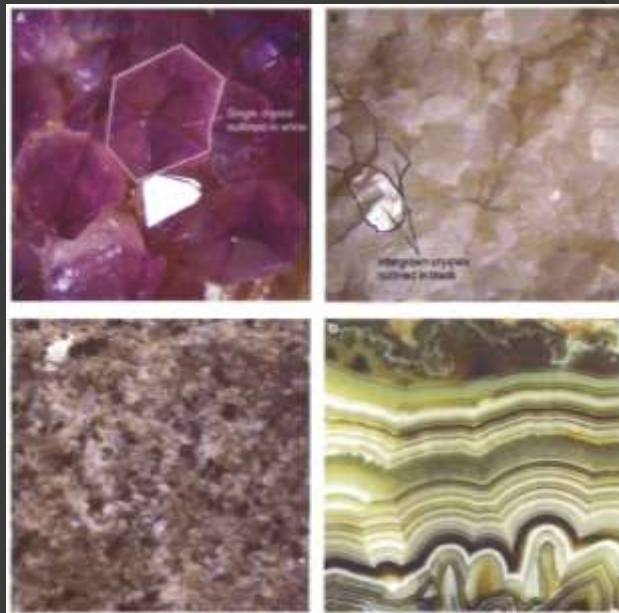
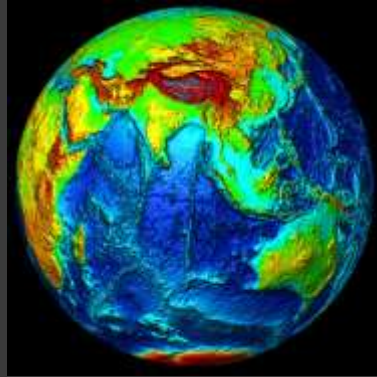
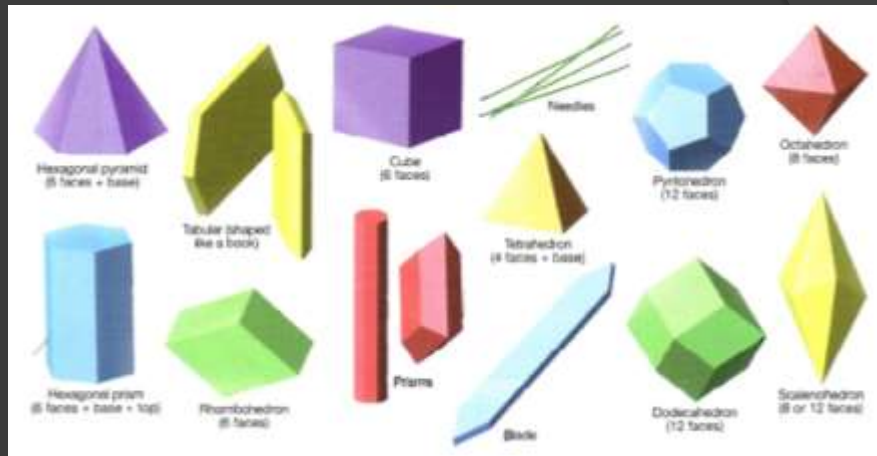


ROCKS AND MINERAL



KRISTAL, MINERAL DAN BATUAN



BENTUK KRISTAL



HALITE



HEMATITE

- BENTUK KRITAL
- WARNA
- KILAP
- CORET/STREAK
- BIDANG BELAH
- KEKERASAN

SIFAT FISIK MINERAL

Number of Cleavage Directions	Shapes that Crystals Assume in Nature	Sketch	Illustration of Cleavage Directions
None (no cleavage, only fracture)	Irregular masses with no surface		None
1	Block cleavage "Block" that split apart along flat planes		
2 or 3	Prism-like or plate-like crystals with sharp edges and flat faces		
2 or 3 or 4	Prism-like or plate-like crystals with sharp edges and flat faces		
3 or 4	Block cleavage Sharp ends of cubes and pyramids		
3 or 4 or 6	Four-sided cleavage Sharp ends of double pyramids		
4	Cubic cleavage Sharp ends of octahedrons and pyramids		
6	Sharp ends of double pyramids and pyramids of rhombohedrons		

FELDSPAR

BIDANG BELAH (CLEAVAGE)

HORNBLENDA

PYROXENE

BIDANG BELAH (CLEAVAGE)

