

Identificação

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Títulos protestados, 7

Impulsos de medo, 1.106

Sintomas neuróticos, 36

Horas semanais de catequização pela TV, 16

Impulsos de amor, de amor, 3

Propaganda consumida, 1.106

Alegrias, alegriazinhas espontâneas, 2

Idas ao banheiro para atividades diversas, 36

Tempo de vida previsto para o cidadão

600 mil horas de vida, de vida, de vida

Abatimento pelo consumo de alimentos envenenados

Refrigerantes, remédios e enlatados, 1.125 horas

Abatimento pelo desgosto que se padece

Naquela fila do INPS, 1.125 horas

Abatimento por ficar só no desejo

Daquela mulher bonita que aparece na propaganda

de cigarro, 1.125 horas

Pelo medo de doenças incuráveis

Como cólera, câncer e meningite, ê ê ê

1.125 horas

Abate aqui

Abate ali

Abate isto

Abate aquilo

E jaz pela cidade

Um zumbi sem sepultura

Classificado, numerado

É o cidadão bem-comportado

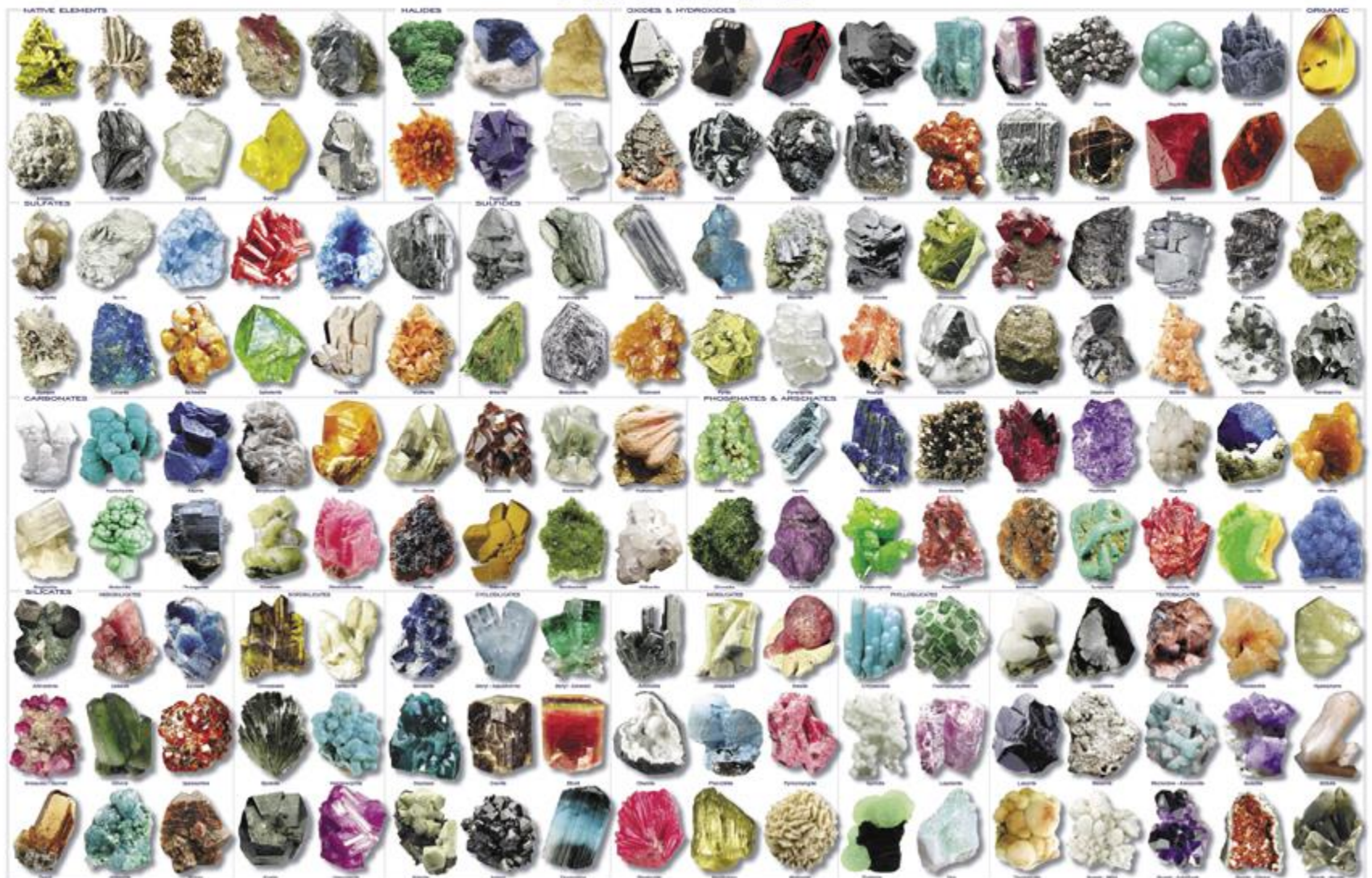


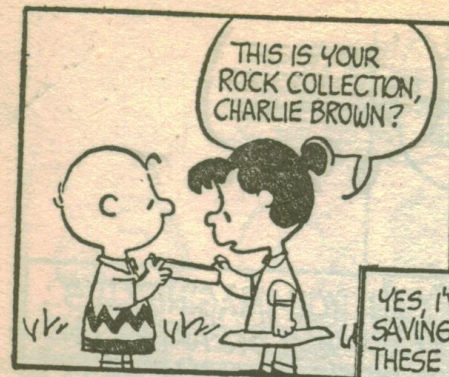


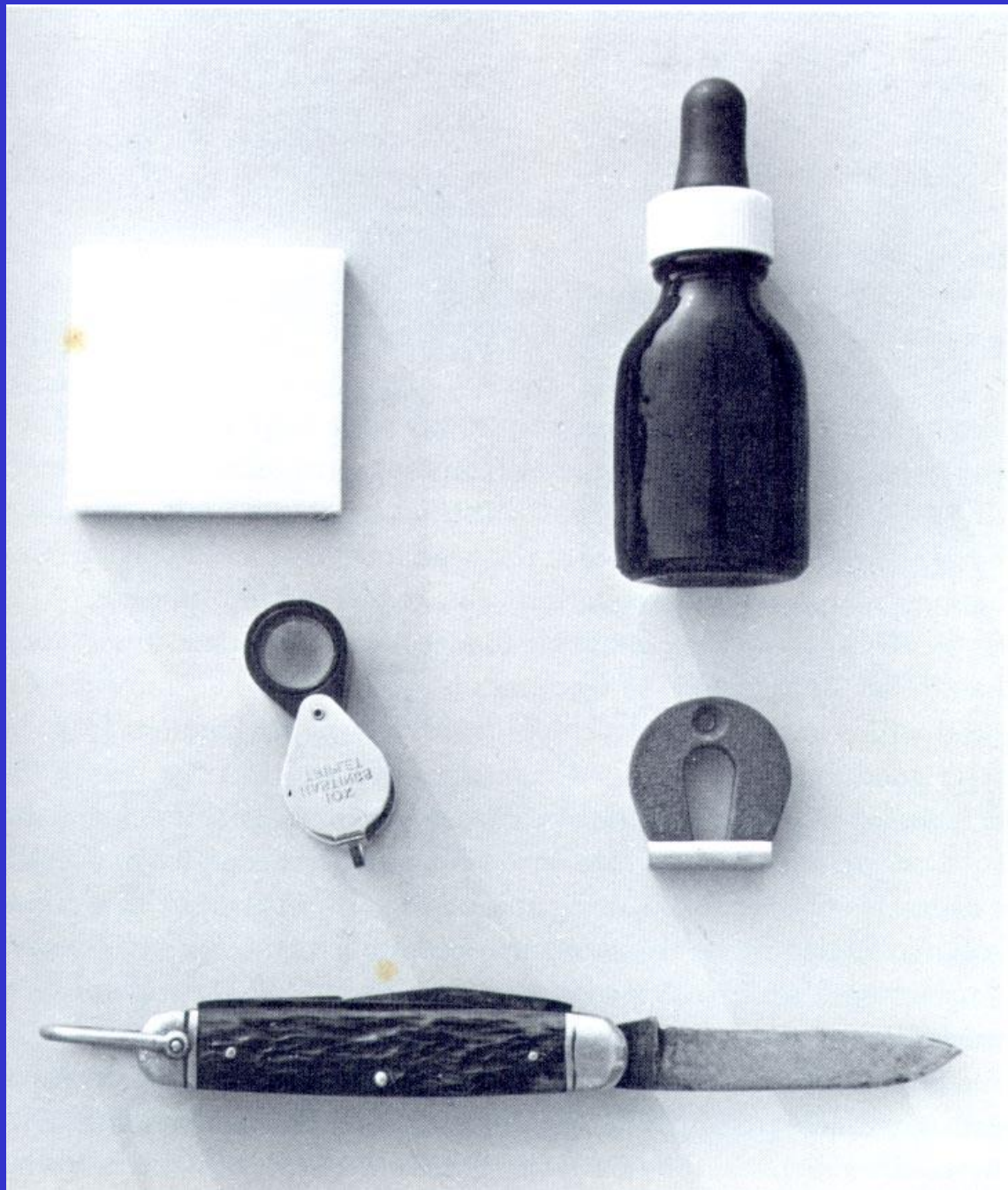




MINERALS









PROPRIEDADES FÍSICAS DOS MINERAIS

Daniel Atencio

PROPRIEDADES

- Hábito
- Clivagem
- Brilho
- Transparência
- Dureza
- Cor e cor do traço
- Densidade relativa
- Propriedades organolépticas
