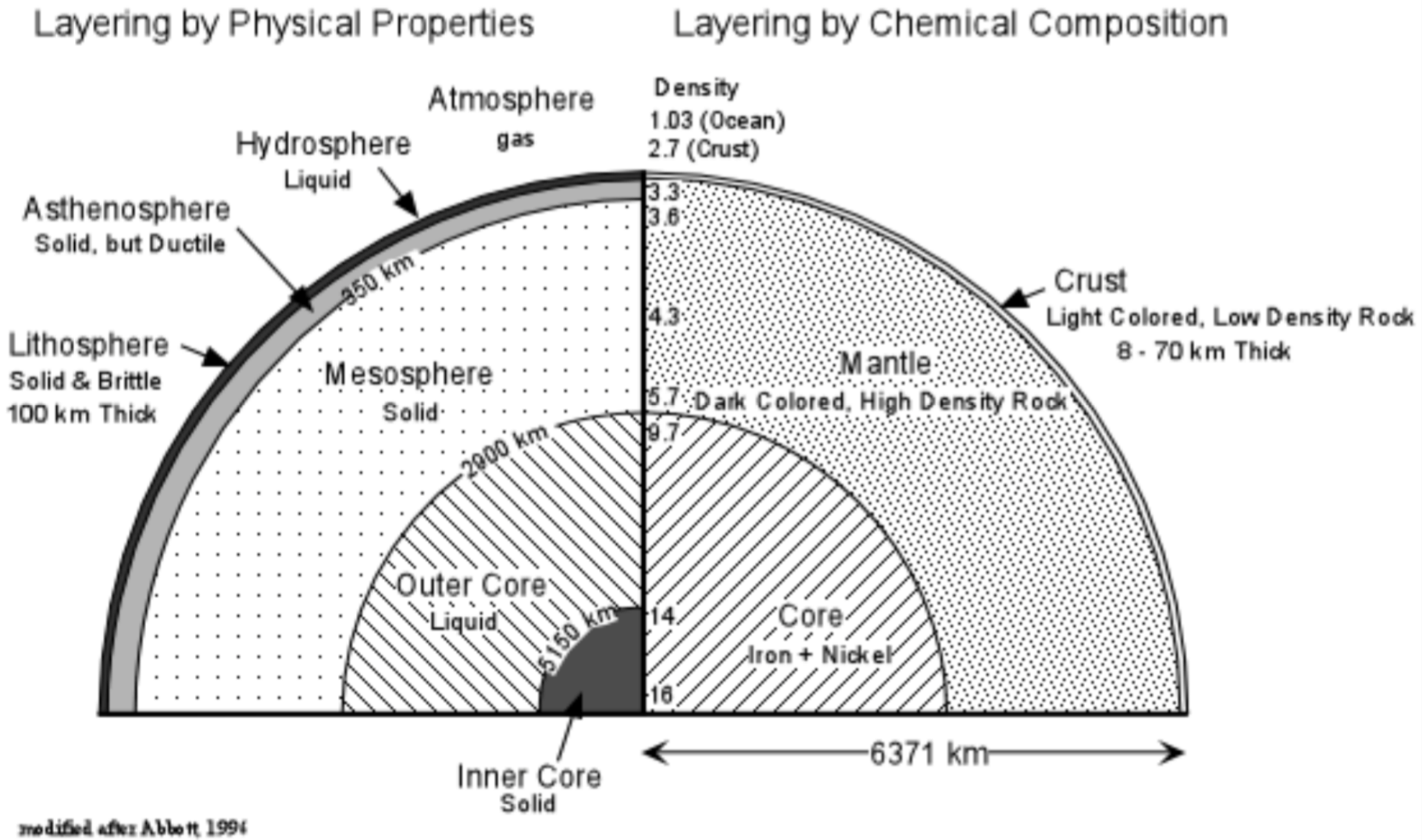
vanlig K er K39 (19 protoner + 20 neutroner)
K40 er radioaktiv (19 protoner + 21 neutroner)
K40 blir til Ar40 (18 protoner + 22 neutroner)

Transition elements (metals)

H 1 Hydrogen 1.007																	He 2 Helium 4.002
Li 3 Lithium 6.941	Be 4 Beryllium 9.0121											B 5 Boron 10.811	C 6 Carbon 12.011	N 7 Nitrogen 14.006	O 8 Oxygen 15.999	F 9 Fluorine 18.998	Ne 10 Neon 20.179
Na 11 Sodium 22.989	Mg 12 Magnesium 24.305											Al 13 Aluminum 26.981	Si 14 Silicon 28.085	P 15 Phosphorus 30.973	S 16 Sulfur 32.066	Cl 17 Chlorine 35.452	Ar 18 Argon 39.948
K 19 Potassium 39.098	Ca 20 Calcium 40.078	Sc 21 Scandium 44.955	Ti 22 Titanium 47.88	V 23 Vanadium 50.941	Cr 24 Chromium 51.996	Mn 25 Manganese 54.938	Fe 26 Iron 55.847	Co 27 Cobalt 58.933	Ni 28 Nickel 58.693	Cu 29 Copper 63.546	Zn 30 Zinc 65.39	Ga 31 Gallium 69.723	Ge 32 Germanium 72.61	As 33 Arsenic 74.921	Se 34 Selenium 78.96	Br 35 Bromine 79.904	Kr 36 Krypton 83.80
Rb 37 Rubidium 85.467	Sr 38 Strontium 87.62	Y 39 Yttrium 88.905	Zr 40 Zirconium 91.224	Nb 41 Niobium 92.906	Mo 42 Molybdenum 95.94	Tc 43 Technetium 98.907	Ru 44 Ruthenium 101.07	Rh 45 Rhodium 102.905	Pd 46 Palladium 106.42	Ag 47 Silver 107.868	Cd 48 Cadmium 112.411	In 49 Indium 114.82	Sn 50 Tin 118.710	Sb 51 Antimony 121.757	Te 52 Tellurium 127.60	I 53 Iodine 126.904	Xe 54 Xenon 131.29
Cs 55 Cesium 132.905	Ba 56 Barium 137.327	La 57 Lanthanum 138.905	Hf 72 Hafnium 178.49	Ta 73 Tantalum 180.947	W 74 Tungsten 183.85	Re 75 Rhenium 186.207	Os 76 Osmium 190.2	Ir 77 Iridium 192.22	Pt 78 Platinum 195.08	Au 79 Gold 196.966	Hg 80 Mercury 200.59	Tl 81 Thallium 204.383	Pb 82 Lead 207.2	Bi 83 Bismuth 208.980	Po 84 Polonium 208.982	At 85 Astatine 209.987	Rn 86 Radon 222.017
Fr 87 Francium 223.019	Ra 88 Radium 226.025	Ac 89 Actinium 227.027															

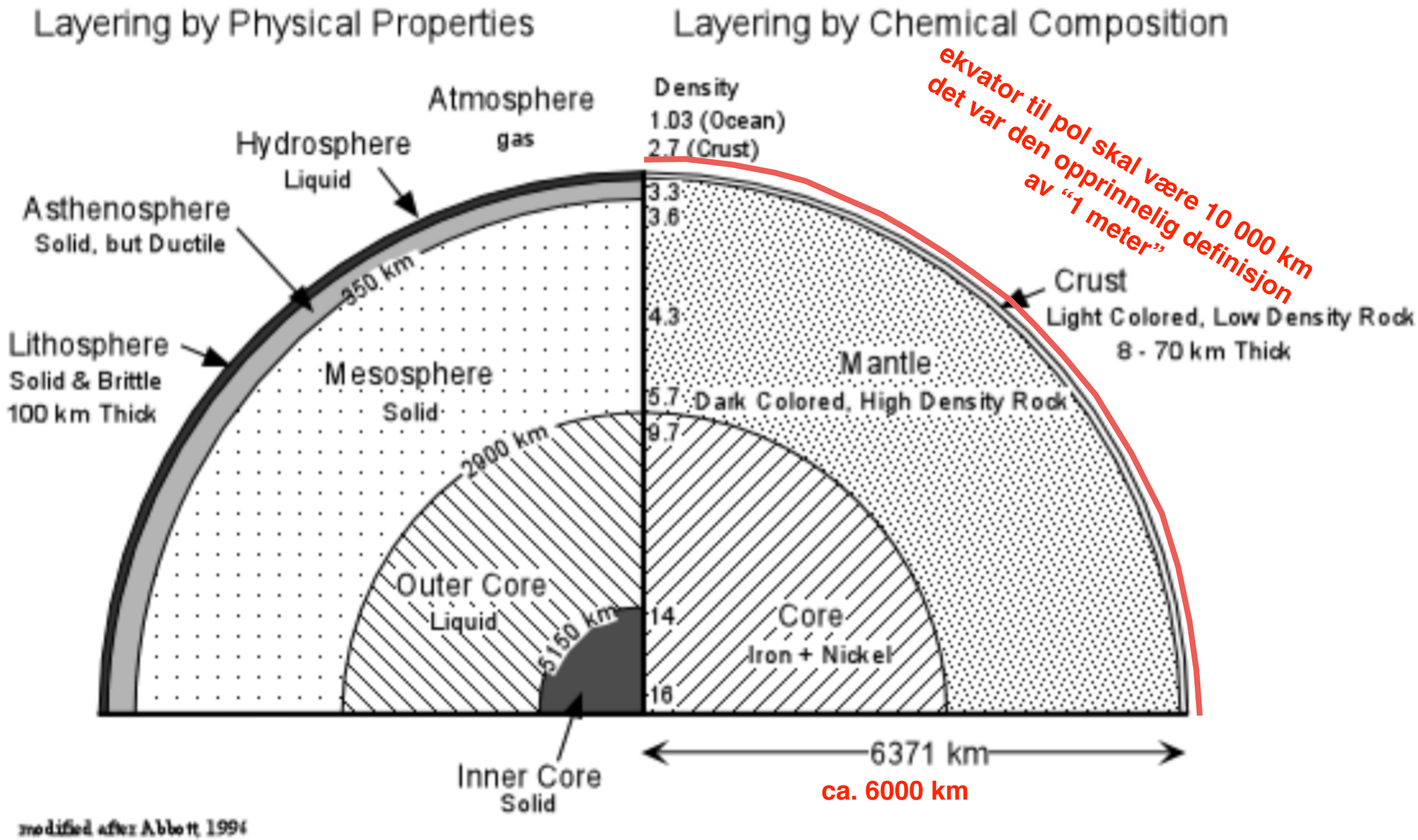
Ce 58 Cerium 140.115	Pr 59 Praseodymium 140.907	Nd 60 Neodymium 144.24	Pm 61 Promethium 144.912	Sm 62 Samarium 150.36	Eu 63 Europium 151.965	Gd 64 Gadolinium 157.25	Tb 65 Terbium 158.925	Dy 66 Dysprosium 162.50	Ho 67 Holmium 164.930	Er 68 Erbium 167.26	Tm 69 Thulium 168.934	Yb 70 Ytterbium 173.04	Lu 71 Lutetium 174.967
Th 90 Thorium 232.038	Pa 91 Protactinium 231.035	U 92 Uranium 238.028	Np 93 Neptunium 237.048	Pu 94 Plutonium 244.064	Am 95 Americium 243.061	Cm 96 Curium 247.070	Bk 97 Berkelium 247.070	Cf 98 Californium 251.079	Es 99 Einsteinium 252.083	Fm 100 Fermium 257.095	Md 101 Mendelevium 258.10	No 102 Nobelium 259.100	Lr 103 Lawrencium 262.11

Internal Structure of the Earth:



Earth has layered structure. Layering can be viewed in two different ways:

Internal Structure of the Earth:



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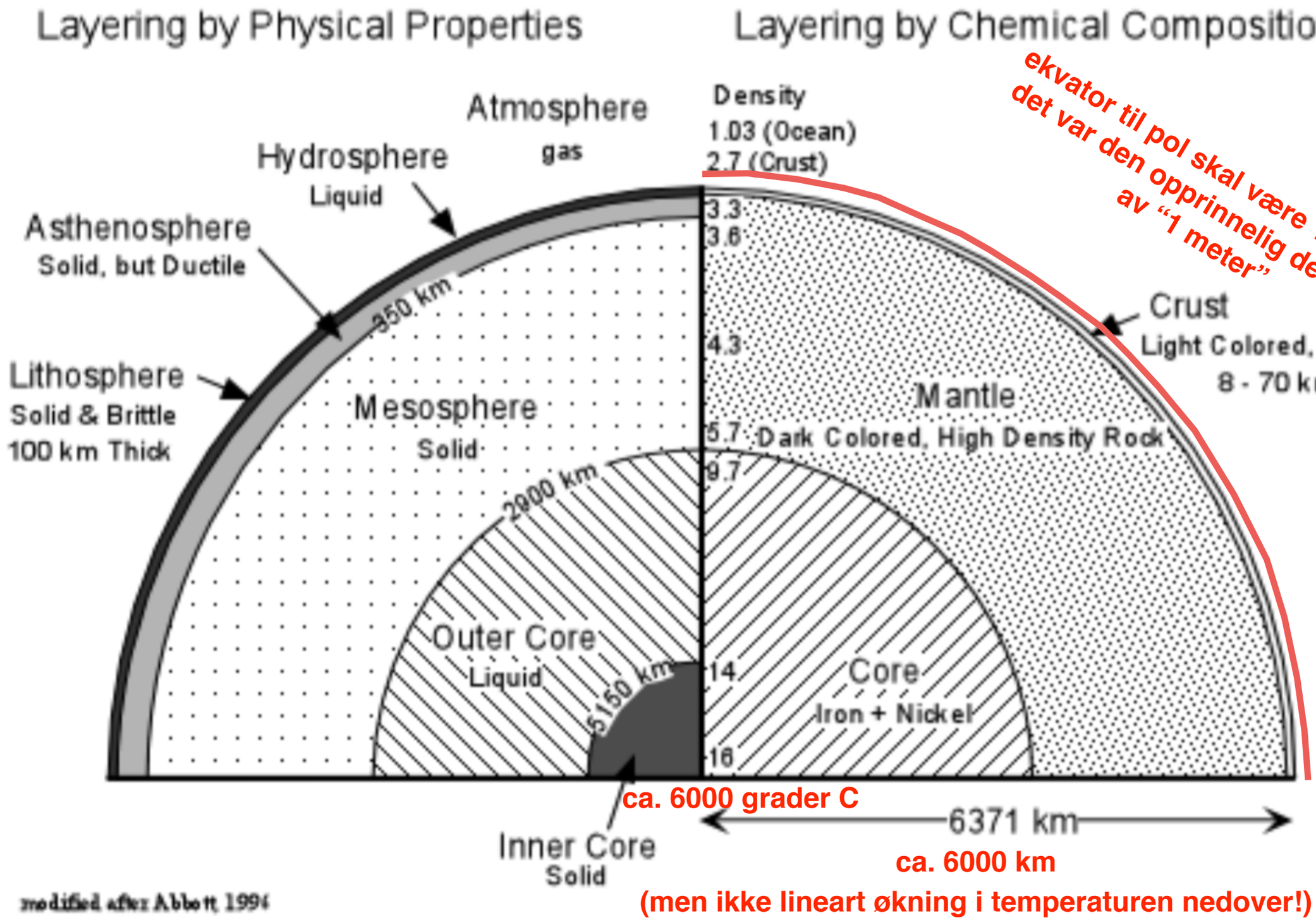