Mohs Scale of Hardness*		Hardness of Some Common Objects
HARD	10 Diamond	
	9 Corundum	
	8 Topaz	
	7 Quartz	
	6 Orthoclase Feldspar	6.5 Streak plate
SOFT	5 Apatite	5.5 Glass, Masonry nail, Knife blade
	4 Fluorite	4.5 Wire (iron) nail
	3 Calcite	3.5 Copper wire or coin (penny)
	2 Gypsum	2.5 Fingernail
	1 Talc	

SKALA MOHS



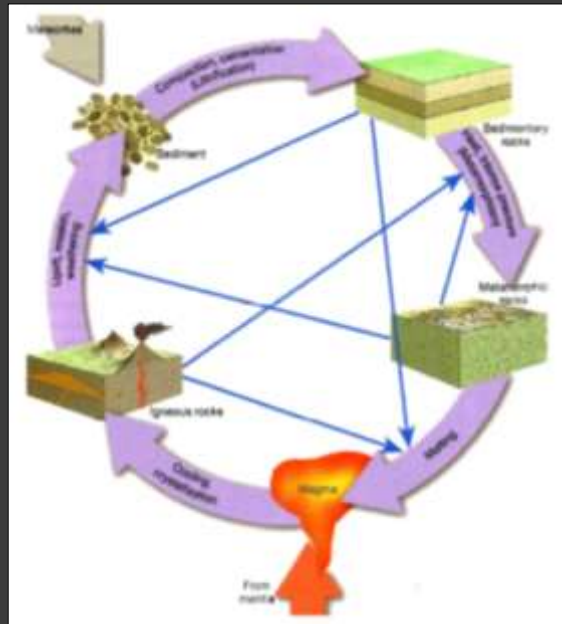
SIFAT KHUSUS

MINERAL DATABASE (Alphabetical Listing)						MINERAL DATABASE (Alphabetical Listing)					
Mineral	Color	Streak	Break	Diagnostic Properties	Notes	Mineral	Color	Streak	Break	Diagnostic Properties	Notes
ADAMITE	Colorless	Colorless	Conchoidal	Crystal form: prismatic, prisms with sharp edges, faces {100}, {110}, {111}, {112}, {113}, {114}, {115}, {116}, {117}, {118}, {119}, {120}, {121}, {122}, {123}, {124}, {125}, {126}, {127}, {128}, {129}, {130}, {131}, {132}, {133}, {134}, {135}, {136}, {137}, {138}, {139}, {140}, {141}, {142}, {143}, {144}, {145}, {146}, {147}, {148}, {149}, {150}, {151}, {152}, {153}, {154}, {155}, {156}, {157}, {158}, {159}, {160}, {161}, {162}, {163}, {164}, {165}, {166}, {167}, {168}, {169}, {170}, {171}, {172}, {173}, {174}, {175}, {176}, {177}, {178}, {179}, {180}, {181}, {182}, {183}, {184}, {185}, {186}, {187}, {188}, {189}, {190}, {191}, {192}, {193}, {194}, {195}, {196}, {197}, {198}, {199}, {200}, {201}, {202}, {203}, {204}, {205}, {206}, {207}, {208}, {209}, {210}, {211}, {212}, {213}, {214}, {215}, {216}, {217}, {218}, {219}, {220}, {221}, {222}, {223}, {224}, {225}, {226}, {227}, {228}, {229}, {230}, {231}, {232}, {233}, {234}, {235}, {236}, {237}, 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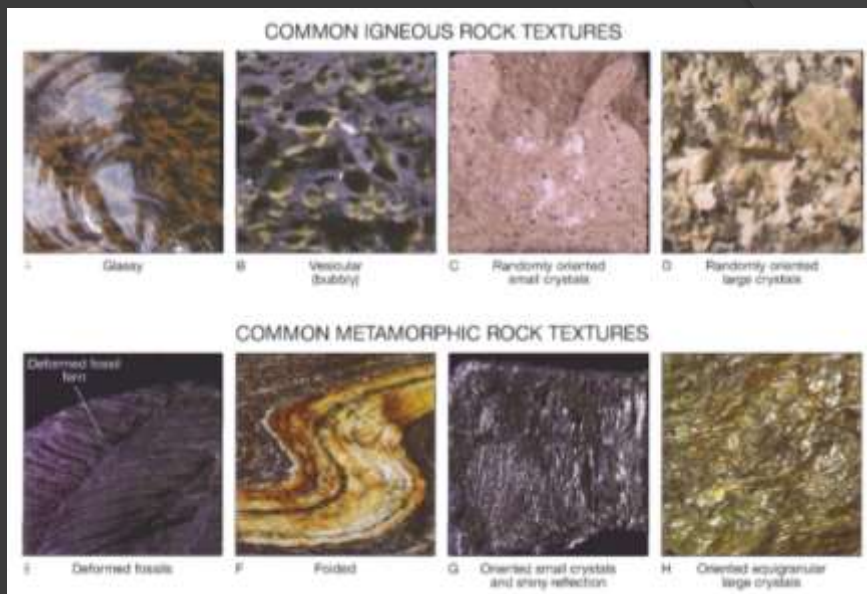
DATABASE MINERAL