- Propriedades magnéticas

COR

- Resulta da absorção seletiva da luz
- É determinada por vários fatores
- O principal fator é a composição química (elementos químicos de transição: Fe, Cu, Ni, Cr, V...)
- Alguns elementos podem dar um forte efeito na cor mesmo em pequenas quantidades por substituição iônica

Table 6.2

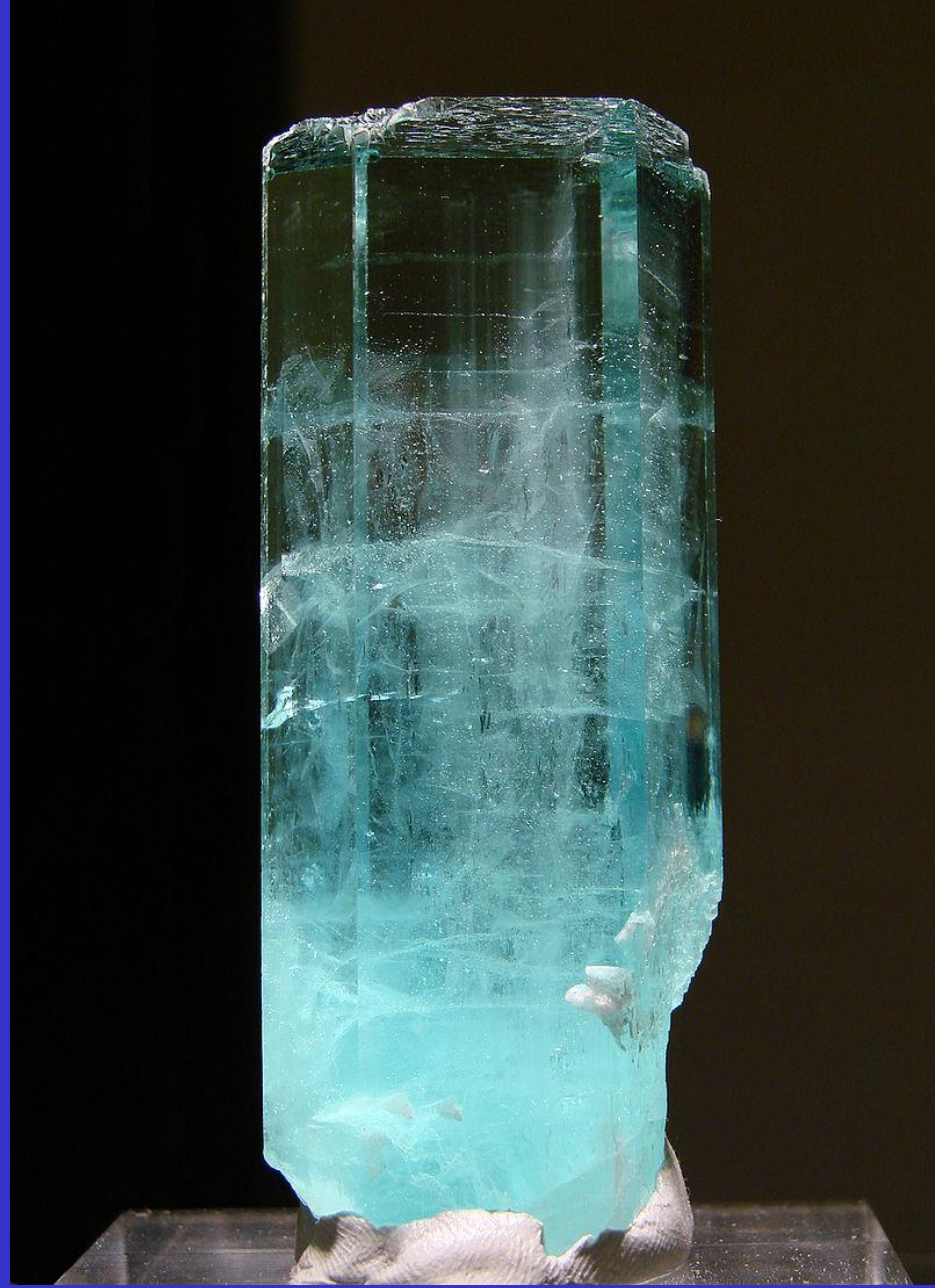
**EXAMPLES OF COMMON
MINERALS WHOSE
COLOR IS DUE TO THE
INTERACTION OF
TRANSITION ELEMENTS
AND CRYSTAL FIELD
TRANSITIONS***

Absorbing Ion	Mineral	Formula	Color
Cr ³⁺	Beryl (emerald)	Be ₃ Al ₂ Si ₆ O ₁₈	Green
	Corundum (ruby)	Al ₂ O ₃	Red
Mn ³⁺	Tourmaline (rubellite)	Na(Li,Al) ₃ Al ₆ (BO ₃) ₃ (Si ₆ O ₁₈)OH ₄	Pink
Mn ²⁺	Beryl (morganite)	Be ₃ Al ₂ Si ₆ O ₁₈	Pink
	Spessartine garnet	Mn ₃ Al ₂ (SiO ₄) ₃	Yellow-orange
	Andradite garnet	Ca ₃ Fe ₂ (SiO ₄) ₃	Green
Fe ³⁺	Chrysoberyl	BeAl ₂ O ₄	Yellow
	Olivine (peridot)	(Mg,Fe) ₂ SiO ₄	Yellow-green
Fe ²⁺	Almandine garnet	Fe ₃ Al ₂ (SiO ₄) ₃	Dark red
	Turquoise	CuAl ₆ (PO ₄) ₄ (OH) ₈ ·5H ₂ O	Light blue

*From Loeffler, B. M. and Burns, R. G., 1976, Shedding light on the color of gems and minerals. *American Scientist*, v. 64, pp. 636–647. Many of the minerals listed in the table are illustrated in Plates I through IV, Chapter 15.