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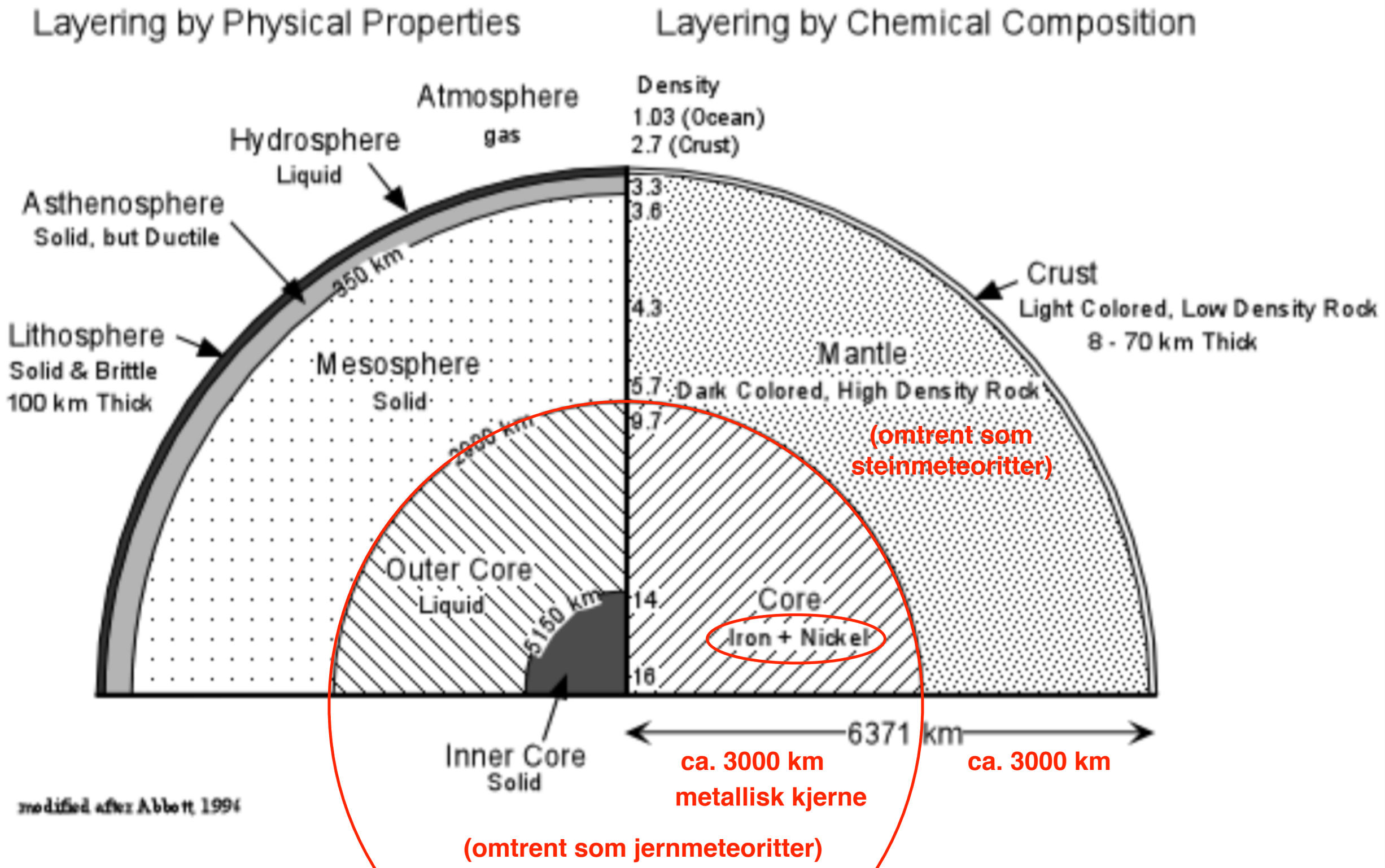
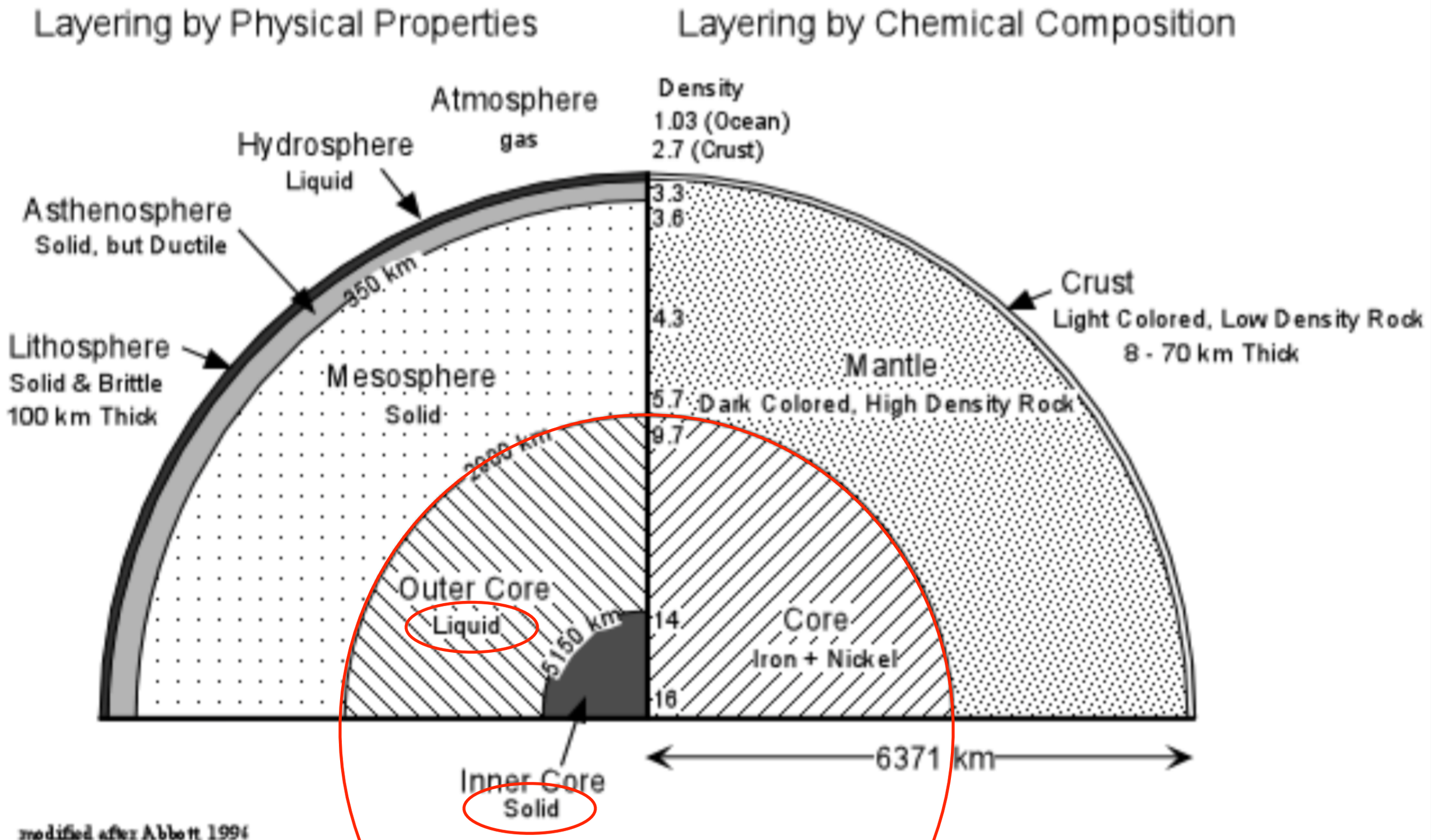


Earth has layered structure. Layering can be viewed in two different ways:

Internal Structure of the Earth:



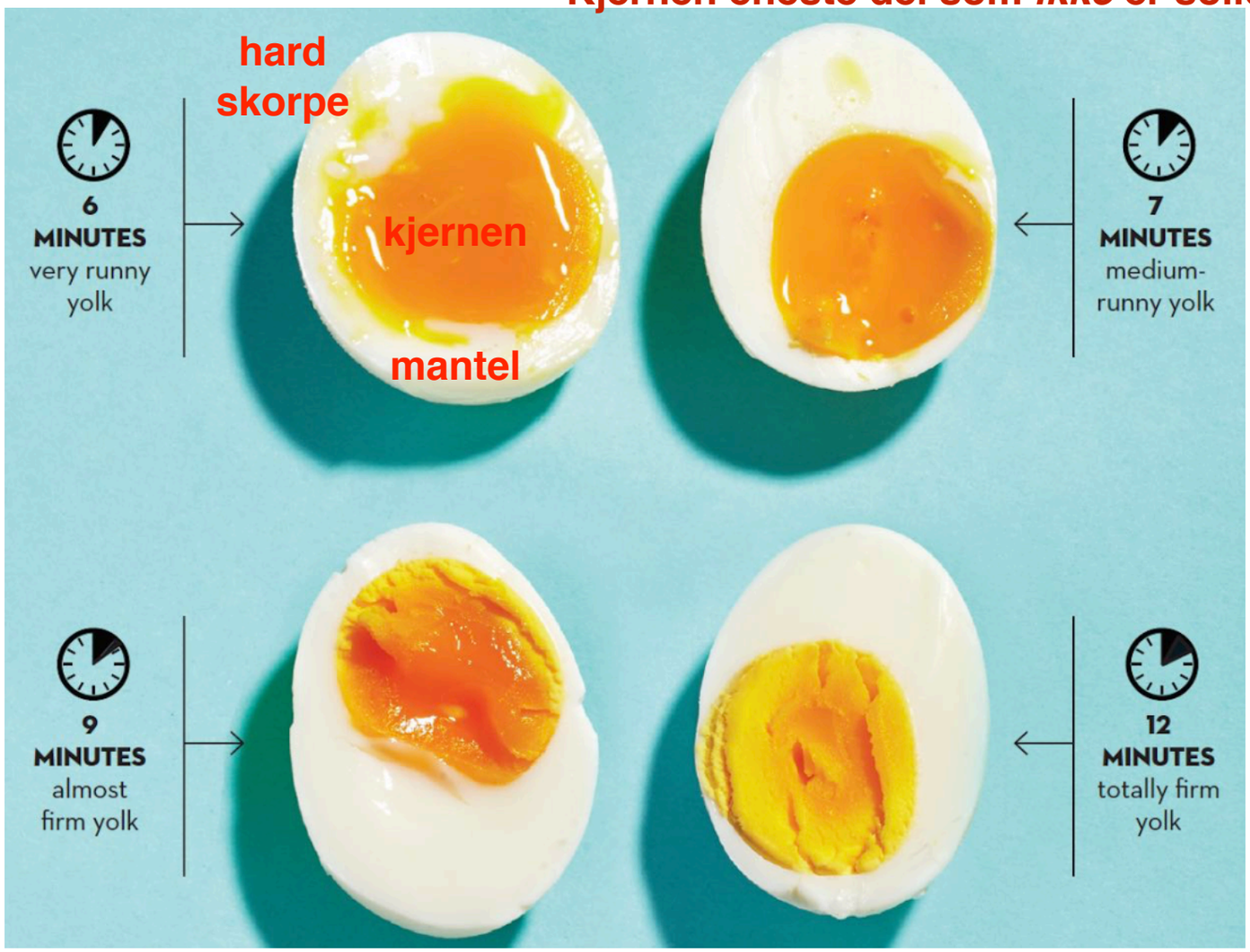
Solid (pga. høy trykk som presser atomene sammen)

Earth has layered structure. Layering can be viewed in two different ways:

Er bløtkokt egg en brukbar modell?

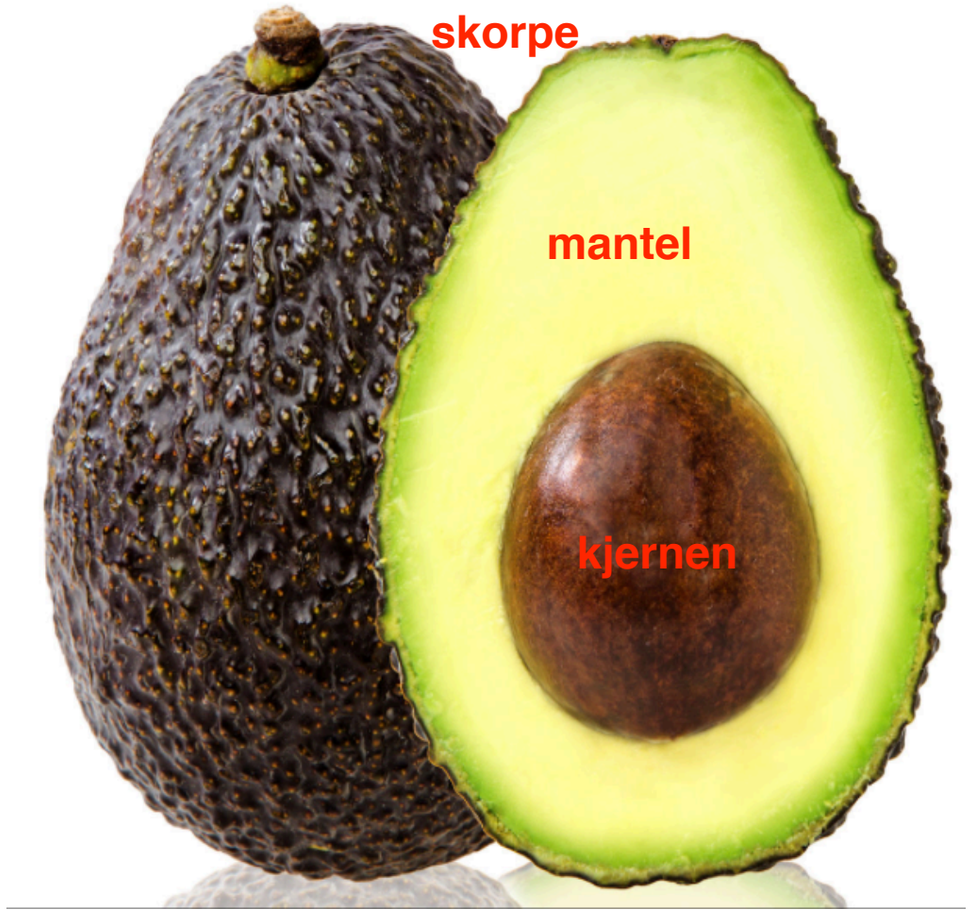
Korrekt som modell: Hard tynn skorpe/litosfære

Kjernen eneste del som *ikke* er solid



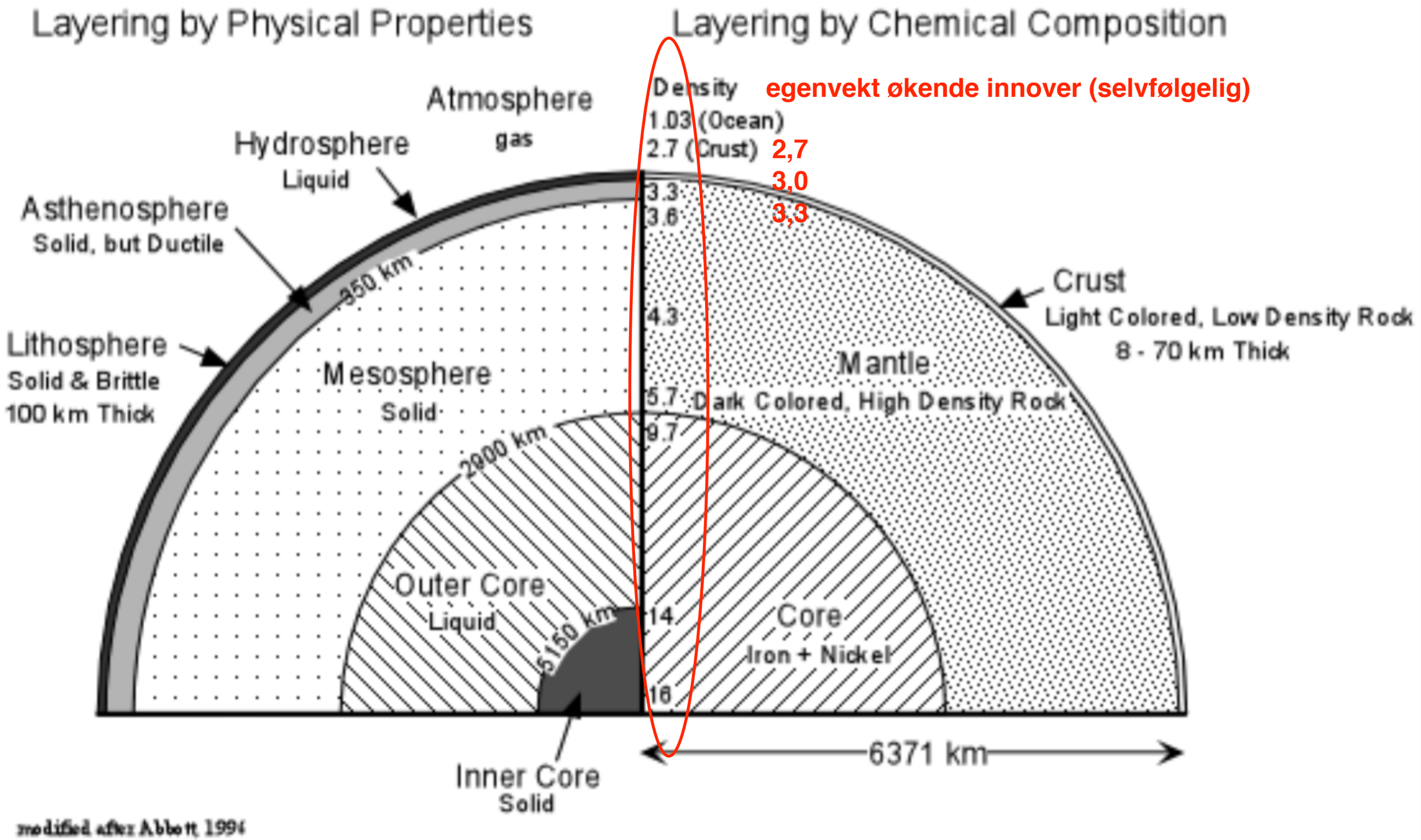
ikke noe perfekt modell: Kjernen helt i midten skal være *solid*.

Er avocado en brukbar modell?