MINERAL PEMBENTUK BATUAN



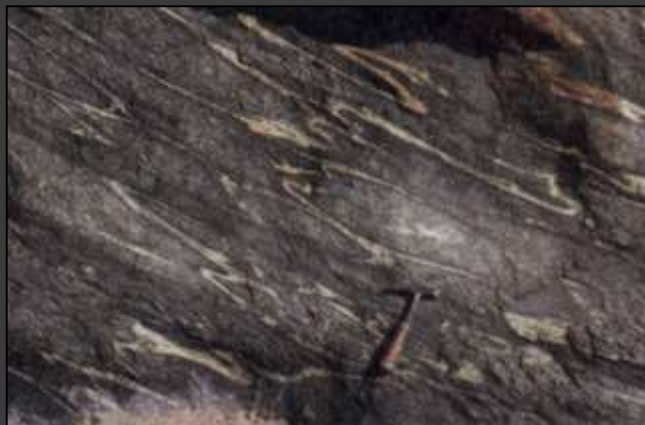
SIKLUS BATUAN



WARNA, TEKSTUR, STRUKTUR



BATUAN METAMORFOSA

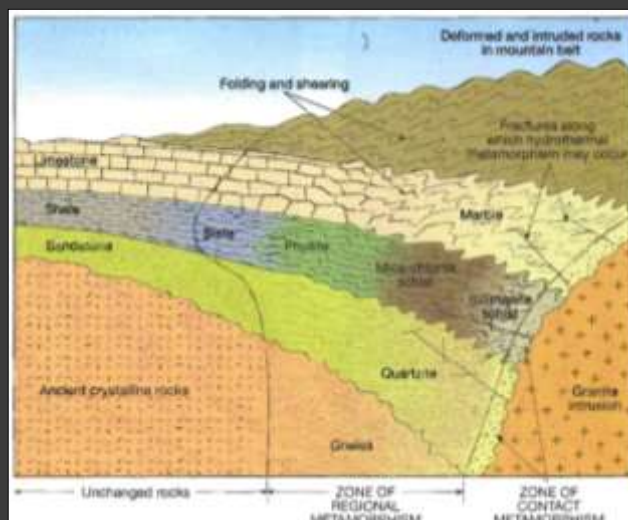


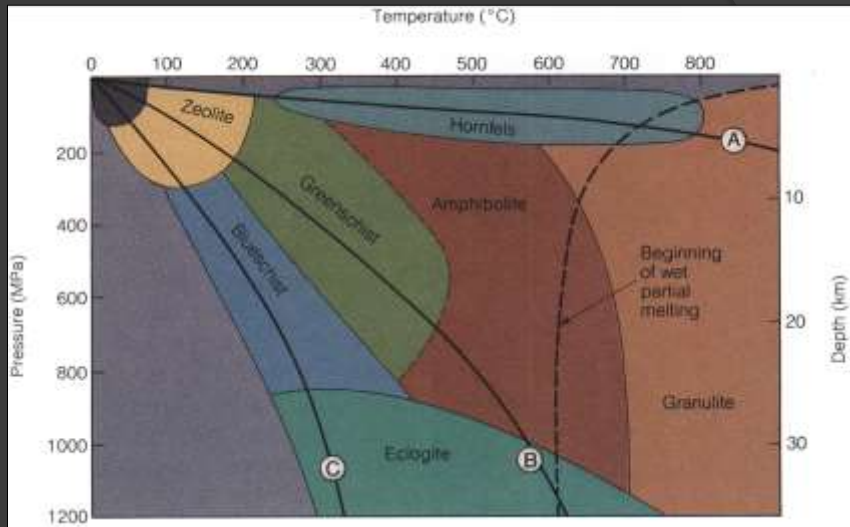
2005

Metamorfosa dan Batuan Metamorfik

- Batuan metamorfik umumnya terjadi dibawah permukaan akibat **panas (T)**, **tekanan (P)** dan **aktifitas fluida**
- Panas dari intrusi magma adalah sumber utama yang menyebabkan metamorfosa.
- Tekanan terjadi diakibatkan oleh beban perlapisan diatas (lithostatic pressure) atau tekanan diferensial sebagai hasil berbagai stress misalnya tektonik stress (*differential stress*)