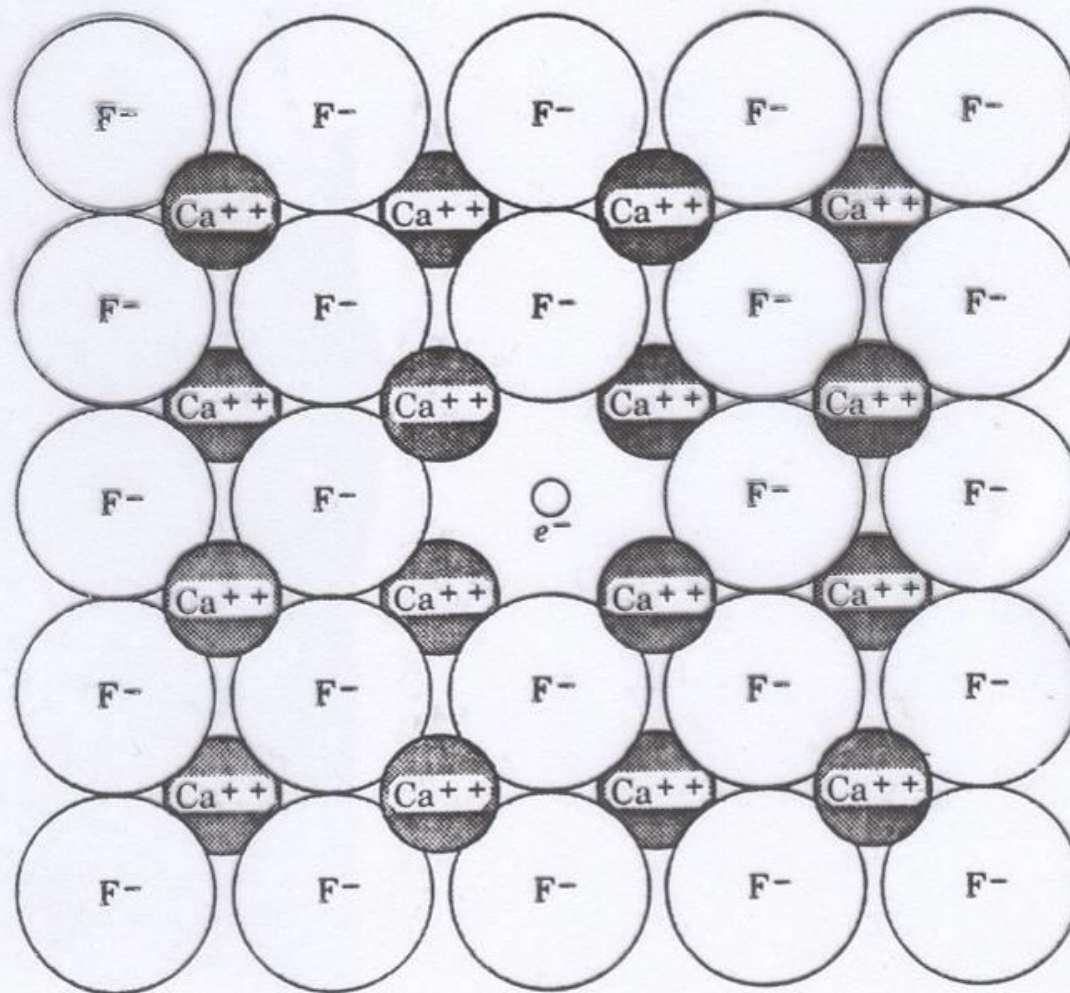


esmeralda (berilo)



água marinha (berilo)

FIG. 6.19. Schematic illustration of the structure of fluorite, CaF_2 , in which an electron fills a vacancy created by a fluorine ion that was removed. Here a color center is the result of the electron taking the place of the dislodged ion. (Adapted from Nassau, K., *The Causes of Color*. *Scientific American*, v. 243, pp. 124–156. Copyright © 1980 by Scientific American, Inc. All rights reserved.)



- *Minerais idiocromáticos*: têm cores bastante características, por exemplo, o enxofre.
- *Minerais alochromáticos*: a cor varia amplamente, por exemplo, quartzo e fluorita.

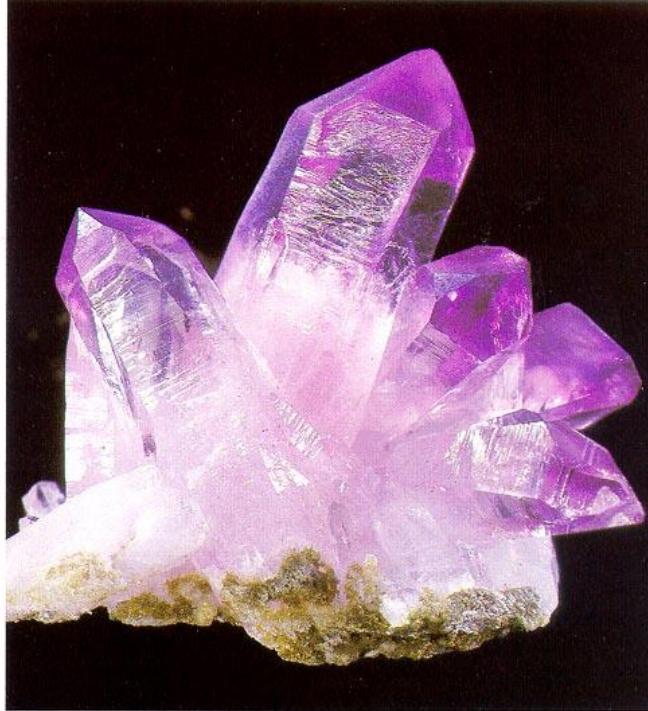
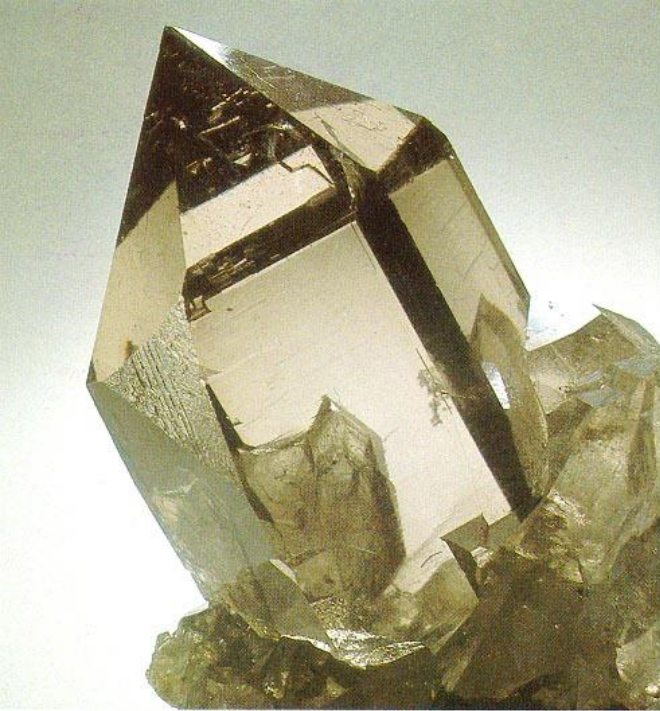