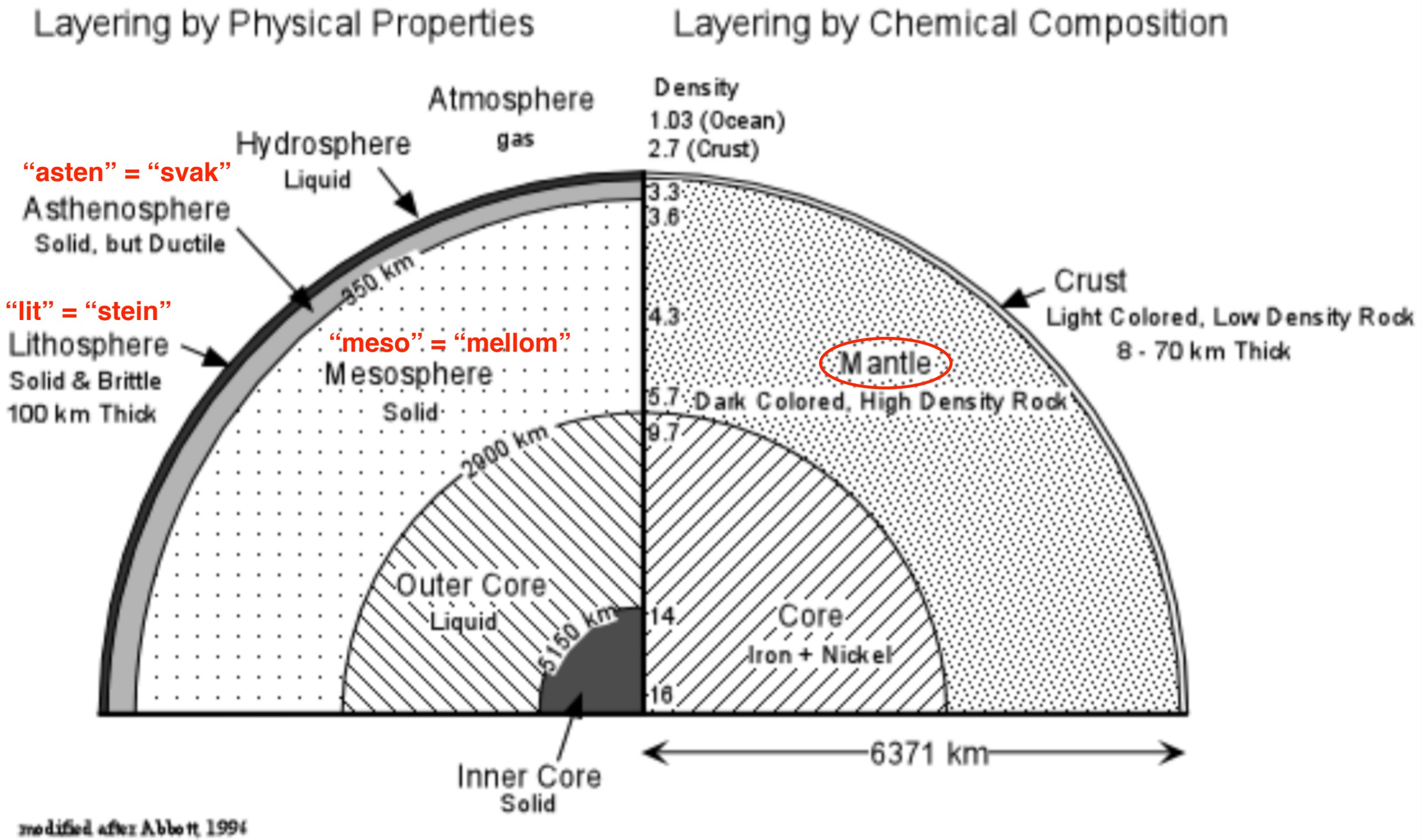
Svakhet med denne modellen: for mennesker er Skorpen mer viktig enn Mantelen.

Internal Structure of the Earth:



Earth has layered structure. Layering can be viewed in two different ways:

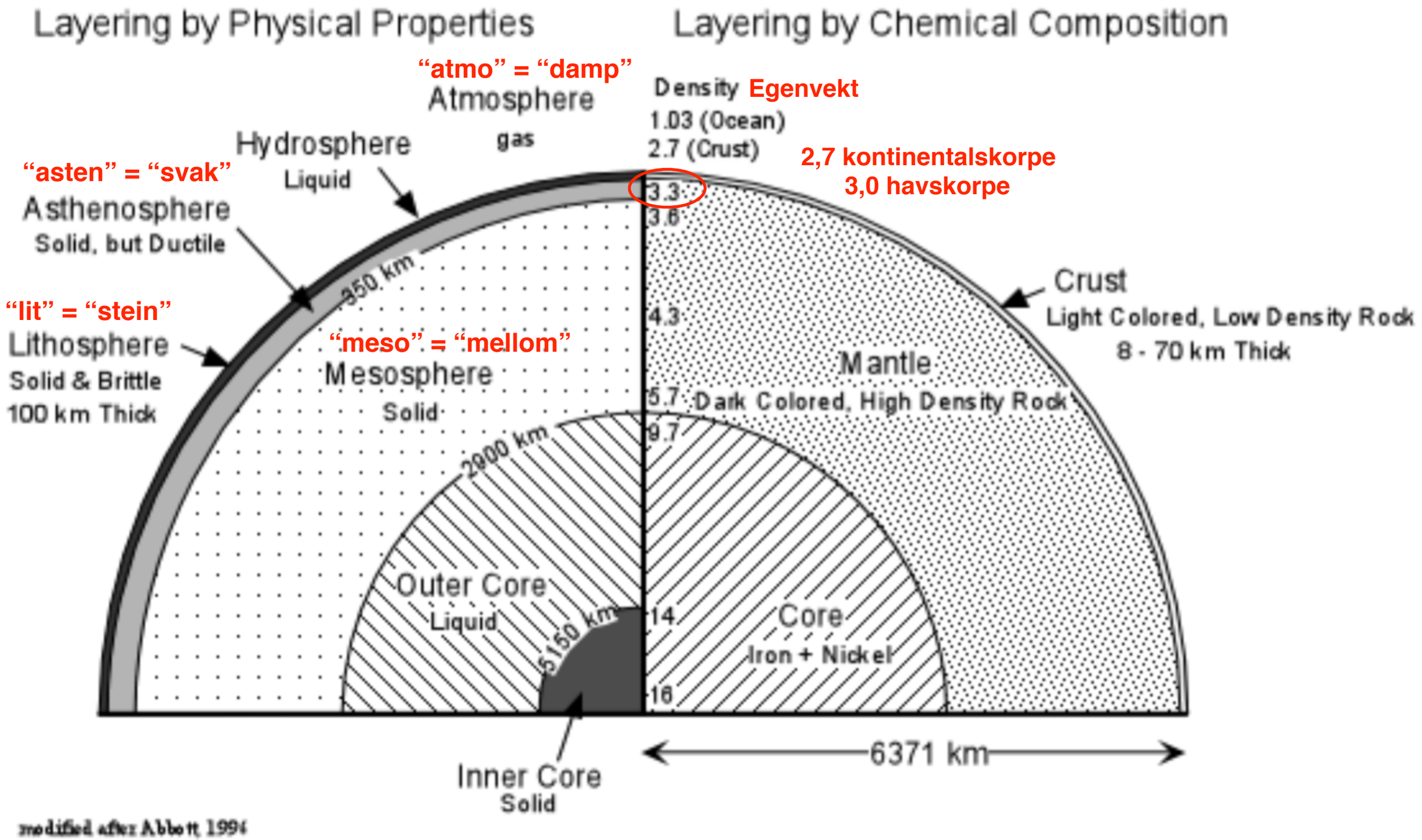
Internal Structure of the Earth:



Earth has layered structure. Layering can be viewed in two different ways:

Internal Structure of the Earth:

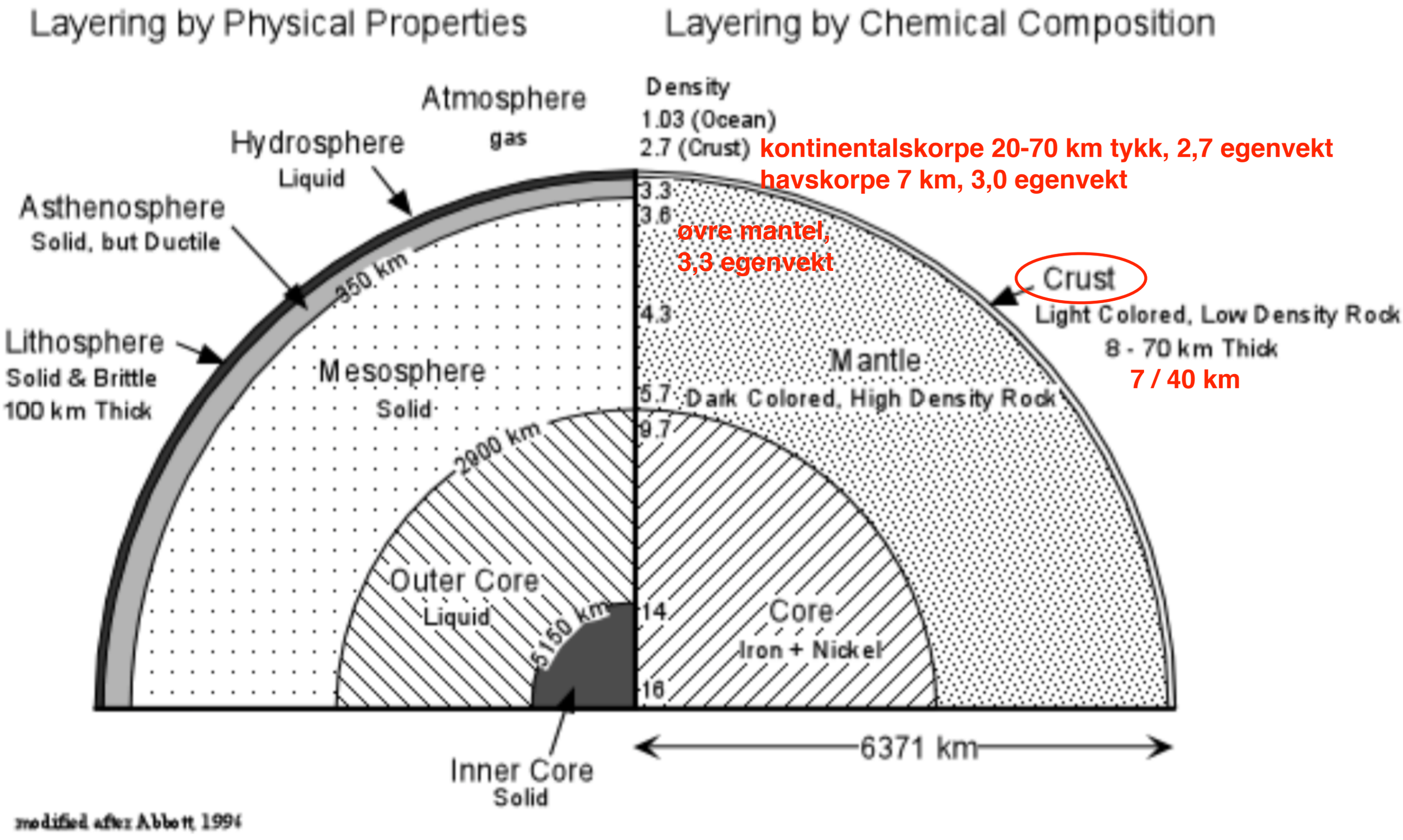
(**Hydrosfære** er egentlig ikke noe "sfære." Det er *alt vann*,)
(**Biosfære** er definert som *alt liv*, ikke noe "sfære")



modified after Abbott 1994

Earth has layered structure. Layering can be viewed in two different ways:

Internal Structure of the Earth:



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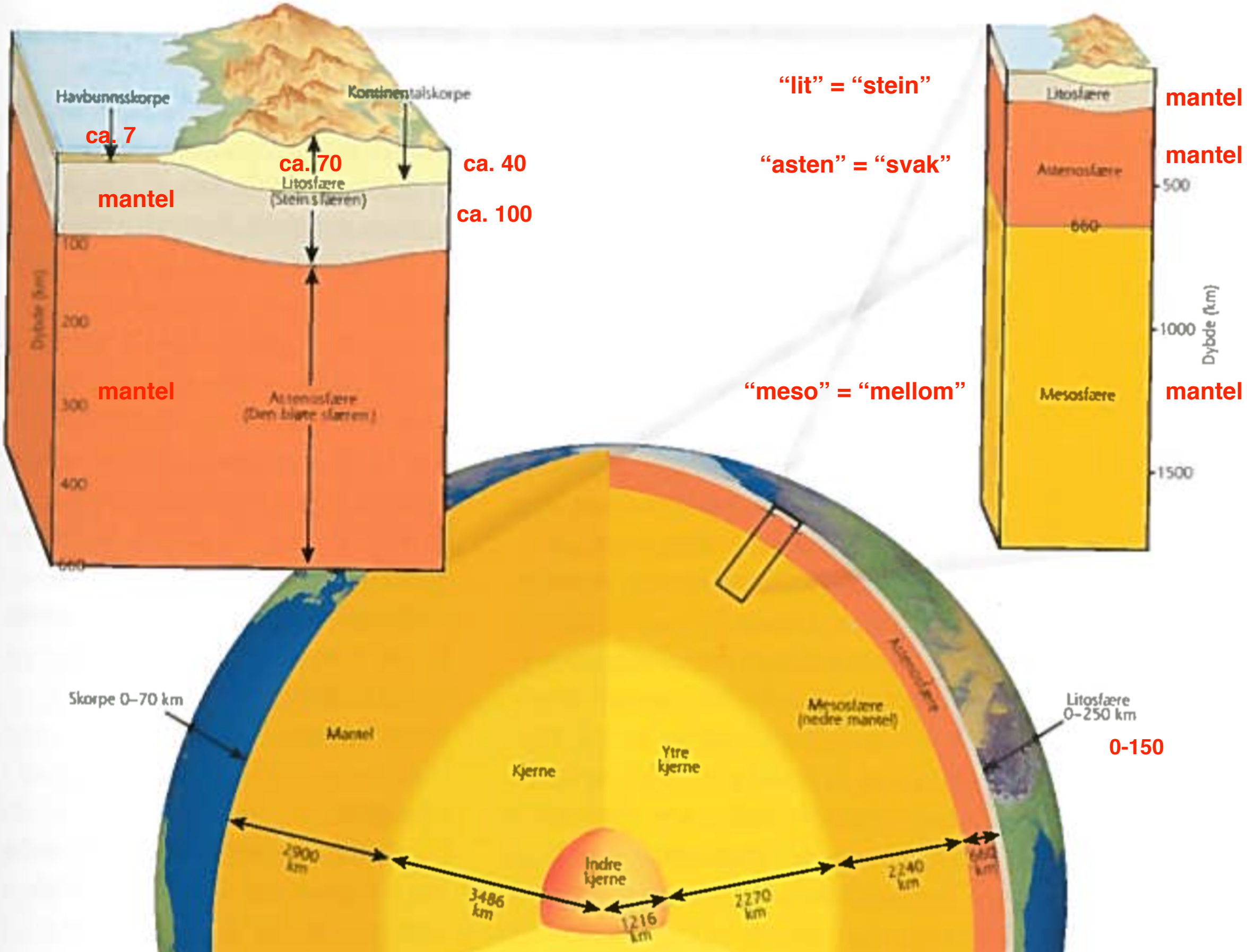