- Fluida yang berasal dari batuan sedimen dan magma dapat mempercepat reaksi kima yang berlangsung pada saat proses metamorfosa yang dapat menyebabkan pembentukan mineral baru

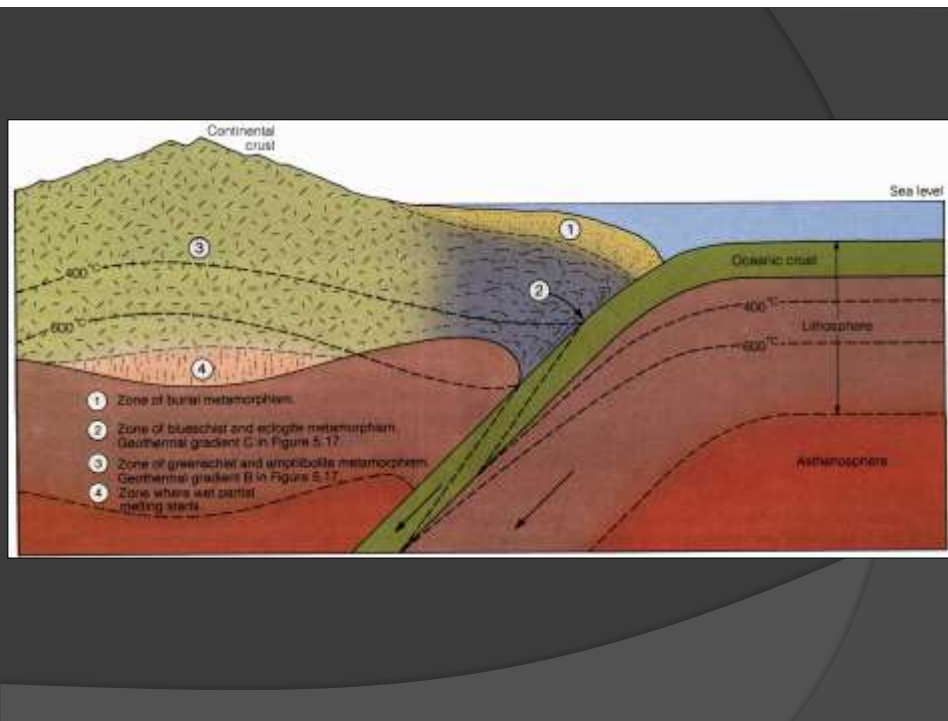
- Tiga jenis metamorfosa: **Kontak**, **Dinamik** dan **Regional metamorfosa**





- A. Thermal gradient around an intrusive igneous rock
 B. Normal continental geothermal gradient
 C. Geothermal gradient at subduction zone

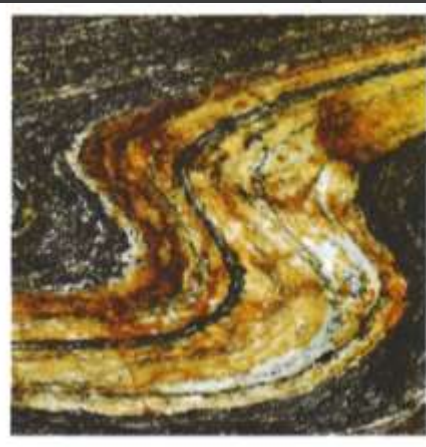
Facies Metamorfosa



- Pada prinsipnya batuan metamorfosa diklasifikasikan berdasarkan tekstur. Tekstur *foliasi* terjadi akibat orientasi dari mineral, sedangkan *non-foliasi* yang tidak memperlihatkan orientasi mineral.