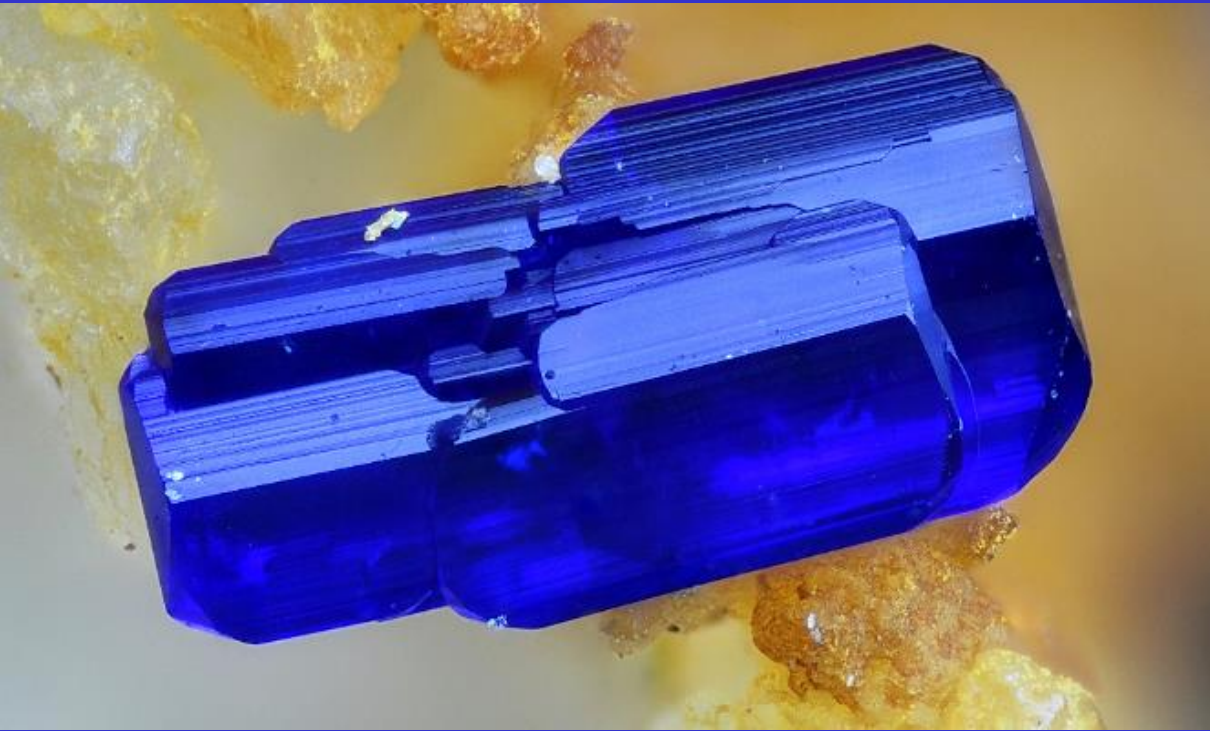
Enxofre



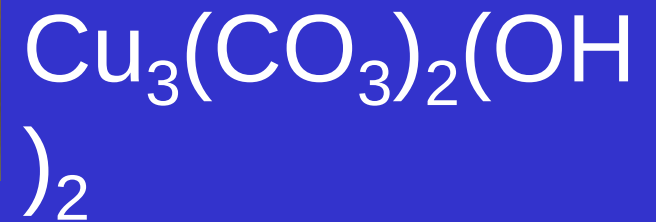
Fluorita

Quartzo





Azurita



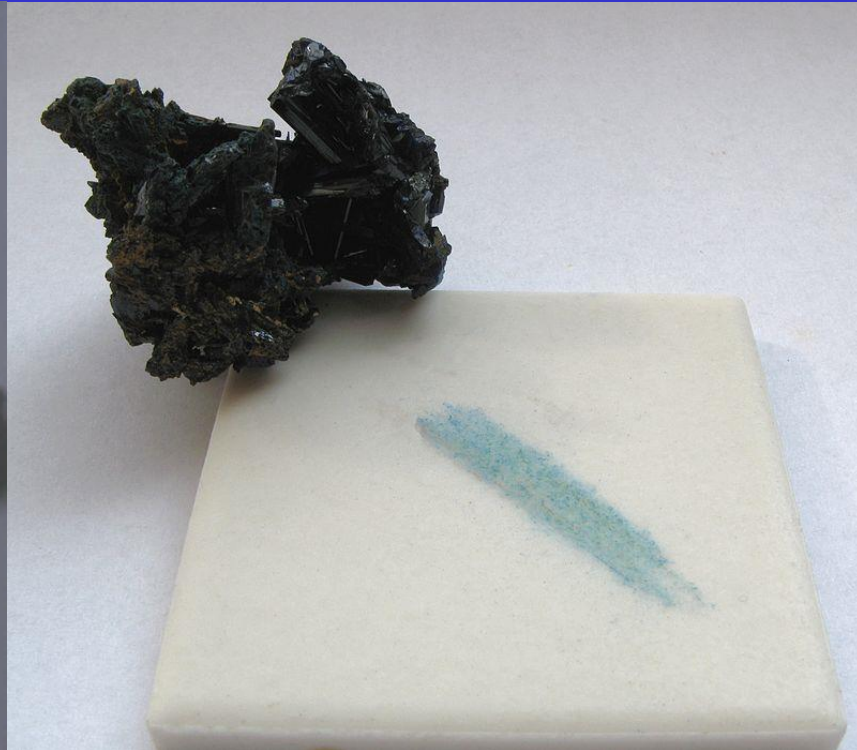
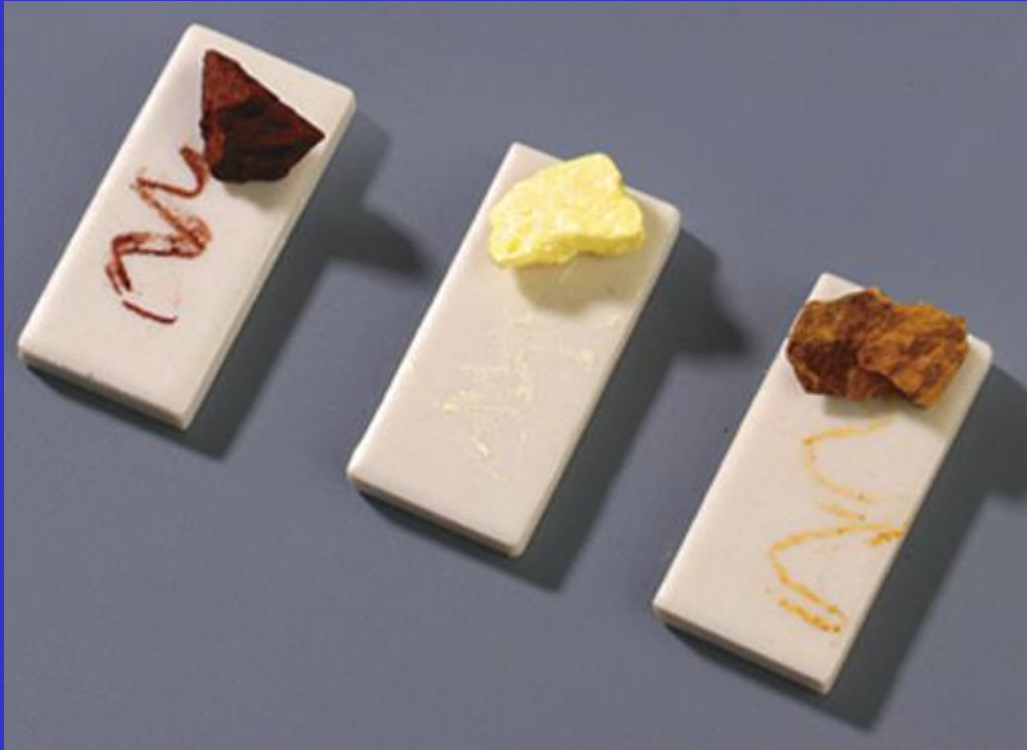
Malaquita





COR DO TRAÇO

- É a cor do pó do mineral.
- Risca-se o mineral numa placa de porcelana.
- Útil para identificação de minerais de brilho metálico, visto que em inúmeros casos a cor do pó é bem distinta da cor exibida pelo mineral.
- Minerais translúcidos e transparentes exibem traço branco.
- Porcelana tem dureza 6 a 7. Minerais com dureza > que 7, o traço resultante não é do mineral, mas sim da porcelana.



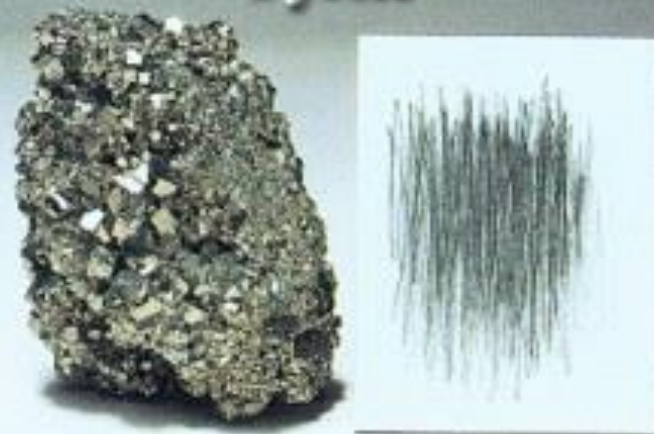


The red-brown streak of the mineral hematite.