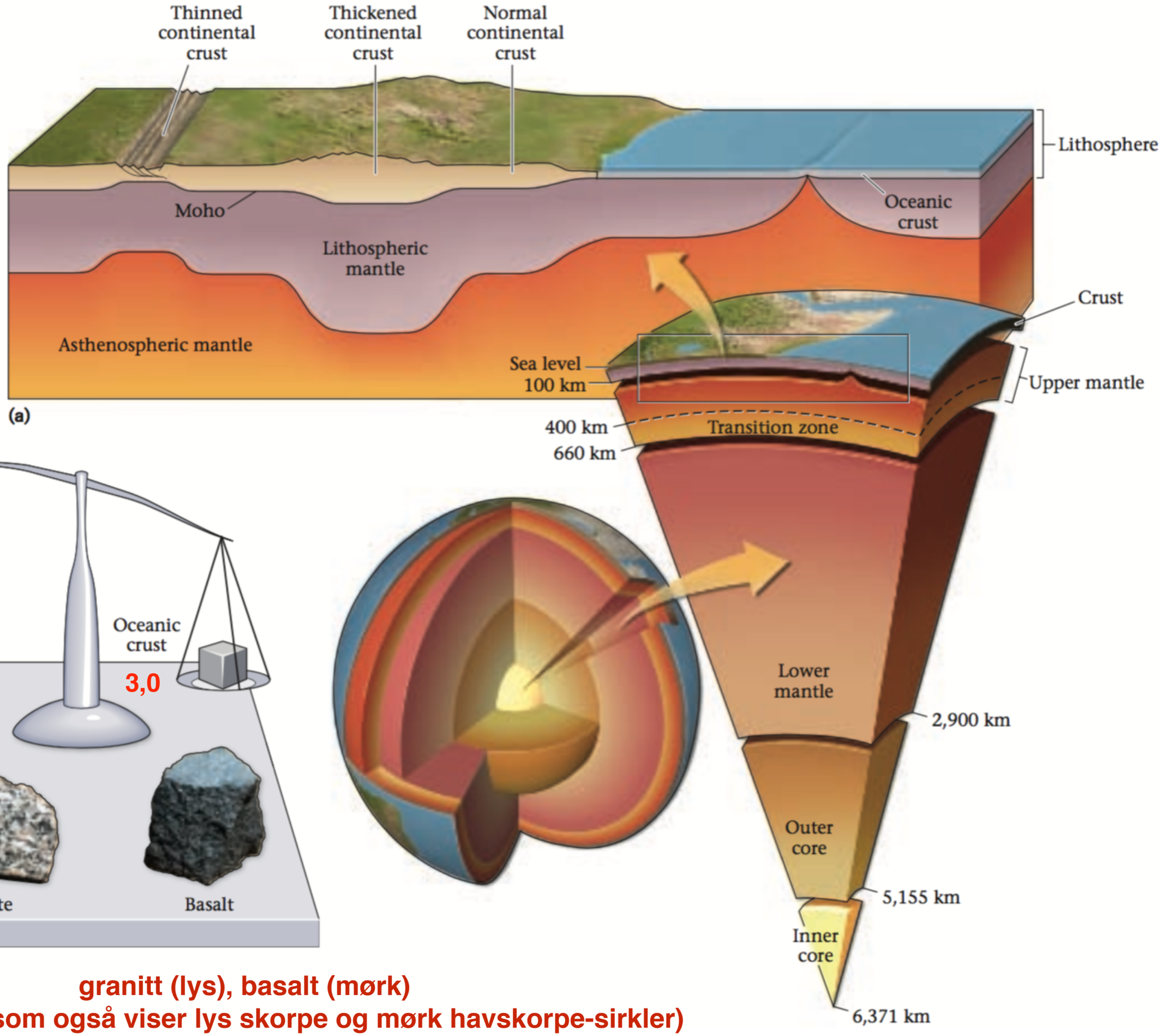
"lit" = "stein"

"asten" = "svak"

"meso" = "mellom"

0-150

FIGURE 2.13 **(a)** This simplified cross section illustrates the differences between continental crust and oceanic crust. Note that the thickness of continental crust can vary greatly. **(b)** Oceanic crust is denser than continental crust.

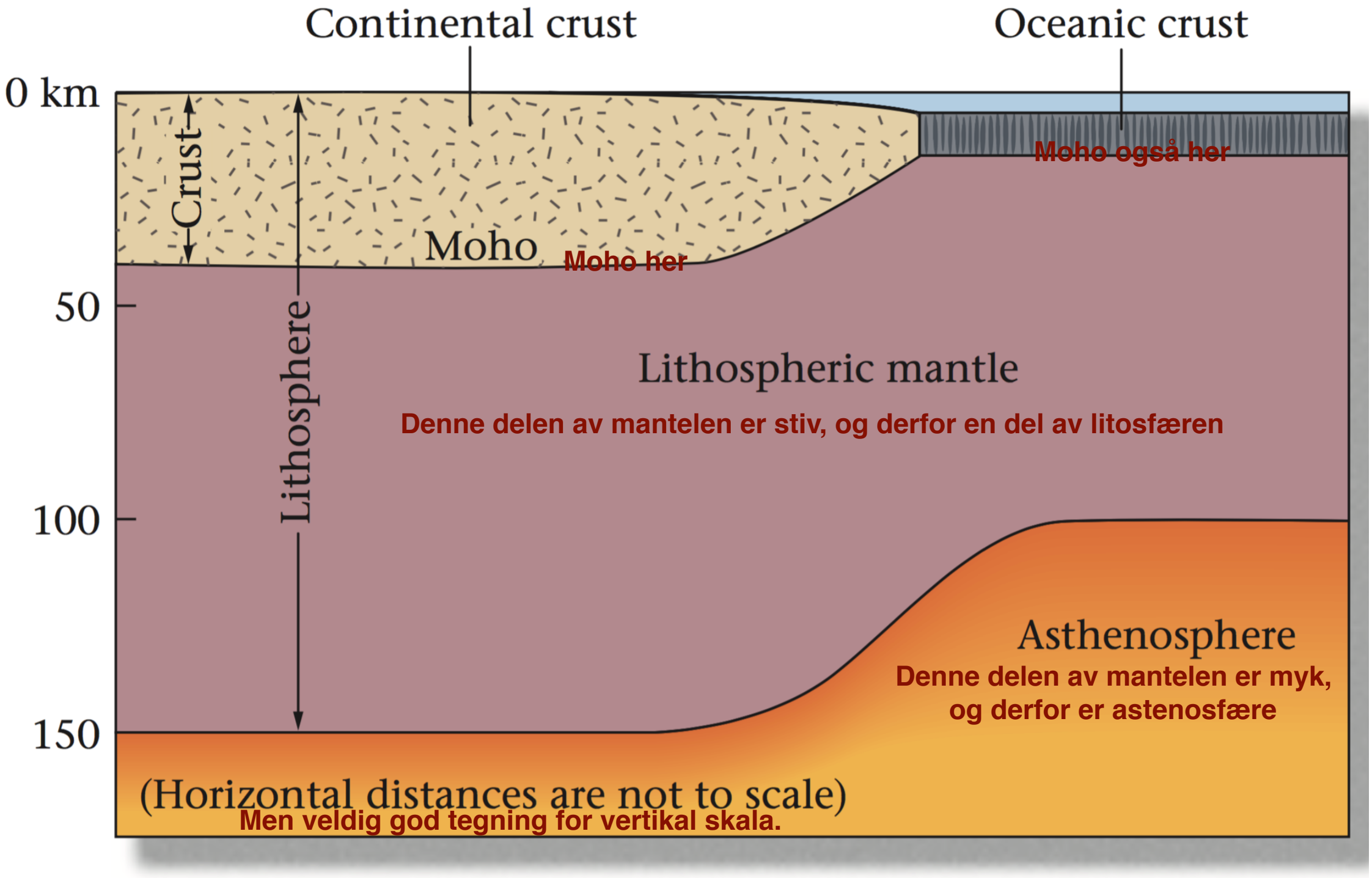


granitt (lys), basalt (mørk)

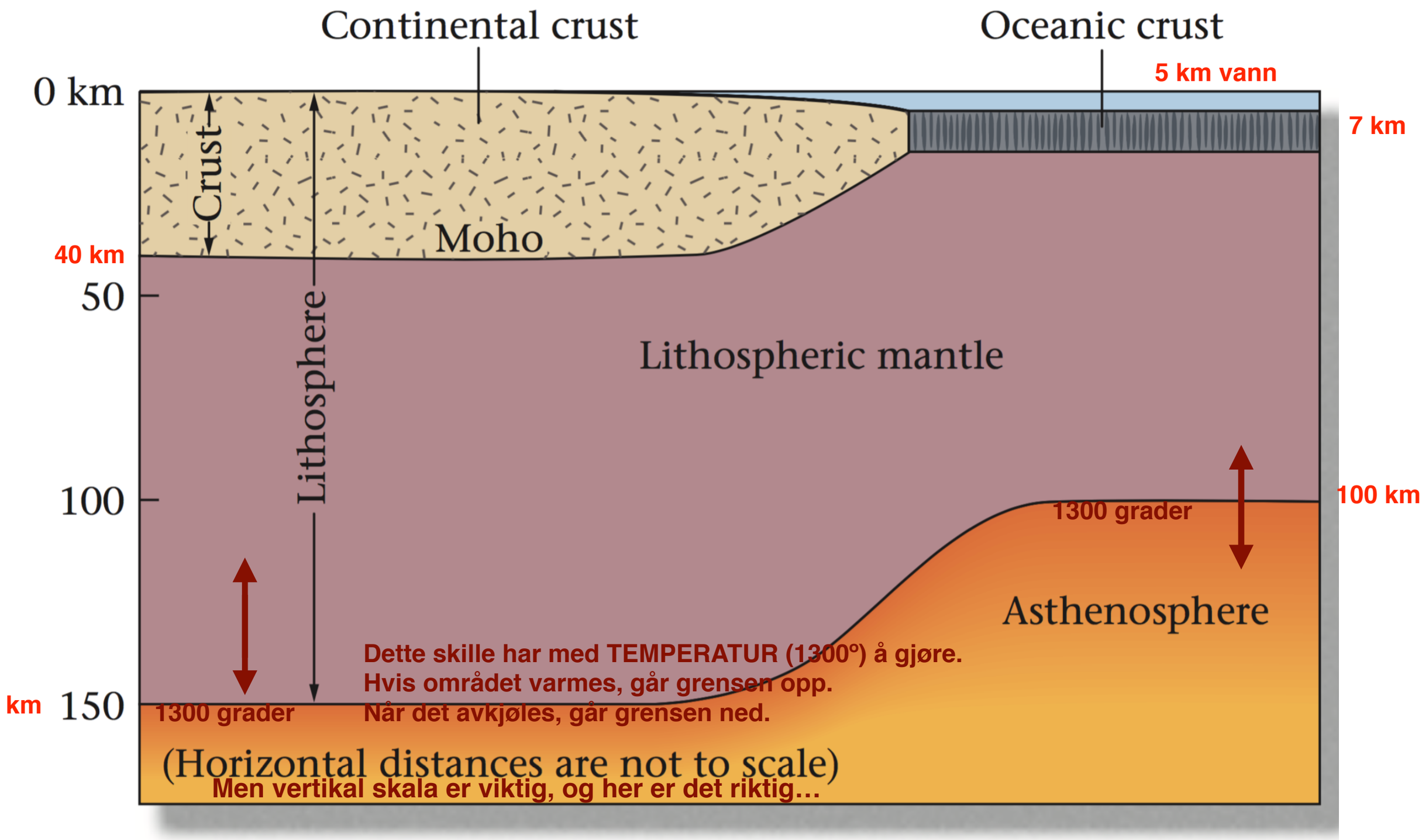
(se på Månen: som også viser lys skorpe og mørk havskorpe-sirkler)

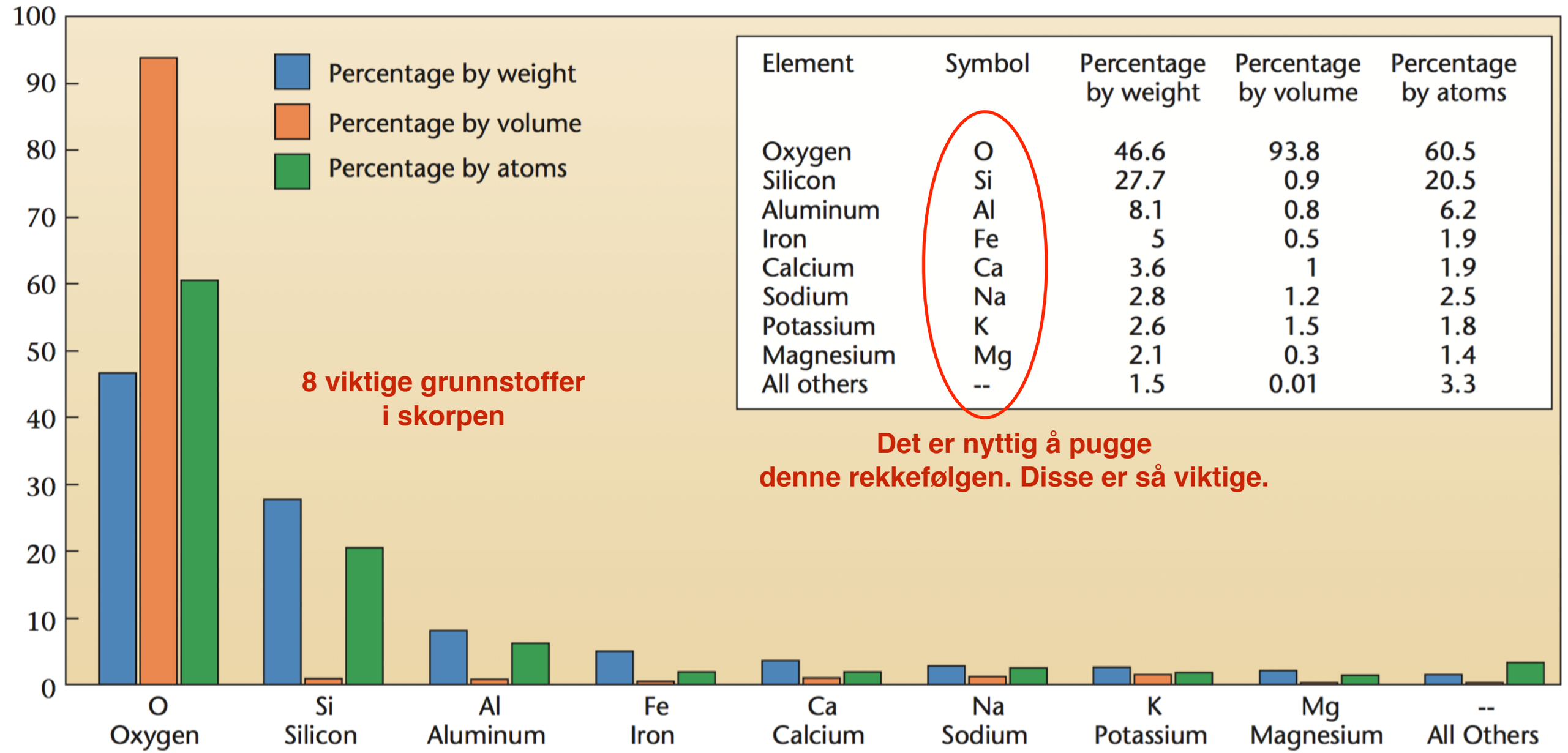
kontinental skorpe
havskorpe
"Moho" **(grense)**
litosfære
astenosfære

Marshak.pdf (page 79 of 957)



Marshak.pdf (page 79 of 957)





Element	Symbol	Percentage by weight	Percentage by volume	Percentage by atoms
Oxygen	O	46.6	93.8	60.5
Silicon	Si	27.7	0.9	20.5
Aluminum	Al	8.1	0.8	6.2
Iron	Fe	5	0.5	1.9
Calcium	Ca	3.6	1	1.9
Sodium	Na	2.8	1.2	2.5
Potassium	K	2.6	1.5	1.8
Magnesium	Mg	2.1	0.3	1.4
All others	--	1.5	0.01	3.3

8 viktige grunnstoffer i skorpen

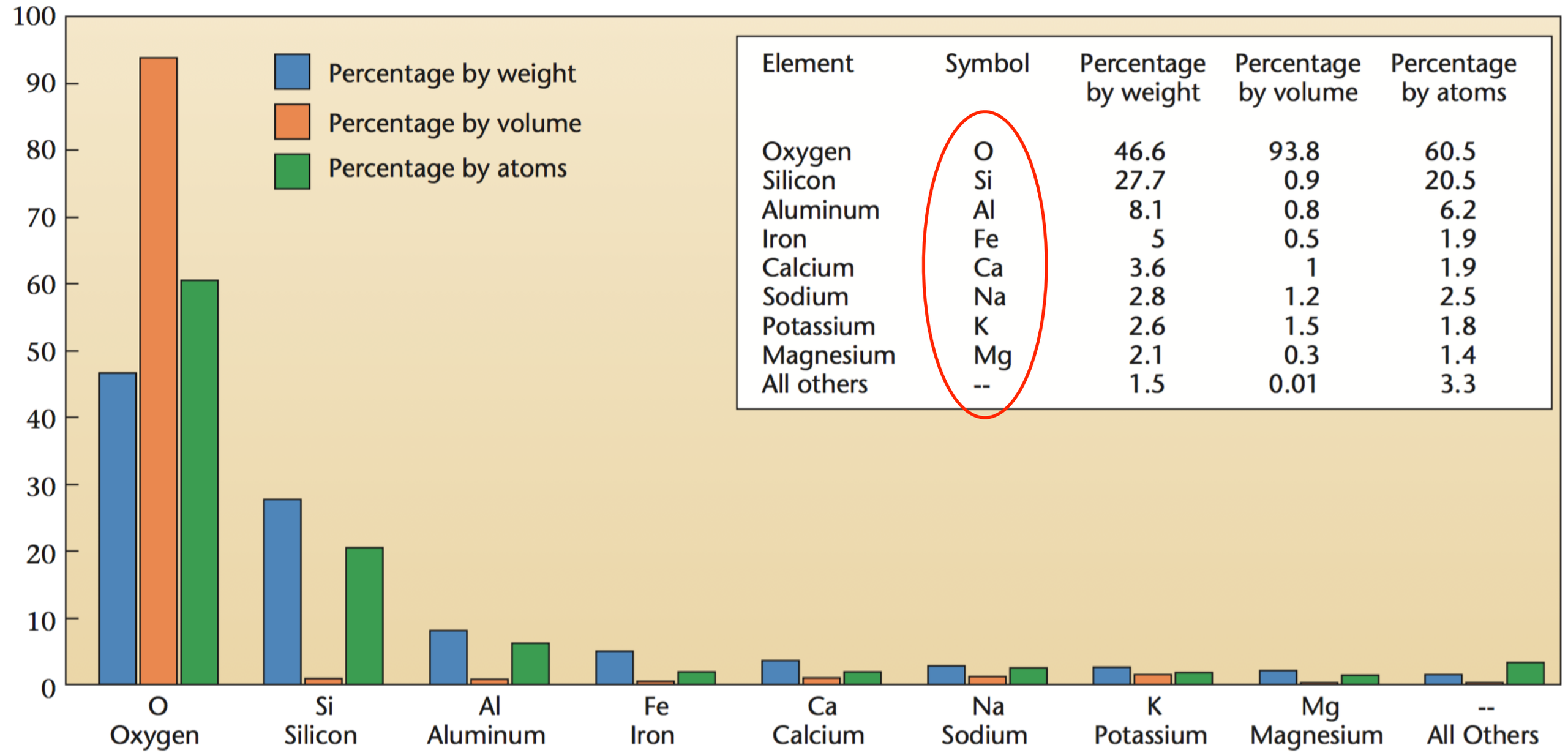
Det er nyttig å pugge denne rekkefølgen. Disse er så viktige.