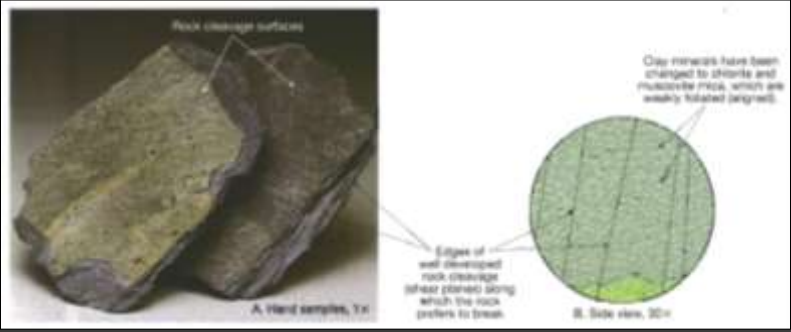
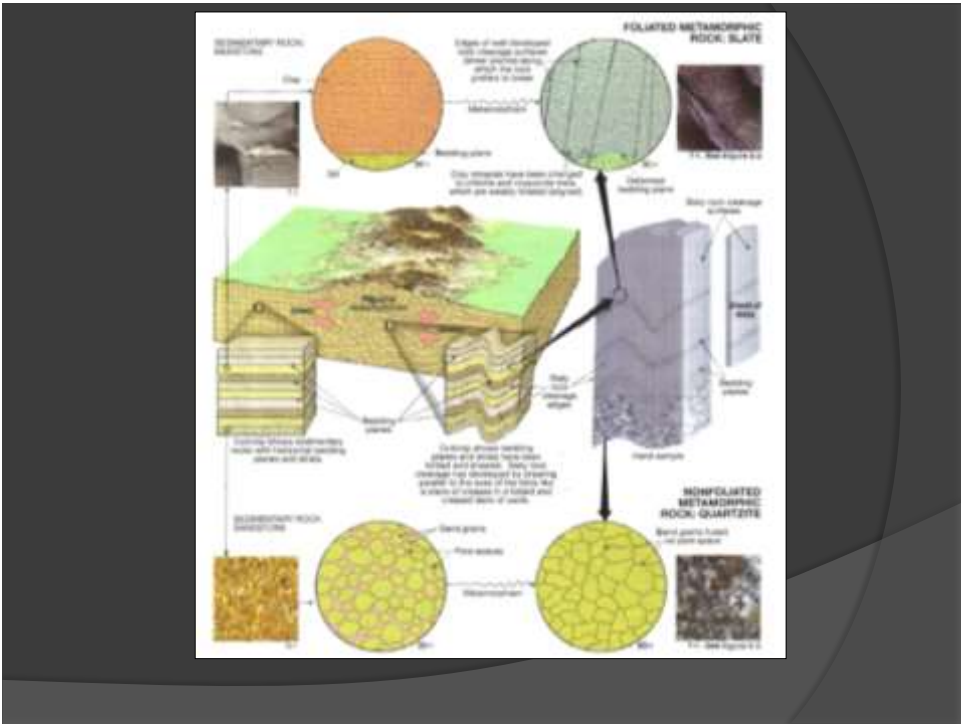