Cinnabar



Pyrite

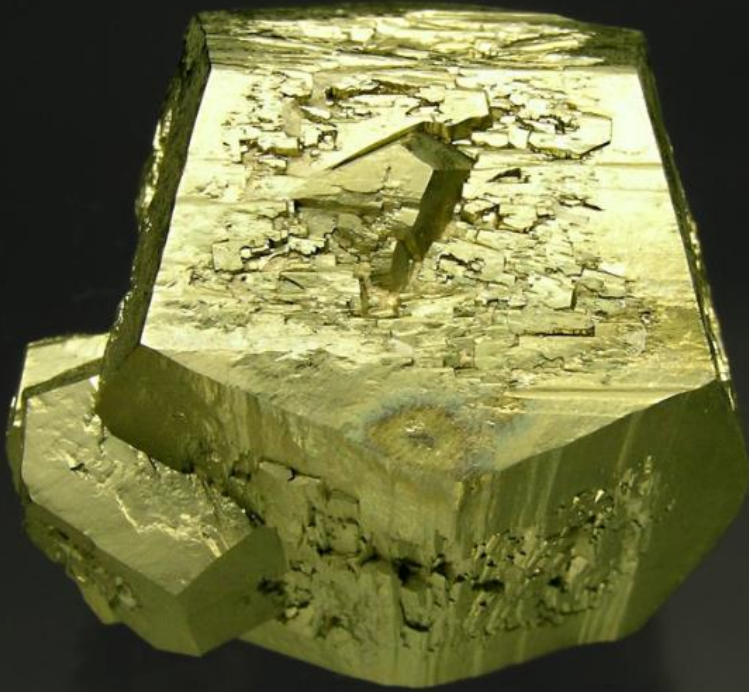


BRILHO

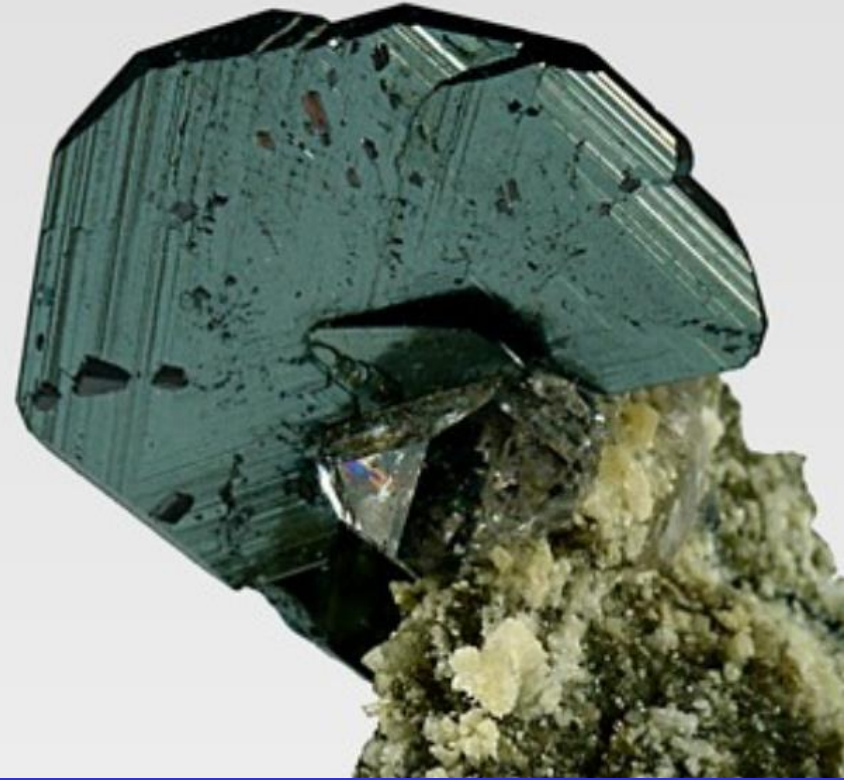
- Qualidade e intensidade de luz refletida de um mineral
- Tipos:
 - Metálico
 - Não metálico: vítreo, resinoso, adamantino, perláceo, sedoso, gorduroso
 - Quando a superfície não tem brilho, diz-se que é fosca.



Galena PbS
, Quartz Si
O₂ , Calcite



Pirita FeS_2



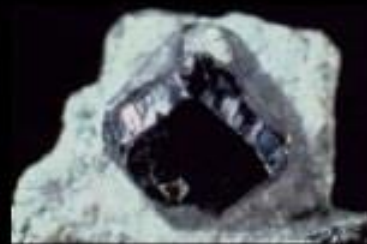
Hematita Fe_2O_3



Metallic Luster - Pyrite



Nonmetallic Luster - Kaolinite



Metallic Luster



Vitreous



Dull

Nonmetallic Luster

Transparência: passagem da luz

- *Minerais transparentes*: não absorvem ou absorvem pouco a luz
- *Minerais translúcidos*: absorvem a luz consideravelmente e dificultam o reconhecimento das imagens através deles
- *Minerais opacos*: absorvem toda a luz – elementos nativos metálicos, óxidos e sulfetos

DUREZA

- resistência ao ser riscado.

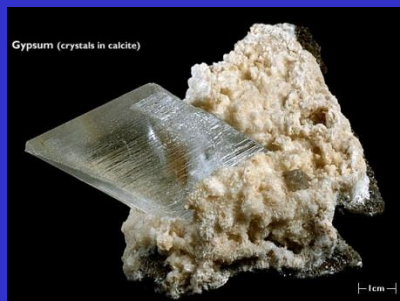


Escala de Mohs

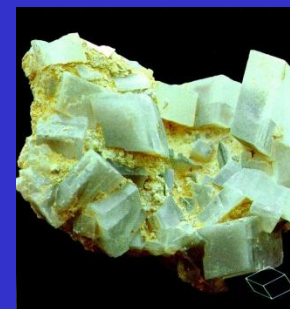
1 – Talco	$\text{Mg}_3\text{Si}_4\text{O}_{10}(\text{OH})_2$	Palito de fósforo (~1,1)
2 – Gipsita	$\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$	Unha (~ 2)
3 – Calcita	CaCO_3	Alfinete (~3,5)
4 – Fluorita	CaF_2	
5 – Apatita	$\text{Ca}_5(\text{PO}_4)_3(\text{F}, \text{Cl}, \text{OH})$	Aço – lâmina de barbear (~ 5)
6 – Feldspato potássico	$\text{K}(\text{AlSi}_3\text{O}_8)$	Vidro (~ 5,5)
7 – Quartzo	SiO_2	Porcelana (~ 6,0)
8 – Topázio	$\text{Al}_2\text{SiO}_4(\text{F}, \text{OH})_2$	
9 – Coríndon	Al_2O_3	
10 - Diamante	C	