FIGURE 2.14 A table and a graph illustrating the abundance of elements in the Earth's crust.

Merk at C og H (karbon og hydrogen) er ikke med

(Oksygen, Karbon, Hydrogen er vesentlig for organisk liv)

Oksygen, Silisium vesentlig for de fleste bergarter



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All others	--	1.5	0.01	3.3

FIGURE 2.14 A table and a graph illustrating the abundance of elements in the Earth's crust.

"Only Strong Athletes In College Study Past Midnight"

(Typisk bilde, tatt fra internett et sted…)

Her menes Grunnstoffer (ikke geologiske Mineraler)

Mineraler

Geologer 'leser' bergarter.

Min litt barnslig lesemodell:

- **Atomer tilsvarer bokstaver i en bok**
- **Mineraler tilsvarer ord**
- **Bergarter tilsvarer setninger**
- **Blotninger tilsvarer avsnitt**
- **Kartområder tilsvarer kapitler**

Definition of a Mineral:

A mineral is

- Naturally formed - it forms in nature on its own (some say without the aid of humans]
- Solid (it cannot be a liquid or a gas)
- With a definite chemical composition (every time we see the same mineral it has the same chemical composition that can be expressed by a chemical formula).
- and a characteristic crystalline structure (atoms are arranged within the mineral in a specific ordered manner). **ordered in a lattice *("gitter" på norsk)***
- usually inorganic, although a mineral can be formed by an organic process.

Definition of a Mineral:

A mineral is

- Naturally formed - it forms in nature on its own (some say without the aid of humans]
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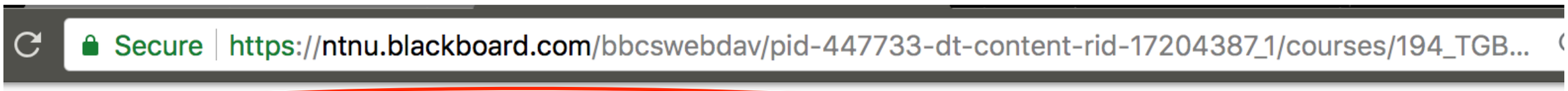
- and a characteristic crystalline structure (atoms are arranged within the mineral in a specific ordered manner).
- usually inorganic, although a mineral can be formed by an organic process.

KINGS

K kjemi
I ikke organisk
N naturlig
G gitter (lattice)
S solid

Last ned pdf-listen fra Pensum i Blackboard (Bb).
Alle skal bli kjent med disse ca. 110 ting. En fordel å 'pugge' dem etter du lærer mer om dem.

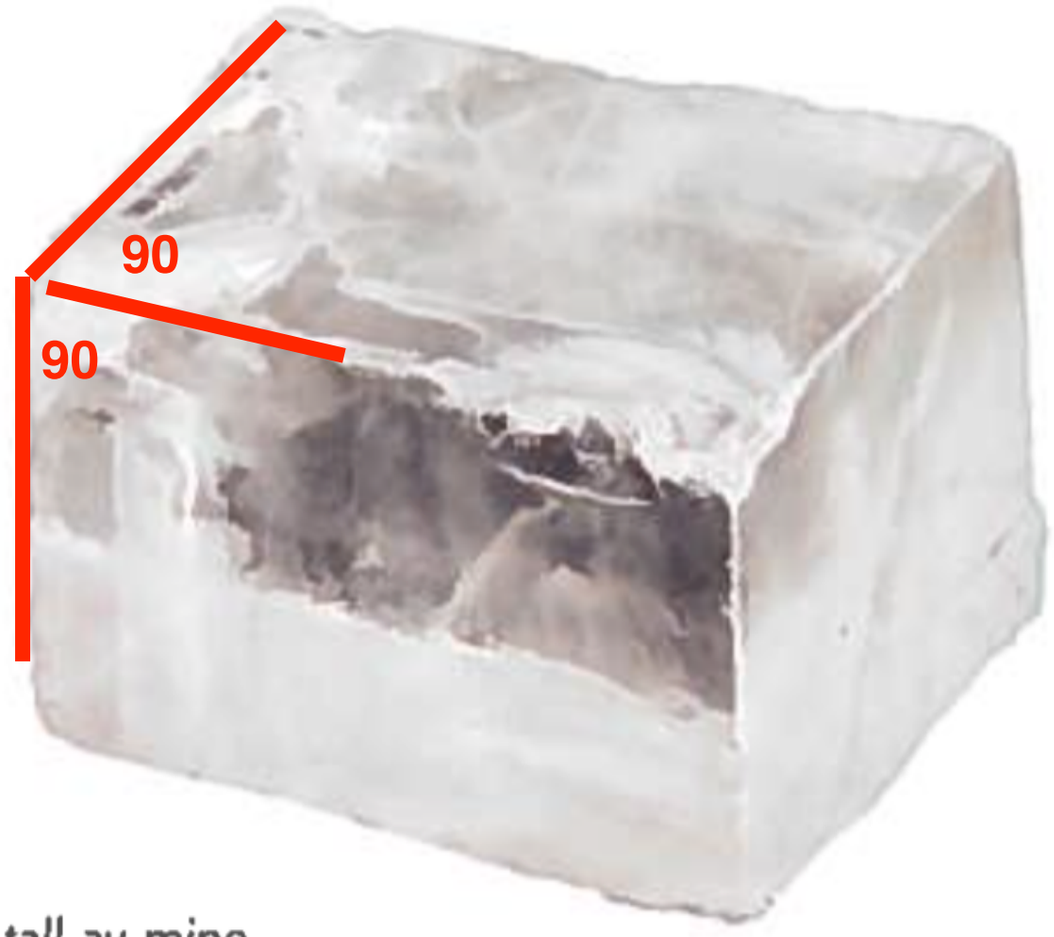


Lenke-liste, ca. 30 mineraler, 60 bergarter, 20 fossiler

Geologi innføring 18.08.2016 Allan Krill

ikke-silikater **(vi går videre, men kommer tilbake til disse)**

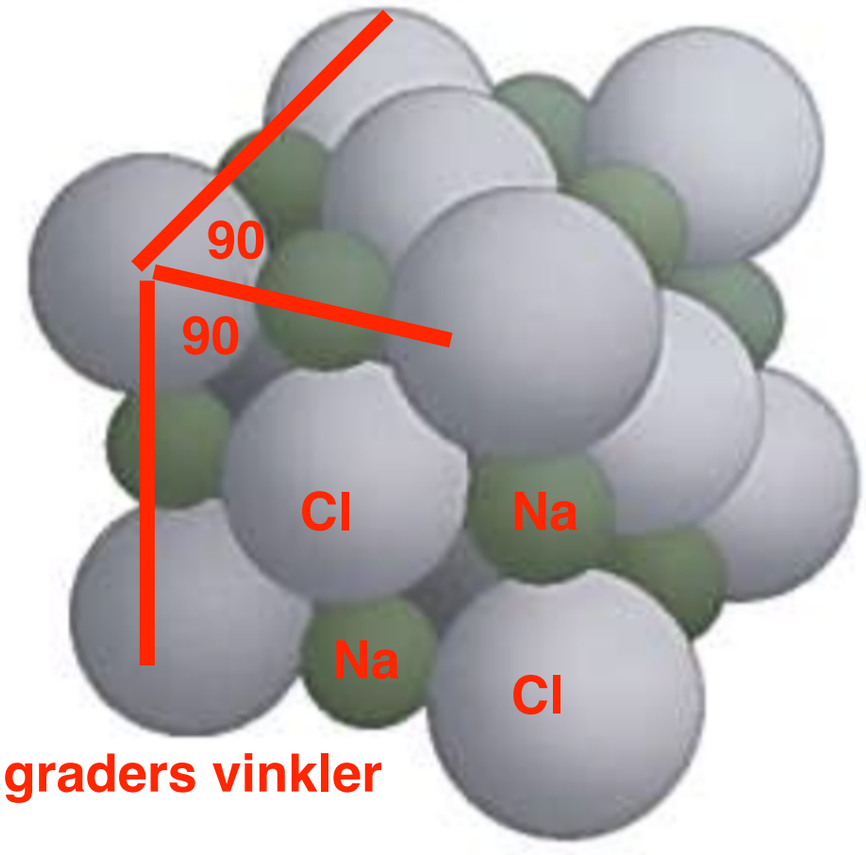
kalsitt / kalkspat $CaCO_3$ hardhet 3, 3 perfekte kløv, bruser med saltsyre (10%HCl)
dolomitt (Ca-Mg)CO_3 hardhet 3,5, 3 kløv, pulver bruser med saltsyre (10%HCl)
halitt / steinsalt NaCl, 3 perfekte kløv, kubisk, lav egenvekt
pyritt / svovelkis FeS_2 gullfarget men sort strek, hardt, kubiske krystaller, ingen kløv, oksiderer rustfarget
kobberkis / chalkopyritt ligner pyritt men mer orange og fargerik, oksiderer blågrønn
gips $CaSO_4.H_2O$ hardhet 2, vann i formelen, dannes ved lav temperatur
magnetitt Fe_3O_4 metallisk, magnetisk, gir svart strek
hematitt Fe_2O_3 metallisk blåsvart eller rustrød, gir rødbrun strek, derfor ble tidligere kalt "blod-jernglans
grafitt ren C, grå strek, kan tegne på papir som blyant



Krystall av mineralet halitt. Legg merke til at halitt krystalliserer etter et mønster som passer med mineralets indre krystallgitter.

Krystallgitteret i halitt (steinsalt) er bygd opp som en terning vekselvis med natriumioner Na^+ (grønne) og klorioner Cl^- (grågule).

Dette er ikke et *molekyl,*
fordi ubegrenset antall atomer



denne krystall har 90 graders vinkler
fordi gitteret har 90 graders vinkler

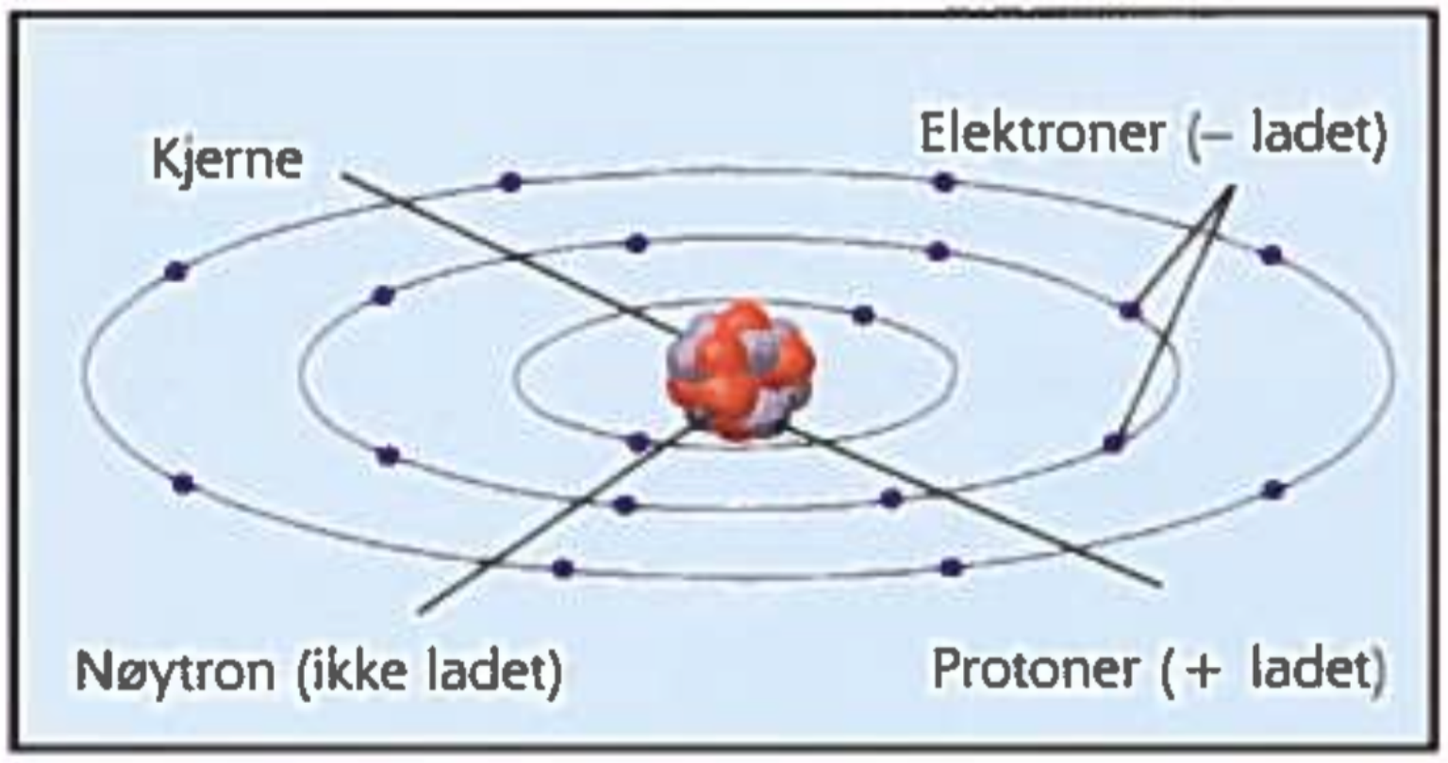
Mineralers egenskaper

Mineraler forekommer i en fasci-

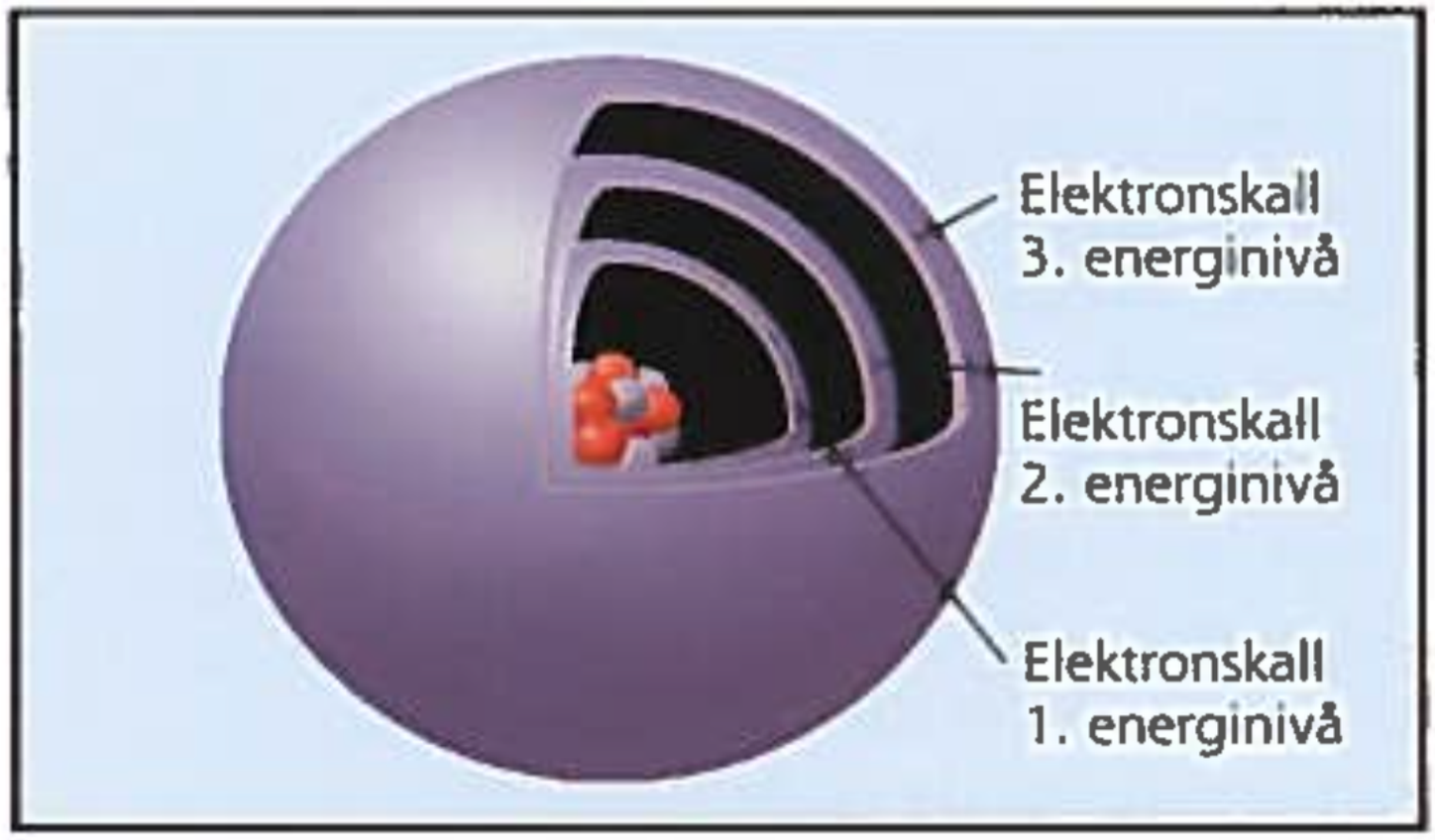
gjenspeiler dette indre krystallgitteret. Mineralet vil hele tiden

et mineral**, et** gitter**, en** krystall

kjemi repetisjon (dere kan fra før)



A



B

FIGURE a.5 This schematic drawing of a neon atom shows the two complete electron shells. The inner shell contains two electrons, the outer one eight. The "shells" merely represent the most likely location for an election to be.