KLASIFIKASI BATUAN METAMORF

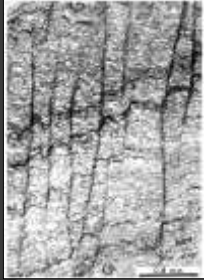


- Merekam peristiwa deformasi (strain)
- Veins sebagai bukti aktifitas fluida

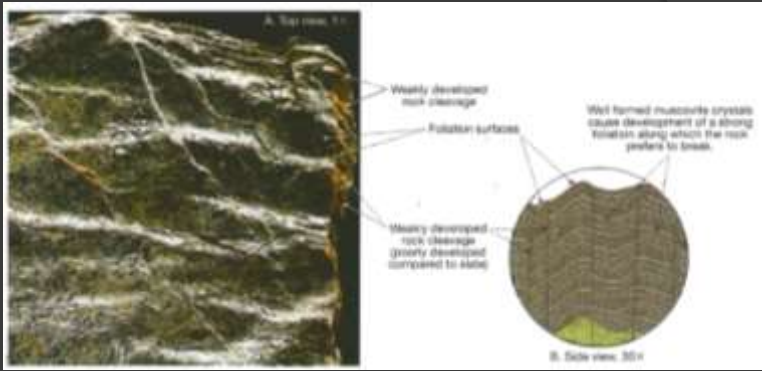
KLASIFIKASI BATUAN METAMORF



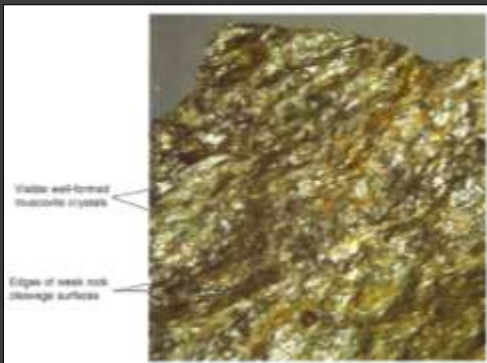
SLATE



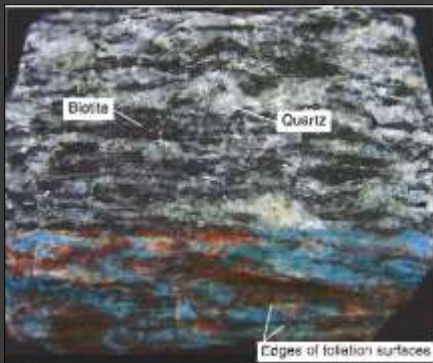
FOLIATED



PHYLLITE



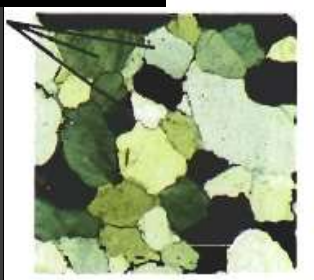
MICA SCHIST



GNEISSIC TEXTURE

SCHIST AND GNEISS

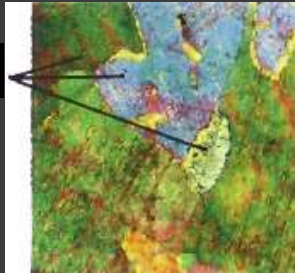
QUARTZ SAND GRAINS



QUARTZITE

NON-FOLIATED

CALCITE CRYSTALS



MARBLE

NON-FOLIATED

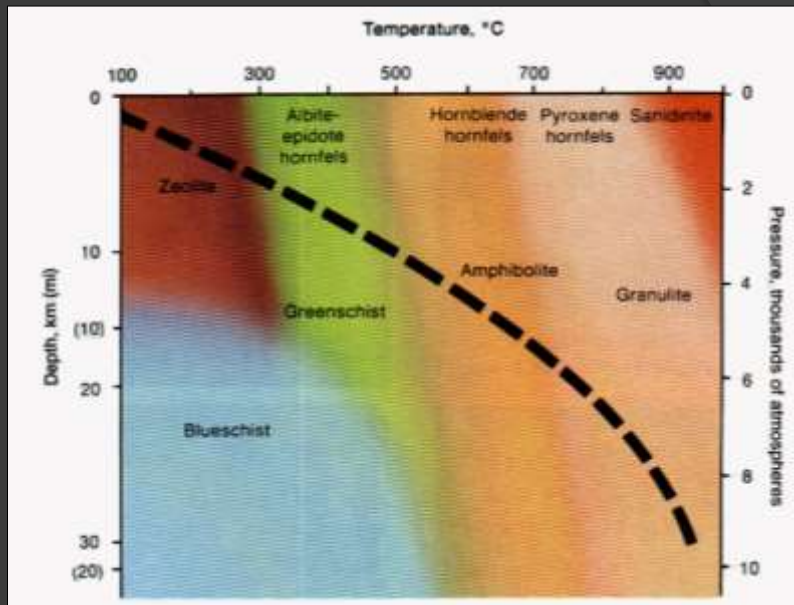


TOURMALINE QUARTZITE



ANTRACITE COAL

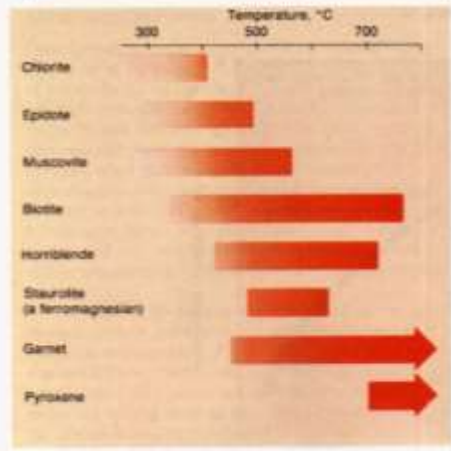
NON-FOLIATED



Facies Metamorfosa

Simplified table relating rock type, metamorphic grade, and index minerals.