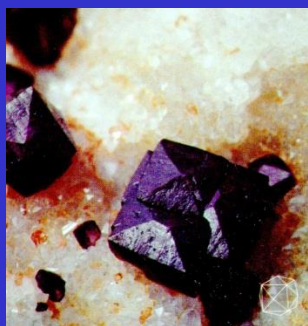
Talco



Gipsita



Calcita



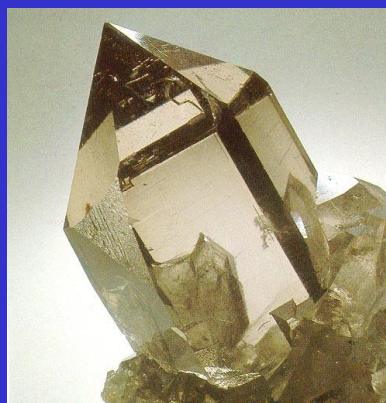
Fluorita



Apatita



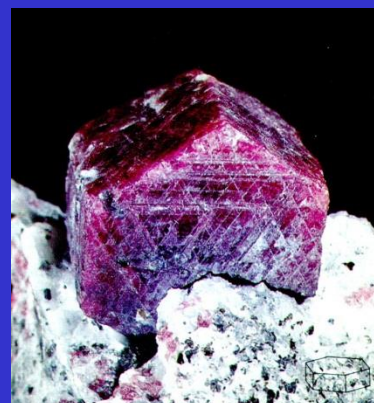
Feldspato



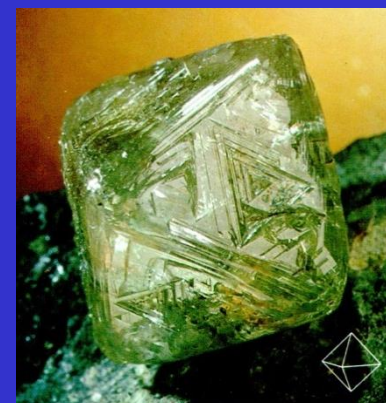
Quartzo



Topázio



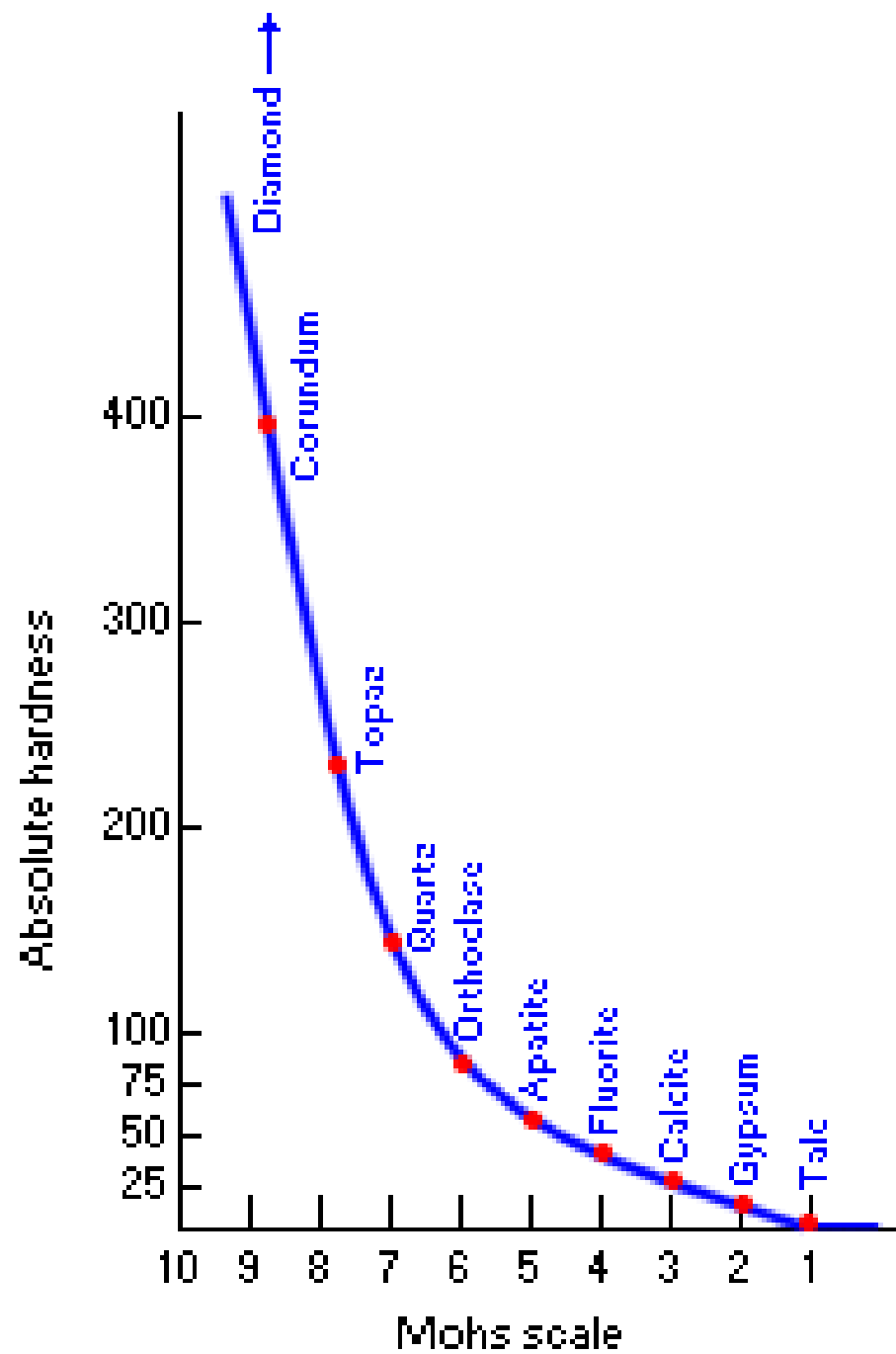
Coríndon



Diamante

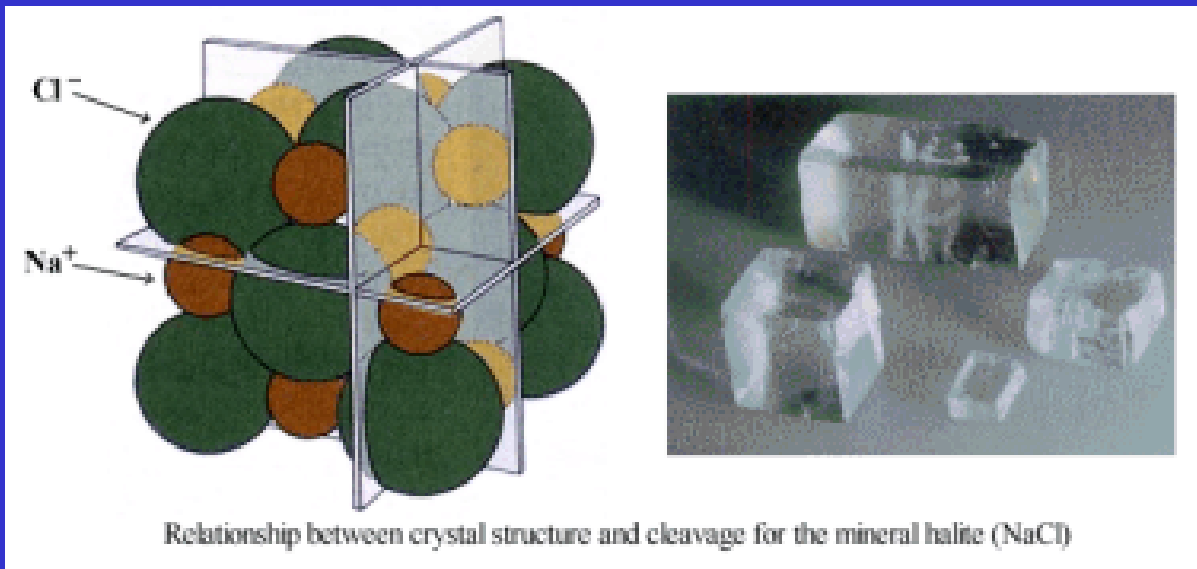
DUREZA

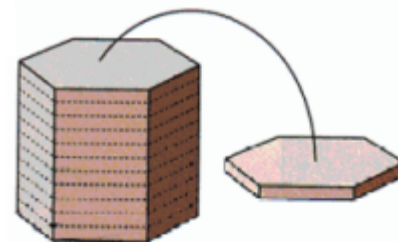
- Refere-se à resistência relativa de um mineral ao ser riscado
- Escala de dureza relativa de Mohs (não representa intervalos iguais de dureza)