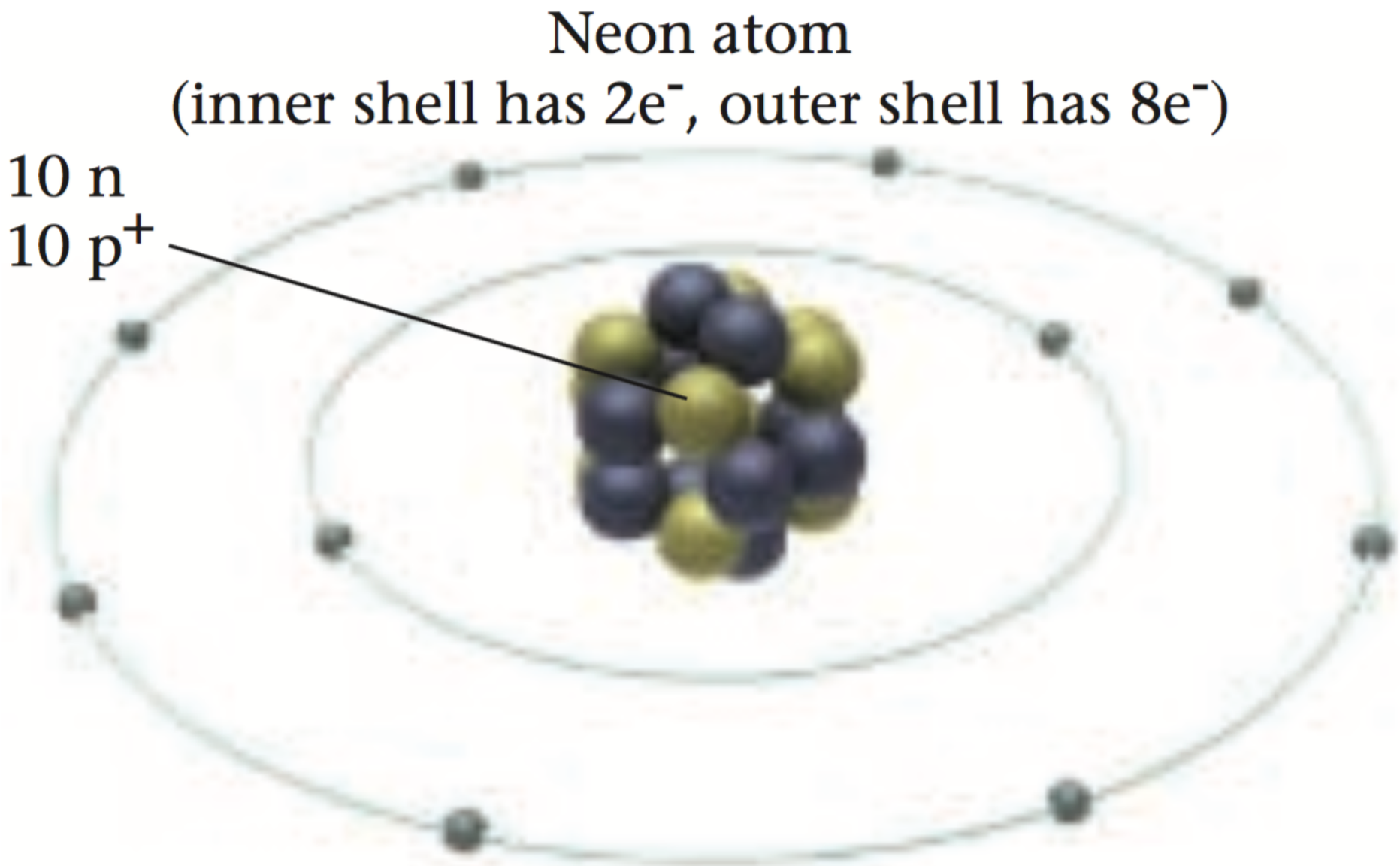


FIGURE a.3 The modern periodic table of the elements. The columns group elements with related properties. For example, inert gases are listed in the column on the right. Metals are found in the central and left parts of the chart.

Alkali metals

Symbol — He 2 Helium 4.002

Atomic number **atomisk nummer er lik antall protoner**

Name

Atomic weight

atomisk masse er omtrent lik antall protoner + nøytroner

Helium er 4,002 fordi vanlig helium har 2 + 2

Inert gases

Nonmetals

Transition elements (metals)

H 1 Hydrogen 1.007																	He 2 Helium 4.002
Li 3 Lithium 6.941	Be 4 Beryllium 9.0121											B 5 Boron 10.811	C 6 Carbon 12.011	N 7 Nitrogen 14.006	O 8 Oxygen 15.999	F 9 Fluorine 18.998	Ne 10 Neon 20.179
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Rb 37 Rubidium 85.467	Sr 38 Strontium 87.62	Y 39 Yttrium 88.905	Zr 40 Zirconium 91.224	Nb 41 Niobium 92.906	Mo 42 Molybdenum 95.94	Tc 43 Technetium 98.907	Ru 44 Ruthenium 101.07	Rh 45 Rhodium 102.905	Pd 46 Palladium 106.42	Ag 47 Silver 107.868	Cd 48 Cadmium 112.411	In 49 Indium 114.82	Sn 50 Tin 118.710	Sb 51 Antimony 121.757	Te 52 Tellurium 127.60	I 53 Iodine 126.904	Xe 54 Xenon 131.29
Cs 55 Cesium 132.905	Ba 56 Barium 137.327	La 57 Lanthanum 138.905	Hf 72 Hafnium 178.49	Ta 73 Tantalum 180.947	W 74 Tungsten 183.85	Re 75 Rhenium 186.207	Os 76 Osmium 190.2	Ir 77 Iridium 192.22	Pt 78 Platinum 195.08	Au 79 Gold 196.966	Hg 80 Mercury 200.59	Tl 81 Thallium 204.383	Pb 82 Lead 207.2	Bi 83 Bismuth 208.980	Po 84 Polonium 208.982	At 85 Astatine 209.987	Rn 86 Radon 222.017
Fr 87 Francium 223.019	Ra 88 Radium 226.025	Ac 89 Actinium 227.027															

Ce 58 Cerium 140.115	Pr 59 Praseodymium 140.907	Nd 60 Neodymium 144.24	Pm 61 Promethium 144.912	Sm 62 Samarium 150.36	Eu 63 Europium 151.965	Gd 64 Gadolinium 157.25	Tb 65 Terbium 158.925	Dy 66 Dysprosium 162.50	Ho 67 Holmium 164.930	Er 68 Erbium 167.26	Tm 69 Thulium 168.934	Yb 70 Ytterbium 173.04	Lu 71 Lutetium 174.967
Th 90 Thorium 232.038	Pa 91 Protactinium 231.035	U 92 Uranium 238.028	Np 93 Neptunium 237.048	Pu 94 Plutonium 244.064	Am 95 Americium 243.061	Cm 96 Curium 247.070	Bk 97 Berkelium 247.070	Cf 98 Californium 251.079	Es 99 Einsteinium 252.083	Fm 100 Fermium 257.095	Md 101 Mendelevium 258.10	No 102 Nobelium 259.100	Lr 103 Lawrencium 262.11

FIGURE a.3 The modern periodic table of the elements. The columns group elements with related properties. For example, inert gases are listed in the column on the right. Metals are found in the central and left parts of the chart.

Alkali metals

Symbol — He 2 Helium 4.002 — Atomic number **atomisk nummer er lik antall protoner**
Name
Atomic weight **atomisk masse er lik antall protoner + nøytroner**
Helium er 4,002 fordi det meste av helium har 2 nøytroner

Inert gases

Oksygen (O) er 15,999
hvorfor ikke 16…?

Nonmetals

H 1 Hydrogen 1.007																	He 2 Helium 4.002
Li 3 Lithium 6.941	Be 4 Beryllium 9.0121											B 5 Boron 10.811	C 6 Carbon 12.011	N 7 Nitrogen 14.006	O 8 Oxygen 15.999	F 9 Fluorine 18.998	Ne 10 Neon 20.179
Na 11 Sodium 22.989	Mg 12 Magnesium 24.305											Al 13 Aluminum 26.981	Si 14 Silicon 28.085	P 15 Phosphorus 30.973	S 16 Sulfur 32.066	Cl 17 Chlorine 35.452	Ar 18 Argon 39.948
K 19 Potassium 39.098	Ca 20 Calcium 40.078	Sc 21 Scandium 44.955	Ti 22 Titanium 47.88	V 23 Vanadium 50.941	Cr 24 Chromium 51.996	Mn 25 Manganese 54.938	Fe 26 Iron 55.847	Co 27 Cobalt 58.933	Ni 28 Nickel 58.693	Cu 29 Copper 63.546	Zn 30 Zinc 65.39	Ga 31 Gallium 69.723	Ge 32 Germanium 72.61	As 33 Arsenic 74.921	Se 34 Selenium 78.96	Br 35 Bromine 79.904	Kr 36 Krypton 83.80
Rb 37 Rubidium 85.467	Sr 38 Strontium 87.62	Y 39 Yttrium 88.905	Zr 40 Zirconium 91.224	Nb 41 Niobium 92.906	Mo 42 Molybdenum 95.94	Tc 43 Technetium 98.907	Ru 44 Ruthenium 101.07	Rh 45 Rhodium 102.905	Pd 46 Palladium 106.42	Ag 47 Silver 107.868	Cd 48 Cadmium 112.411	In 49 Indium 114.82	Sn 50 Tin 118.710	Sb 51 Antimony 121.757	Te 52 Tellurium 127.60	I 53 Iodine 126.904	Xe 54 Xenon 131.29
Cs 55 Cesium 132.905	Ba 56 Barium 137.327	La 57 Lanthanum 138.905	Hf 72 Hafnium 178.49	Ta 73 Tantalum 180.947	W 74 Tungsten 183.85	Re 75 Rhenium 186.207	Os 76 Osmium 190.2	Ir 77 Iridium 192.22	Pt 78 Platinum 195.08	Au 79 Gold 196.966	Hg 80 Mercury 200.59	Tl 81 Thallium 204.383	Pb 82 Lead 207.2	Bi 83 Bismuth 208.980	Po 84 Polonium 208.982	At 85 Astatine 209.987	Rn 86 Radon 222.017
Fr 87 Francium 223.019	Ra 88 Radium 226.025	Ac 89 Actinium 227.027															

Transition elements (metals)

Silisium (Si) er 28,085
hvorfor?

Kalium (K) er 39,098
hvorfor ikke 38…?

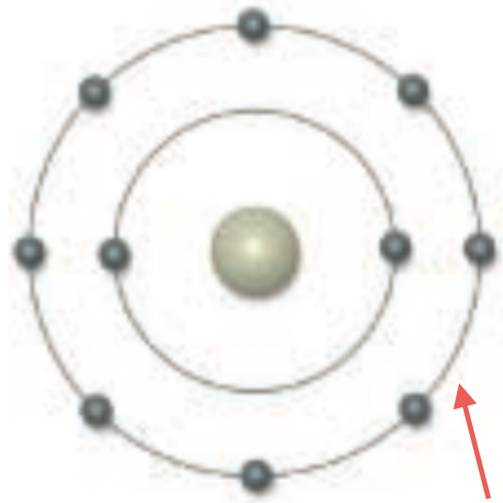
(20 neutroner vanlig)
radioaktiv K40 har 21

Ce 58 Cerium 140.115	Pr 59 Praseodymium 140.907	Nd 60 Neodymium 144.24	Pm 61 Promethium 144.912	Sm 62 Samarium 150.36	Eu 63 Europium 151.965	Gd 64 Gadolinium 157.25	Tb 65 Terbium 158.925	Dy 66 Dysprosium 162.50	Ho 67 Holmium 164.930	Er 68 Erbium 167.26	Tm 69 Thulium 168.934	Yb 70 Ytterbium 173.04	Lu 71 Lutetium 174.967
Th 90 Thorium 232.038	Pa 91 Protactinium 231.035	U 92 Uranium 238.028	Np 93 Neptunium 237.048	Pu 94 Plutonium 244.064	Am 95 Americium 243.061	Cm 96 Curium 247.070	Bk 97 Berkelium 247.070	Cf 98 Californium 251.079	Es 99 Einsteinium 252.083	Fm 100 Fermium 257.095	Md 101 Mendelevium 258.10	No 102 Nobelium 259.100	Lr 103 Lawrencium 262.11

(svarende har med isotoper å gjøre)

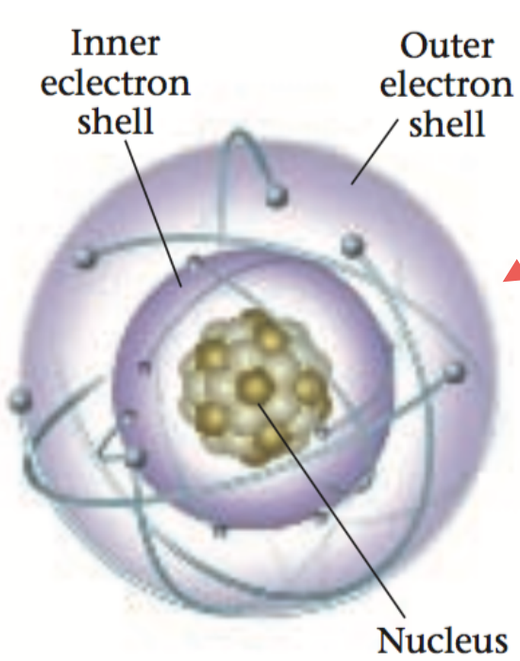
ulike modeller
som brukes
for atom-bindinger

(a)



(c)

ulike modeller
som brukes
for atomer.
(ingen modell
er helt god)



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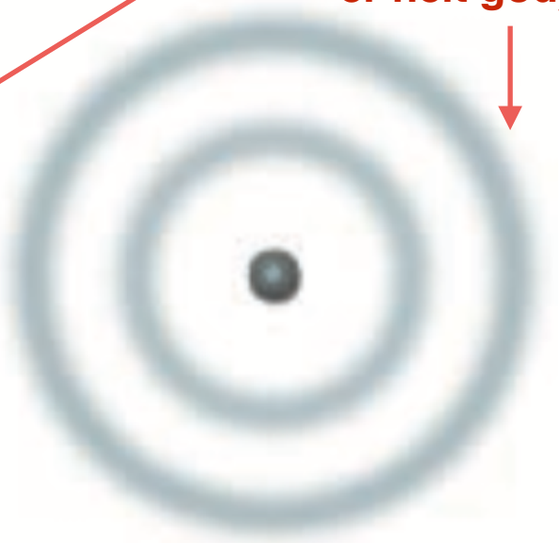


(d)