ROCK TYPE	METAMORPHIC GRADE	INDEX MINERAL
Slate	Low	Chlorite
Phyllite	Low to intermediate	Garnet
Schist	Intermediate to high	Sillimanite
Gneiss	High	



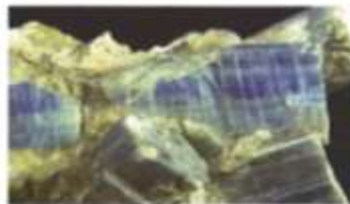
Facies Metamorfosa & Mineral Indeks



A. Staurolite.
Fe-Al silicate, in long prisms;
H = 7, brown, S.G. = 3.7-3.8;
indicates intermediate- to high-grade
metamorphism.



B. Actinolite.
Calcium Mg-Al silicate in long prisms; H = 5-6,
S.G. = 3.0-3.2; indicates low to intermediate
grade of metamorphism (also in some
igneous rocks).



C. Kyanite.
Al silicate, in blades;
H = 5 and 7, gray-blue, S.G. = 3.6-3.7;
indicates intermediate- to high-grade metamorphism.

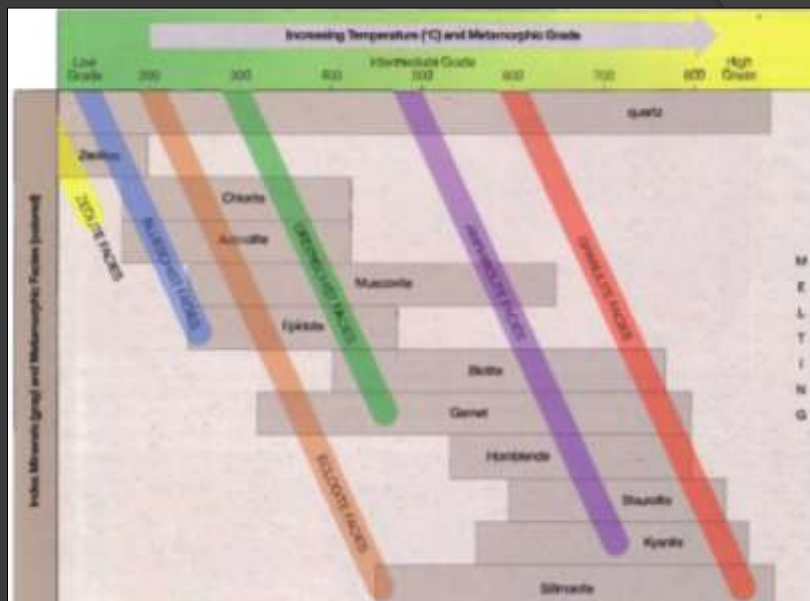


D. Sillimanite.
Al silicate, in needles;
H = 6-7, white to brown, S.G. = 3.2;
indicates high-grade metamorphism.

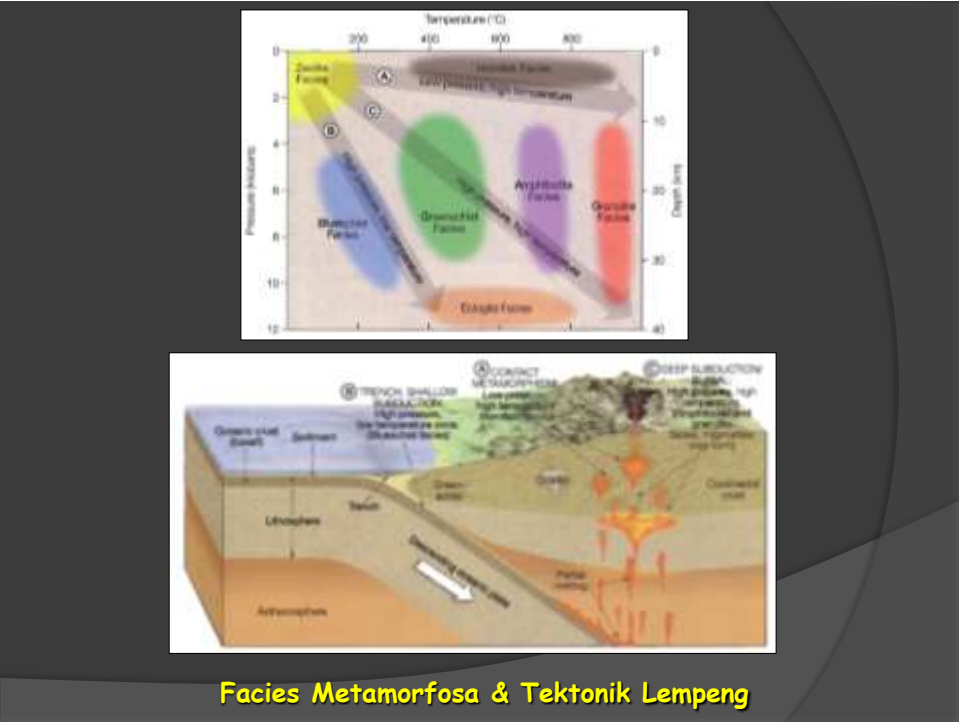
MINERAL INDEX



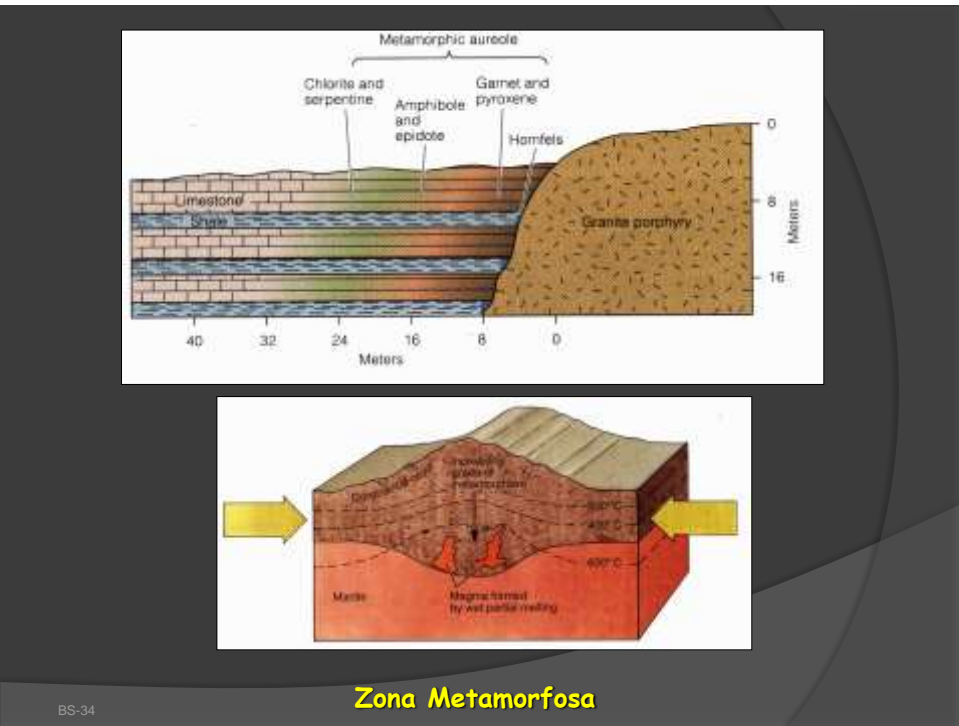
MINERAL INDEX



Facies Metamorfosa & Mineral Indeks



Facies Metamorfosa & Tektonik Lempeng



Zona Metamorfosa

BS-34

- Batuan metamorfik umumnya terjadi didalam zona metamorfosa sebagai akibat perubahan kondisi tekanan (P) dan temperatur (T)
- Fasies metamorfosa dicirikan oleh mineral atau himpunan mineral yang mencirikan sebaran T dan P tertentu.
- Metamorphosa dapat terjadi disetiap kondisi tektonik, tetapi yang paling umum dijumpai pada daerah **kovergensi lempeng**
- Batuan metamorfik berfoliasi membentuk urutan berdasarkan besar butir dan/atau perkembangan foliasi, dari slate yang berbutir halus ke filit dan skeis yang berbutir kasar, gneis dengan lapisan-2 mineral yang terpisah.
- **Amphibolit** adalah batuan metamorfik yang berfoliasi dan berbutir kasar dimana batuan asalnya adalah batuan berkomposisi mafik
- Mamer, kwarsit, batu sabak dan hornfels adalah batuan metamorfik non-foliasi.
- Marmer, slate, grafit, talk dan asbes adalah batuan metamorfik yang juga merupakan mineral industri

BS-35

Metamorfosa dan Batuan Metamorfik