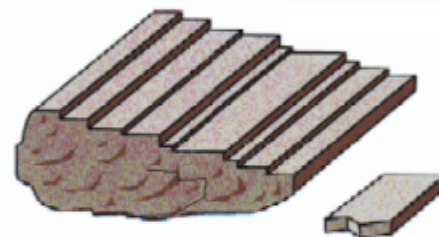
CLIVAGEM

- Tendência de um mineral a se quebrar em superfícies planas

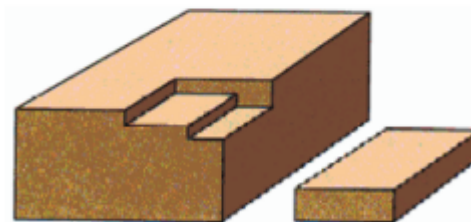




One direction - basal



Two directions - prismatic



Three directions - cubic

Types of Cleavage



Fluorite

Halite

Calcite





Par. ch. 6. 7. 1995

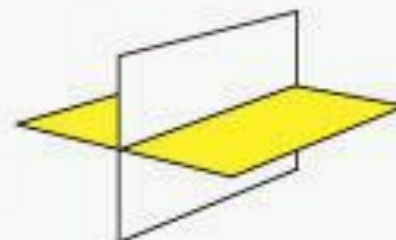
Muscovita



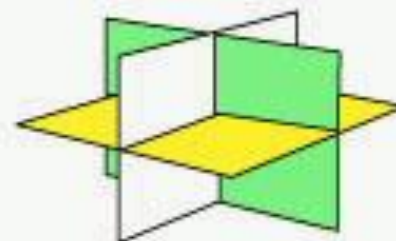
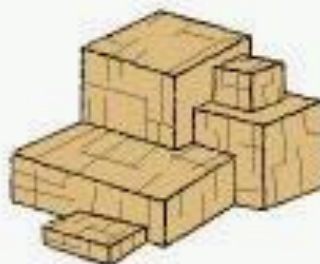




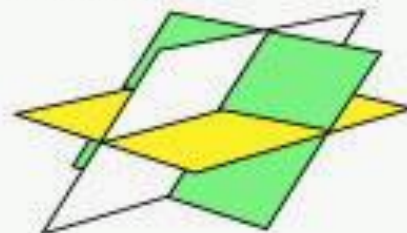
Cleavage in one direction. Example: MUSCOVITE



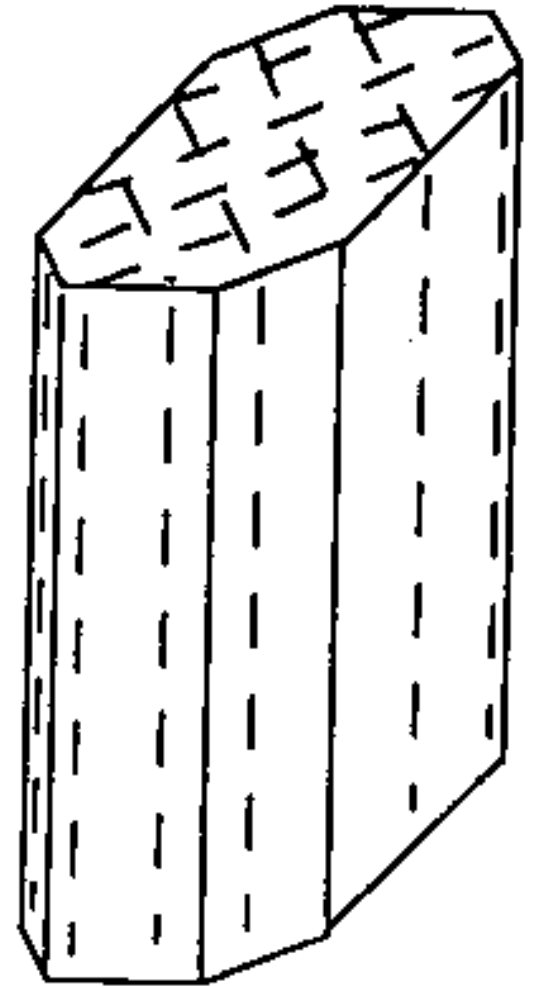
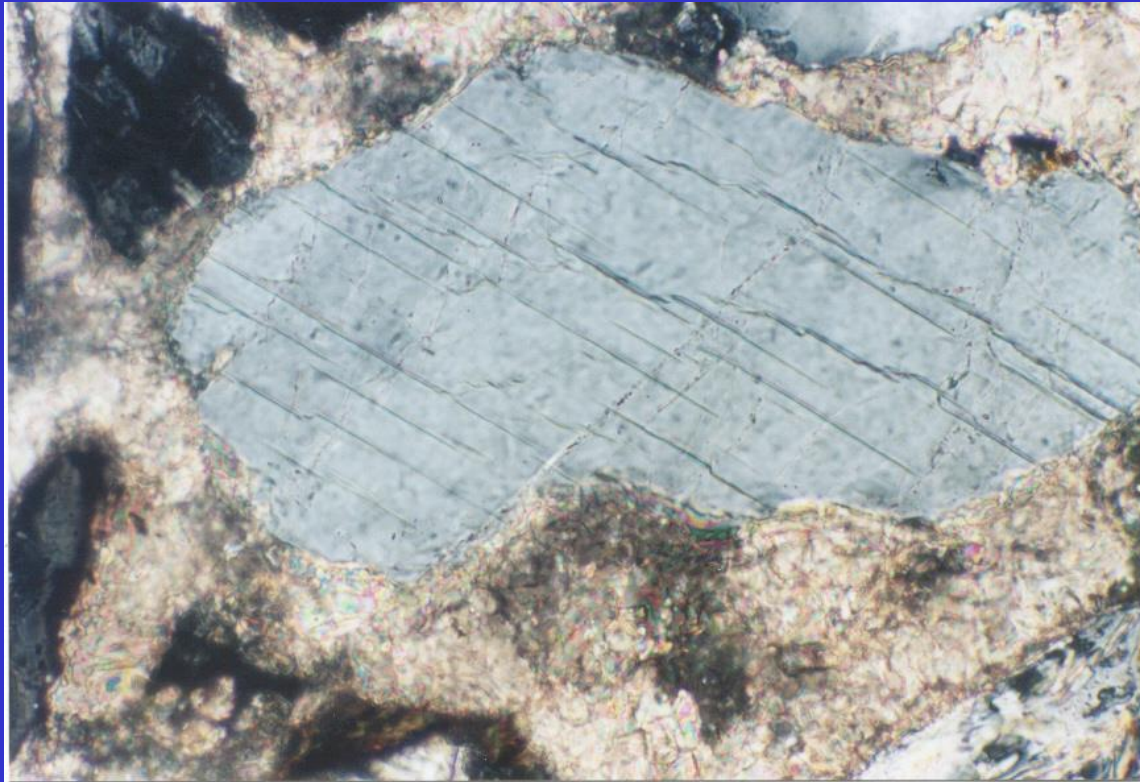
Cleavage in two directions. Example: FELDSPAR



Cleavage in three directions. Example: HALITE



Cleavage in two directions. Example: CALCITE



FRATURA

- quebra dos minerais em superfícies não planas.
- - fratura conchoidal.



- Hábito
- Equidimensional
 - Prismático
 - Acicular
 - Tabular
 - Placóide
 - Terroso
 - Botrioidal
 - Fibroso



Galena Cubes



Pyrite Pyritohedrons



Hexagonal Beryl



Calcite Scalenohedrons

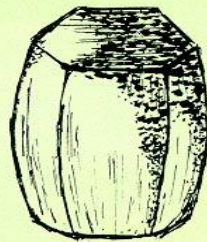


Tabular Wulfenite



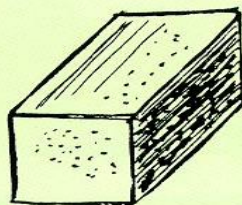
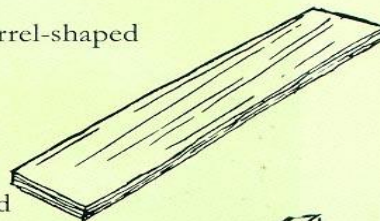
Prismatic Stibnite