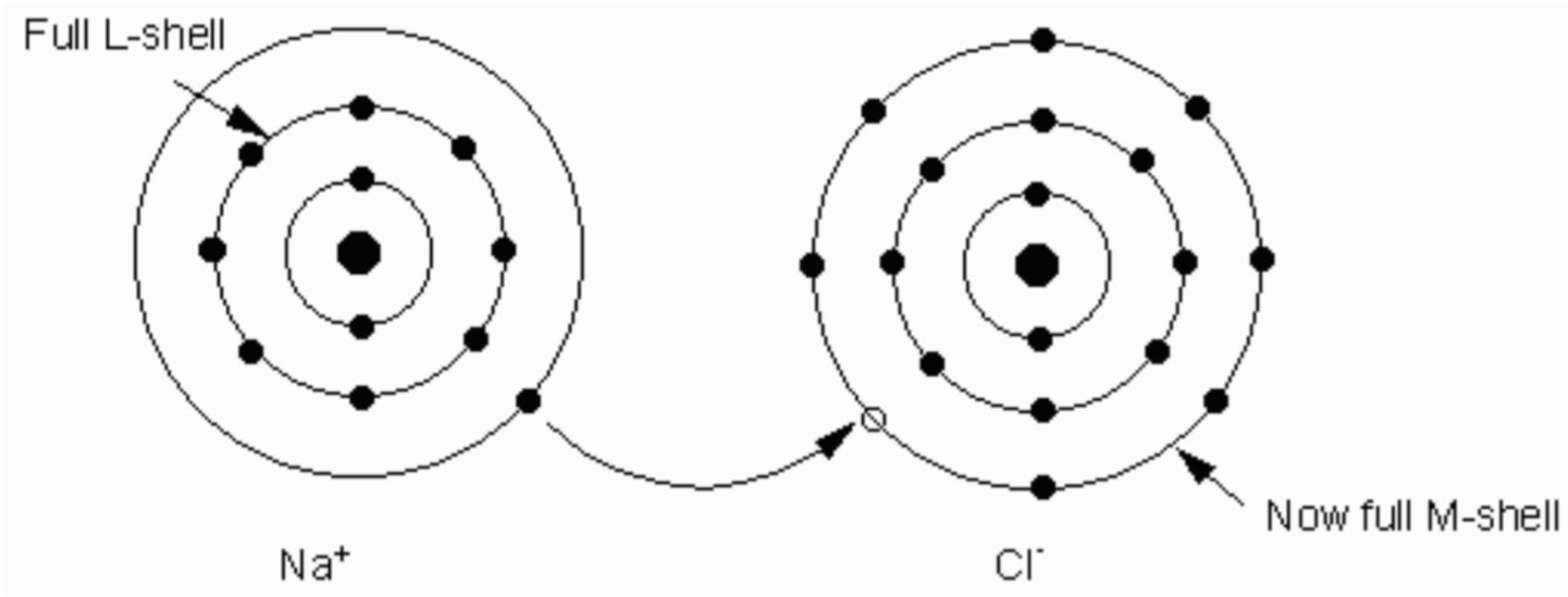
FIGURE a.4 Different ways of portraying atoms. **(a)** Two ways of portraying a water molecule. The large ball is oxygen, and the small ones are hydrogen. The "sticks" represent chemical bonds. **(b)** An image of an atom with a nucleus surrounded by electrons. **(c)** This diagram shows the number of electrons in the inner shells. **(d)** An alternative depiction of electron shells, implying that the electrons constitute a cloud. In reality, electrons do not follow simple circular orbits.

Nelson.pdf (page 21 of 248)

Search

ioniske bindinger

Ionic Bonds - caused by the force of attraction between ions of opposite charge.



Example Na^{+1} and Cl^{-1}. Bond to form NaCl (halite or salt).

Ionic bonds are moderately strong.

disse bindingene er sterke,
fordi atomene må sitte tett sammen
for å 'gi-og-ta' elektroner

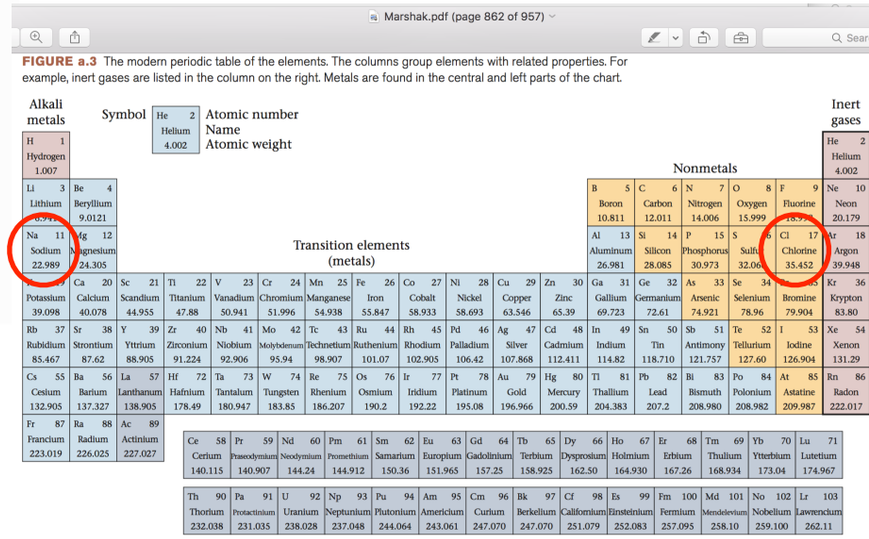

Marshak.pdf (page 862 of 957)

FIGURE a.3 The modern periodic table of the elements. The columns group elements with related properties. For example, inert gases are listed in the column on the right. Metals are found in the central and left parts of the chart.

Alkali metals | Symbol | Atomic number | Name | Atomic weight | Nonmetals | Inert gases

H 1 Hydrogen 1.007																	He 2 Helium 4.002
Li 3 Lithium 6.941	Be 4 Beryllium 9.0121											B 5 Boron 10.811	C 6 Carbon 12.011	N 7 Nitrogen 14.006	O 8 Oxygen 15.999	F 9 Fluorine 18.998	Ne 10 Neon 20.179
Na 11 Sodium 22.989	Mg 12 Magnesium 24.305	Transition elements (metals)										Al 13 Aluminum 26.981	Si 14 Silicon 28.085	P 15 Phosphorus 30.973	S 16 Sulfur 32.06	Cl 17 Chlorine 35.452	Ar 18 Argon 39.948
K 19 Potassium 39.098	Ca 20 Calcium 40.078	Sc 21 Scandium 44.955	Ti 22 Titanium 47.88	V 23 Vanadium 50.941	Cr 24 Chromium 51.996	Mn 25 Manganese 54.938	Fe 26 Iron 55.847	Co 27 Cobalt 58.933	Ni 28 Nickel 58.693	Cu 29 Copper 63.546	Zn 30 Zinc 65.39	Ga 31 Gallium 69.723	Ge 32 Germanium 72.61	As 33 Arsenic 74.921	Se 34 Selenium 78.96	Br 35 Bromine 79.904	Kr 36 Krypton 83.80
Rb 37 Rubidium 85.467	Sr 38 Strontium 87.62	Y 39 Yttrium 88.905	Zr 40 Zirconium 91.224	Nb 41 Niobium 92.906	Mo 42 Molybdenum 95.94	Tc 43 Technetium 98.907	Ru 44 Ruthenium 101.07	Rh 45 Rhodium 102.905	Pd 46 Palladium 106.42	Ag 47 Silver 107.868	Cd 48 Cadmium 112.411	In 49 Indium 114.82	Sn 50 Tin 118.710	Sb 51 Antimony 121.757	Te 52 Tellurium 127.60	I 53 Iodine 126.904	Xe 54 Xenon 131.29
Cs 55 Cesium 132.905	Ba 56 Barium 137.327	La 57 Lanthanum 138.905	Hf 72 Hafnium 178.49	Ta 73 Tantalum 180.947	W 74 Tungsten 183.85	Re 75 Rhenium 186.207	Os 76 Osmium 190.2	Ir 77 Iridium 192.22	Pt 78 Platinum 195.08	Au 79 Gold 196.966	Hg 80 Mercury 200.59	Tl 81 Thallium 204.383	Pb 82 Lead 207.2	Bi 83 Bismuth 208.980	Po 84 Polonium 208.982	At 85 Astatine 209.987	Rn 86 Radon 222.017
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Ce 58 Cerium 140.115	Pr 59 Praseodymium 140.907	Nd 60 Neodymium 144.24	Pm 61 Promethium 144.912	Sm 62 Samarium 150.36	Eu 63 Europium 151.965	Gd 64 Gadolinium 157.25	Tb 65 Terbium 158.925	Dy 66 Dysprosium 162.50	Ho 67 Holmium 164.930	Er 68 Erbium 167.26	Tm 69 Thulium 168.934	Yb 70 Ytterbium 173.04	Lu 71 Lutetium 174.967
Th 90 Thorium 232.038	Pa 91 Protactinium 231.035	U 92 Uranium 238.028	Np 93 Neptunium 237.048	Pu 94 Plutonium 244.064	Am 95 Americium 243.061	Cm 96 Curium 247.070	Bk 97 Berkelium 247.070	Cf 98 Californium 251.079	Es 99 Einsteinium 252.083	Fm 100 Fermium 257.095	Md 101 Mendelevium 258.10	No 102 Nobelium 259.100	Lr 103 Lawrencium 262.11


Schou Jensen.pdf (page 32 of 112) — Edited

Krystall av mineralet halitt. Legg merke til at halitt krystalliserer etter et mønster som passer med mineralets indre krystallgitter.

Krystallgitteret i halitt (steinsalt) er bygd opp som en terning vekselvis med natriumioner Na^+ (grønne) og klorioner Cl^- (grågule).

Mineralers egenskaper

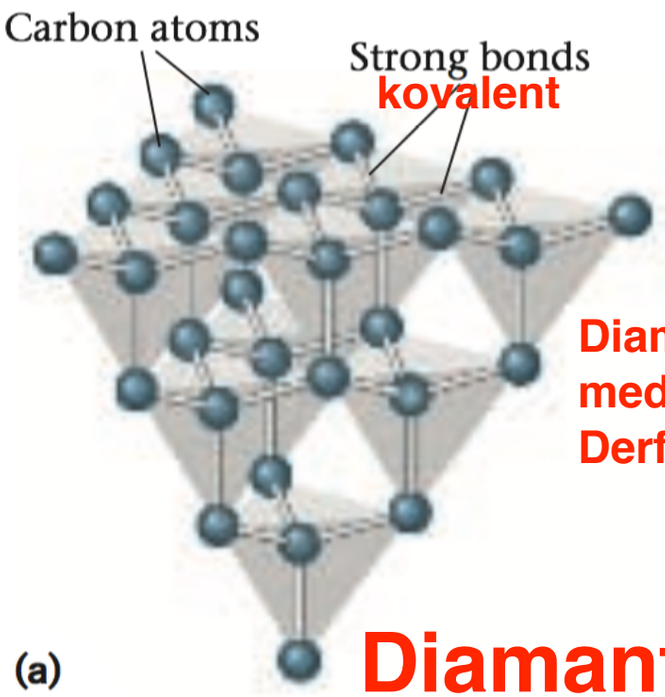
Mineraler forekommer i en fasci-

gjenspeiler dette indre krystallgitteret. Mineralet vil hele tiden

- ***Covalent Bonds*** - Electrons are shared between two or more atoms so that each atom has a stable electronic configuration (completely filled outermost shell) part of the time.

Kovalente bindinger

disse bindingene er også sterke,
fordi atomene må sitte tett sammen
for å dele elektroner mellom seg



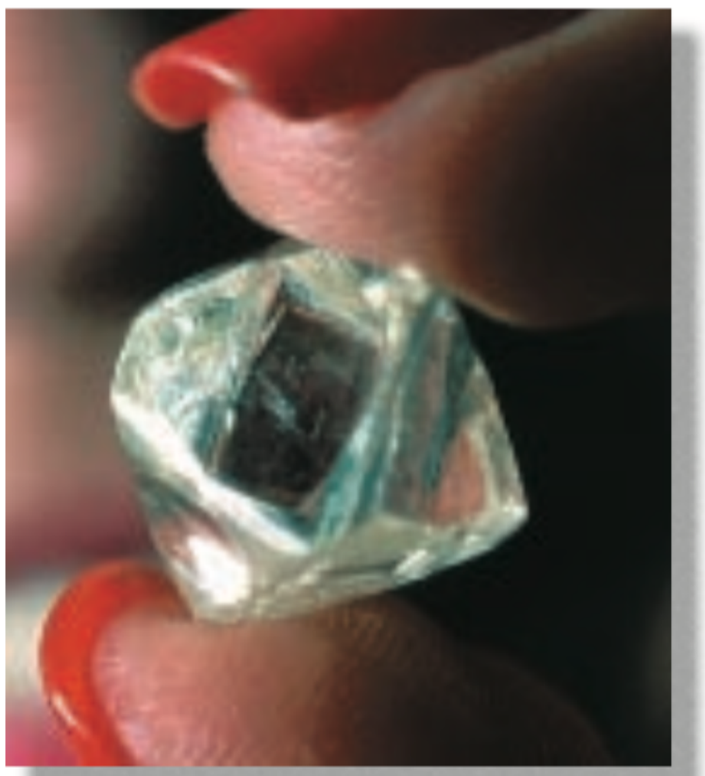
(a)

FIGURE 5.7 **(a)** A ball-and-stick model of diamond, composed of covalently bonded atoms of carbon arranged in a tetrahedron. **(b)** A photograph of a diamond crystal. **(c)** A ball-and-stick model of graphite. Note that the carbon atoms are arranged in sheets of hexagons; the sheets are held together by weak bonds. **(d)** A photograph of a graphite crystal.

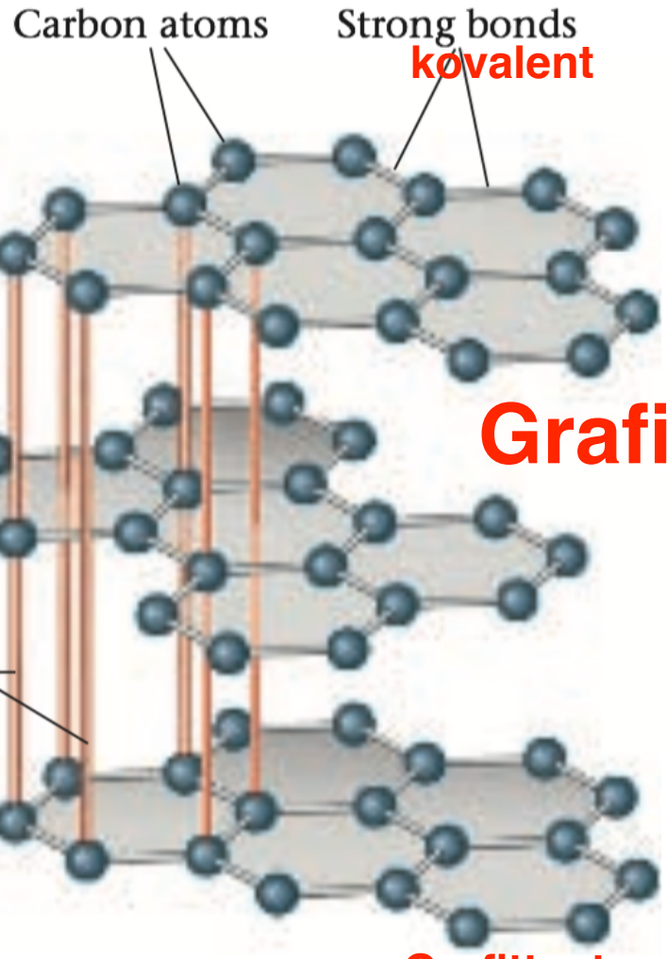
"Van der Waals" bindinger

Diamant: atomene sitter tett sammen
med sterke bindinger.
Derfor hardt mineral.

Diamant

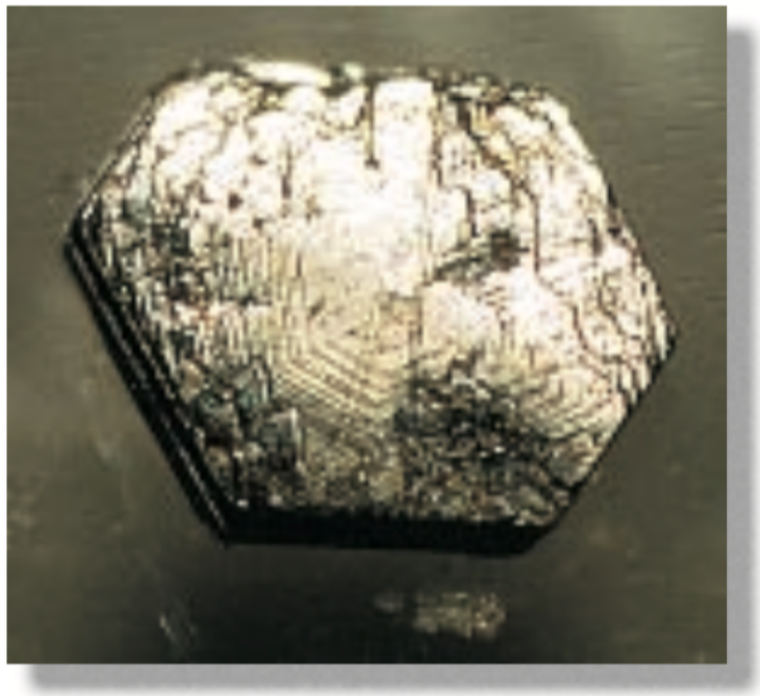


(b)



(c)

Grafitt

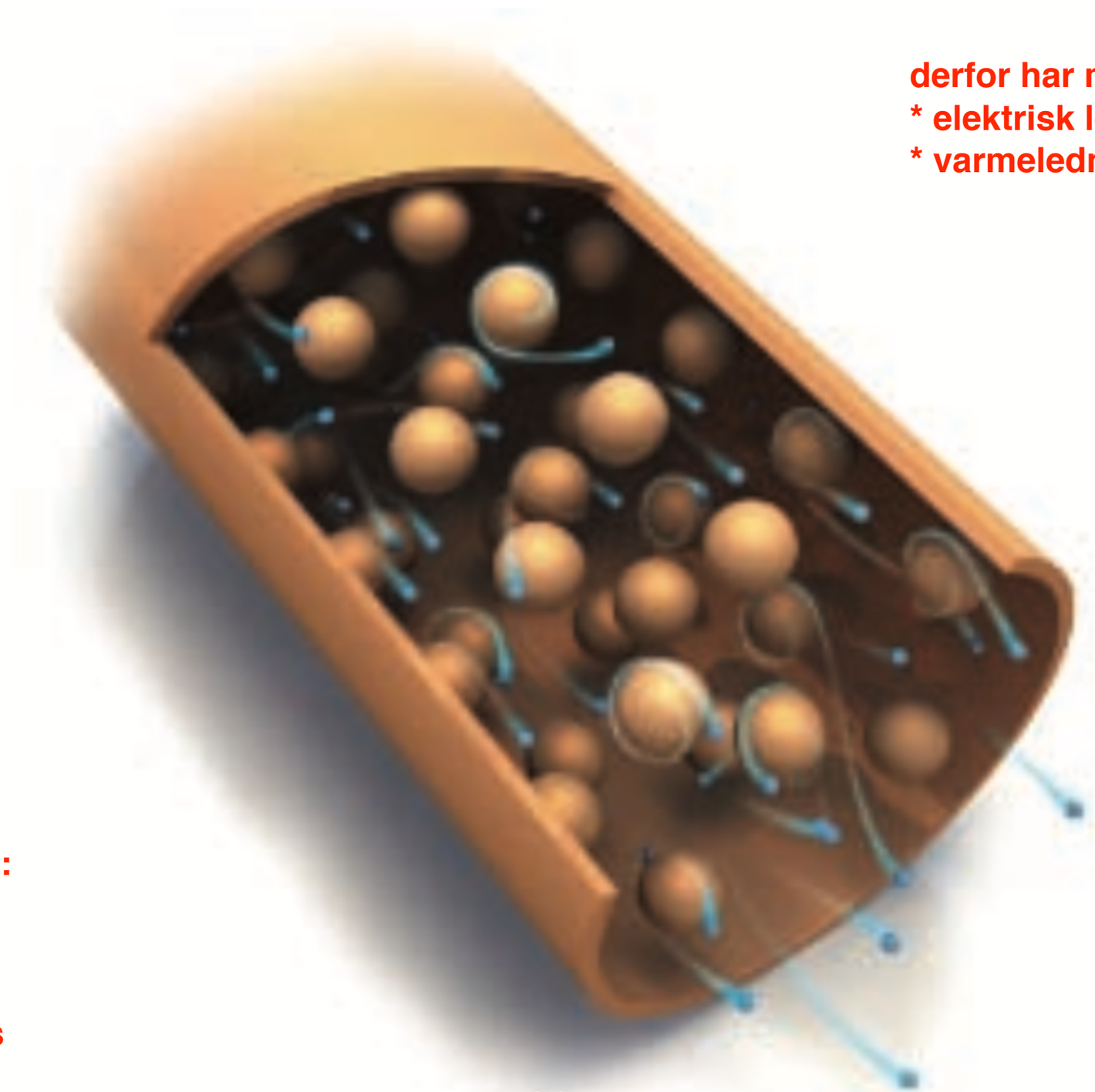


(d)

Grafitt: atomene sterk i plan, svak mellom planene.
Derfor myk (med grå strek, blyant).

"**metalliske** bindinger"

FIGURE a.11 In a metallically bonded material, nuclei and their inner shells of electrons float in a "sea" of free electrons. Sometimes the electrons orbit the nuclei, but at other times they stream through the metal.



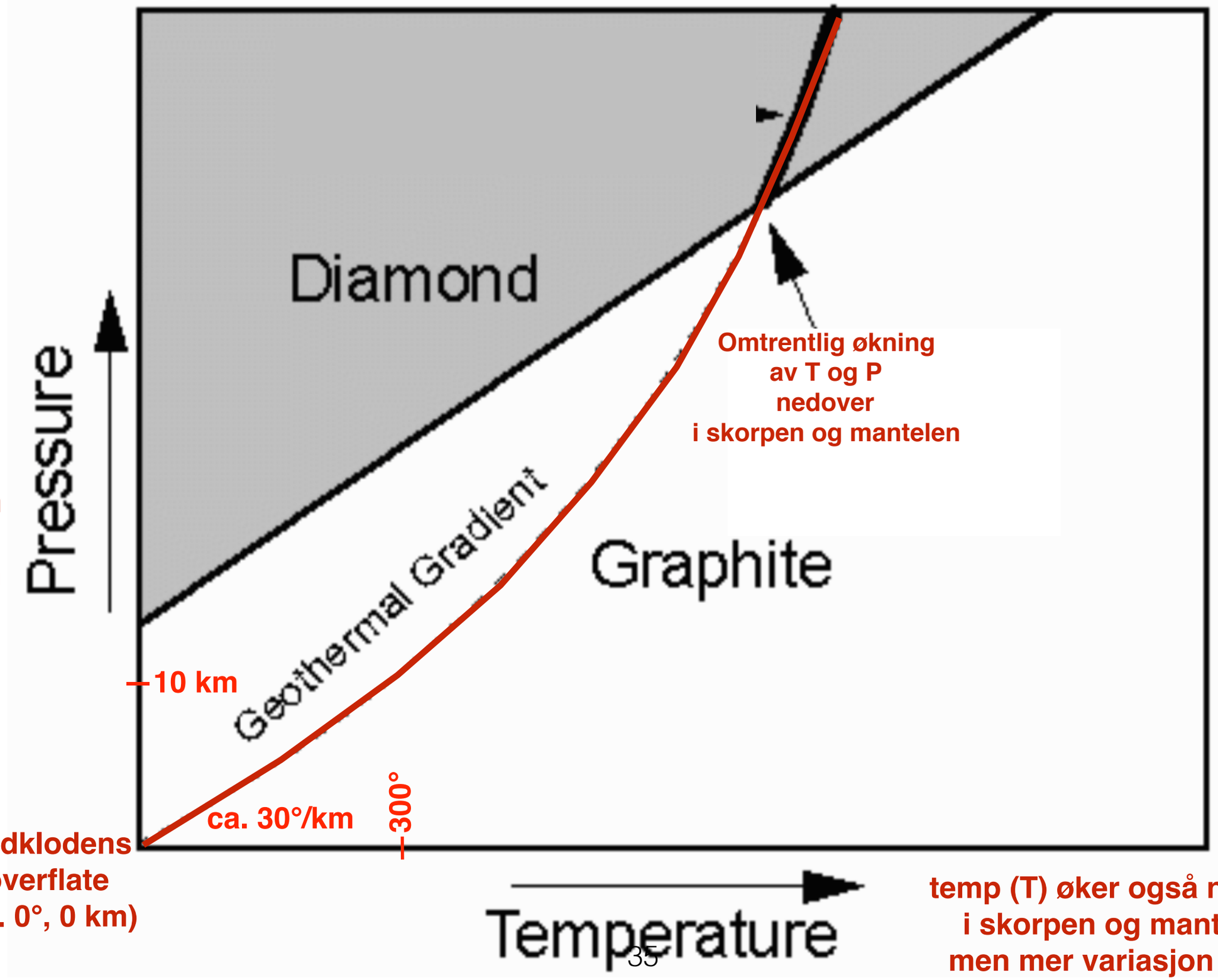
derfor har metaller god:
*** elektrisk ledningsevne**
*** varmeledningsevne**

da har vi hørt om:
- **Ioniske**
- **Kovalente**
- **Metalliske**
- **Van der Waals**

"Fasediagram" for to "faser" av karbon. Heter ofte et "PT-diagram"

Polymorphs of Carbon

"poly" = flere "morf" = form



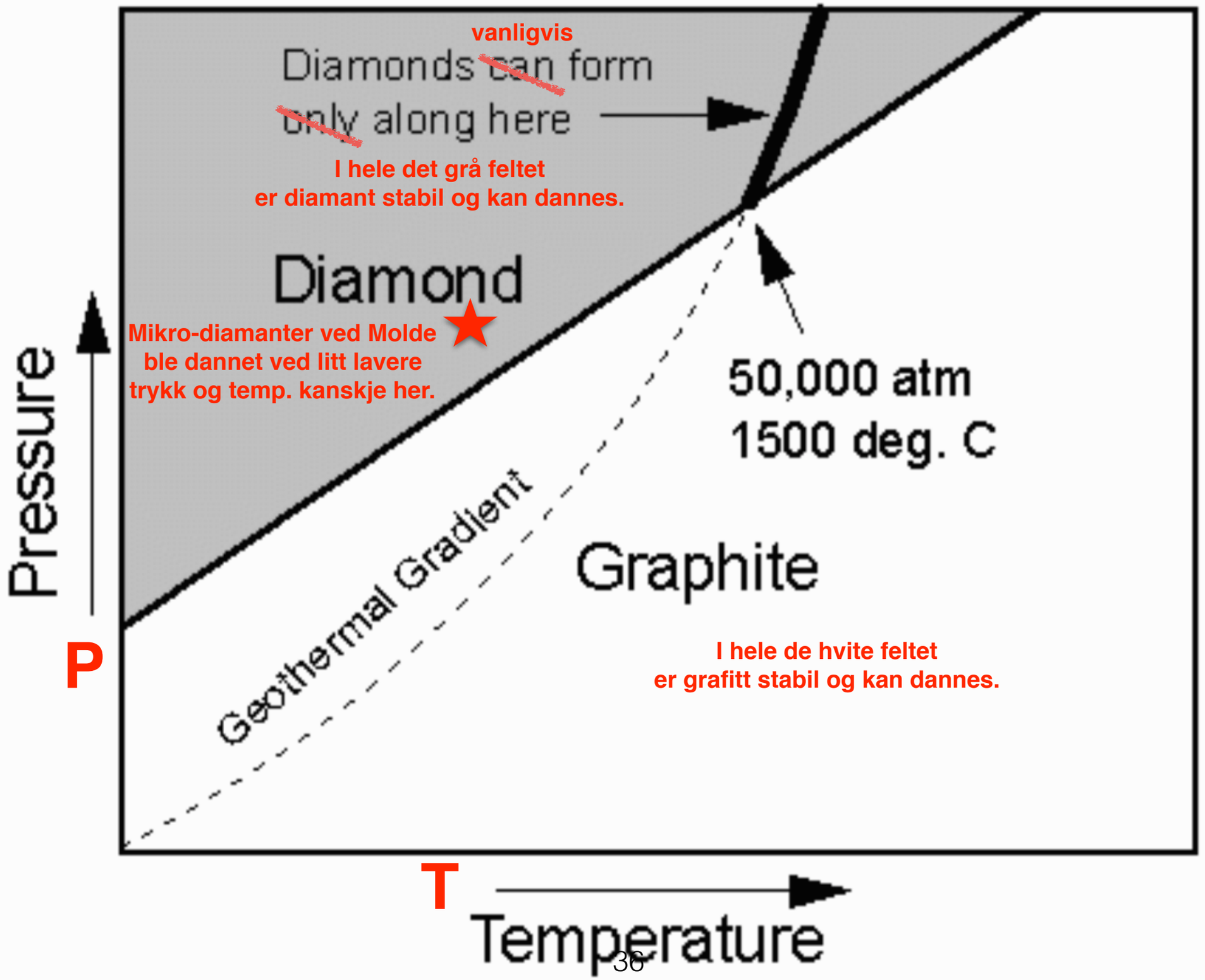
trykk (P) øker nedover i skorpen og mantelen

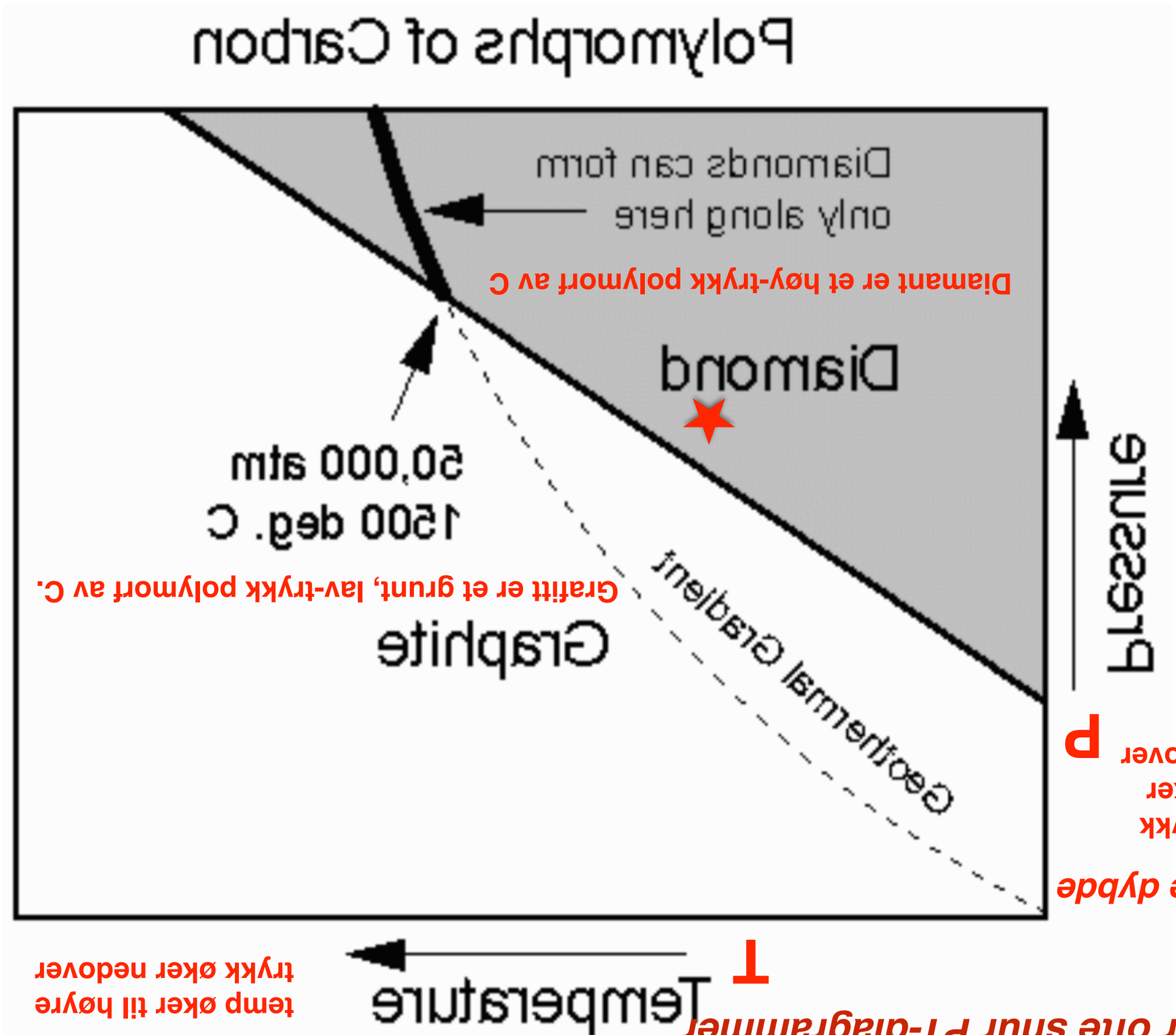
Omtrentlig økning av T og P nedover i skorpen og mantelen

jordklodens overflate (ca. 0°, 0 km)

temp (T) øker også nedover i skorpen og mantelen, men mer variasjon enn P

Polymorphs of Carbon





Geologer otte snur PT-diagrammer