Growth Habits of Single Crystals



Barrel-shaped

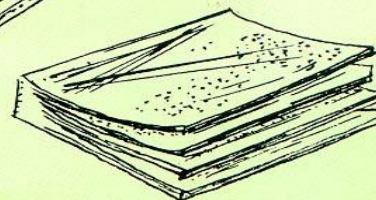
Bladed



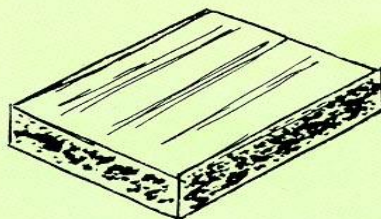
Blocky



Capillary



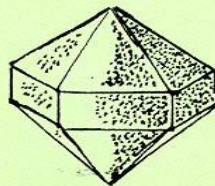
Foliated



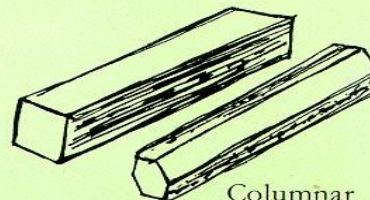
Tabular



Pyramidal



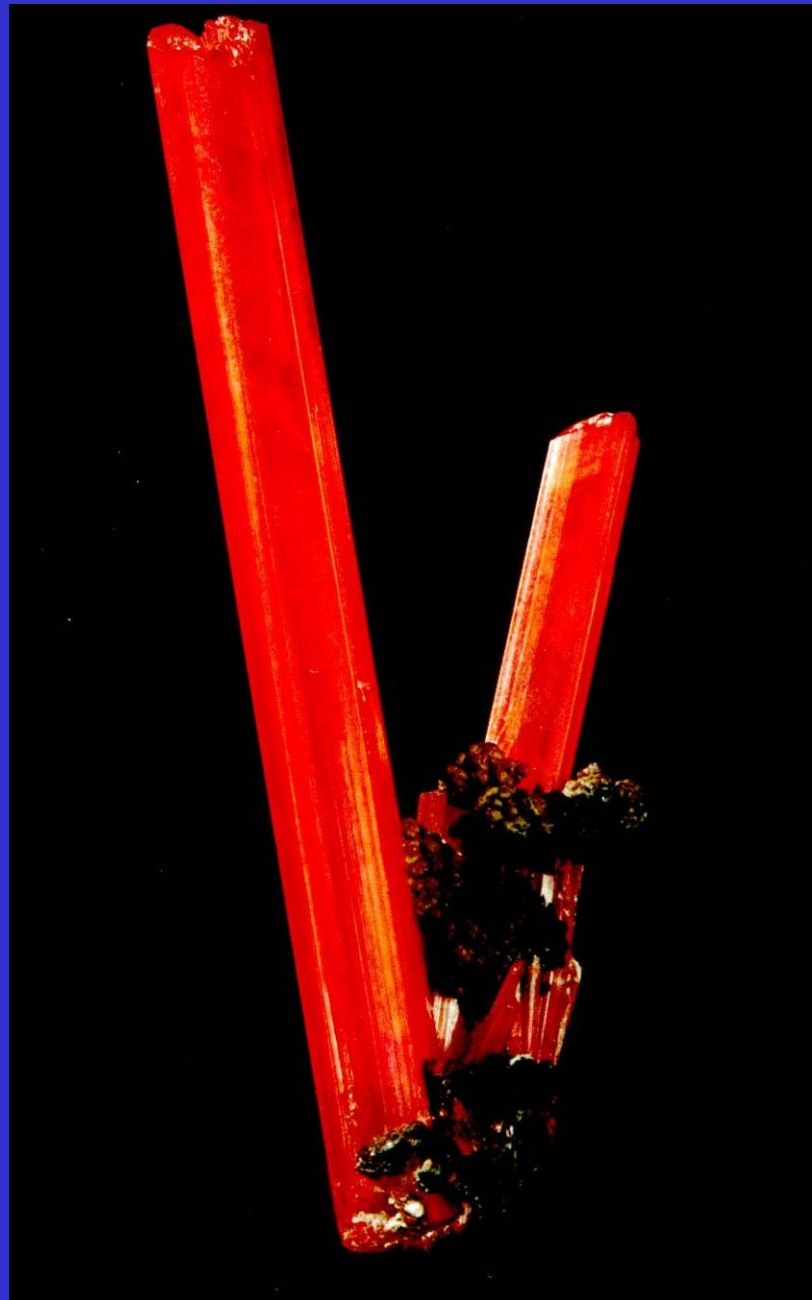
Stubby



Columnar

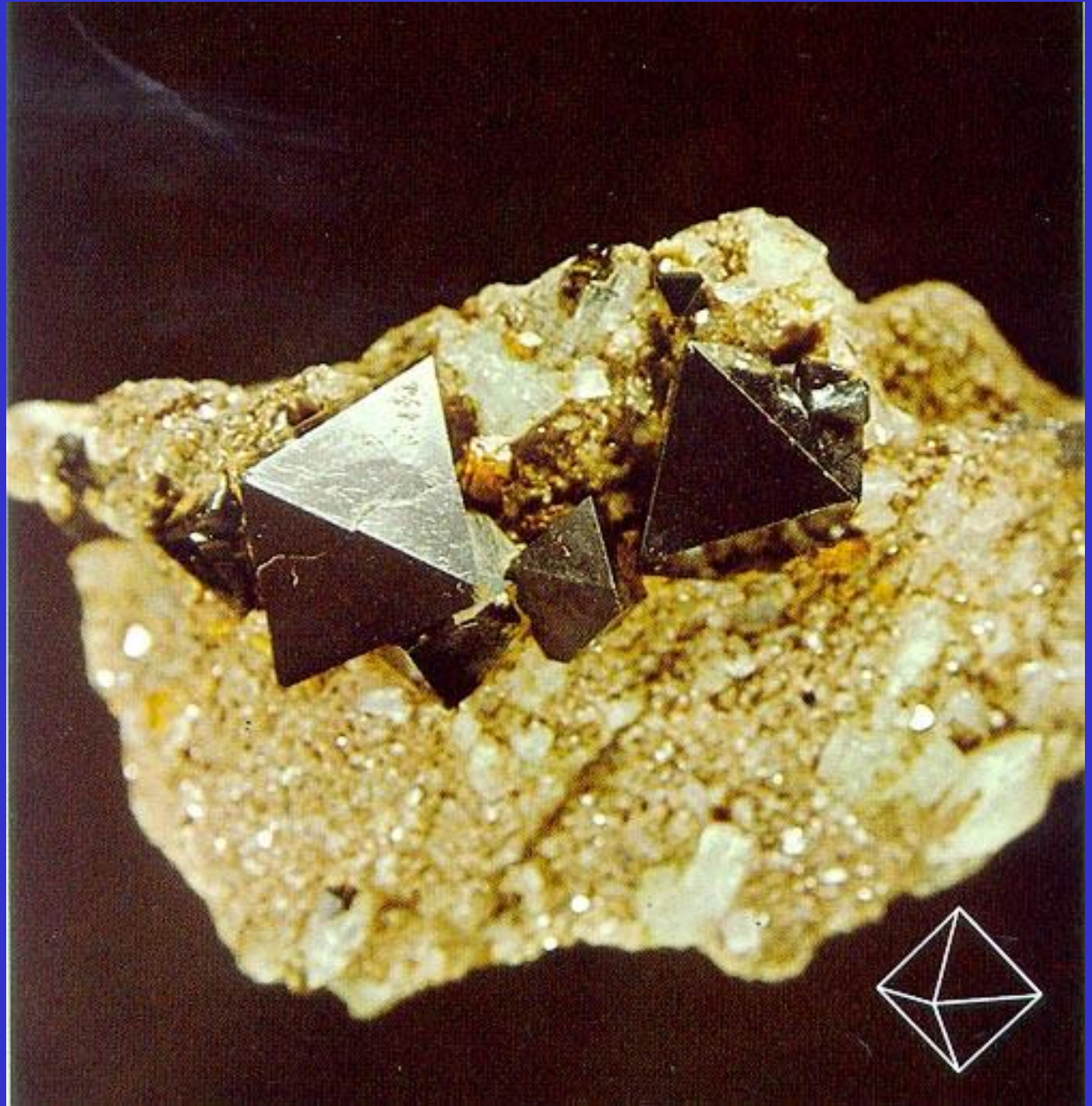
Hábito Prismático

Crocoíta
 PbCrO_4



Hábito Octaédrico

Magnetita



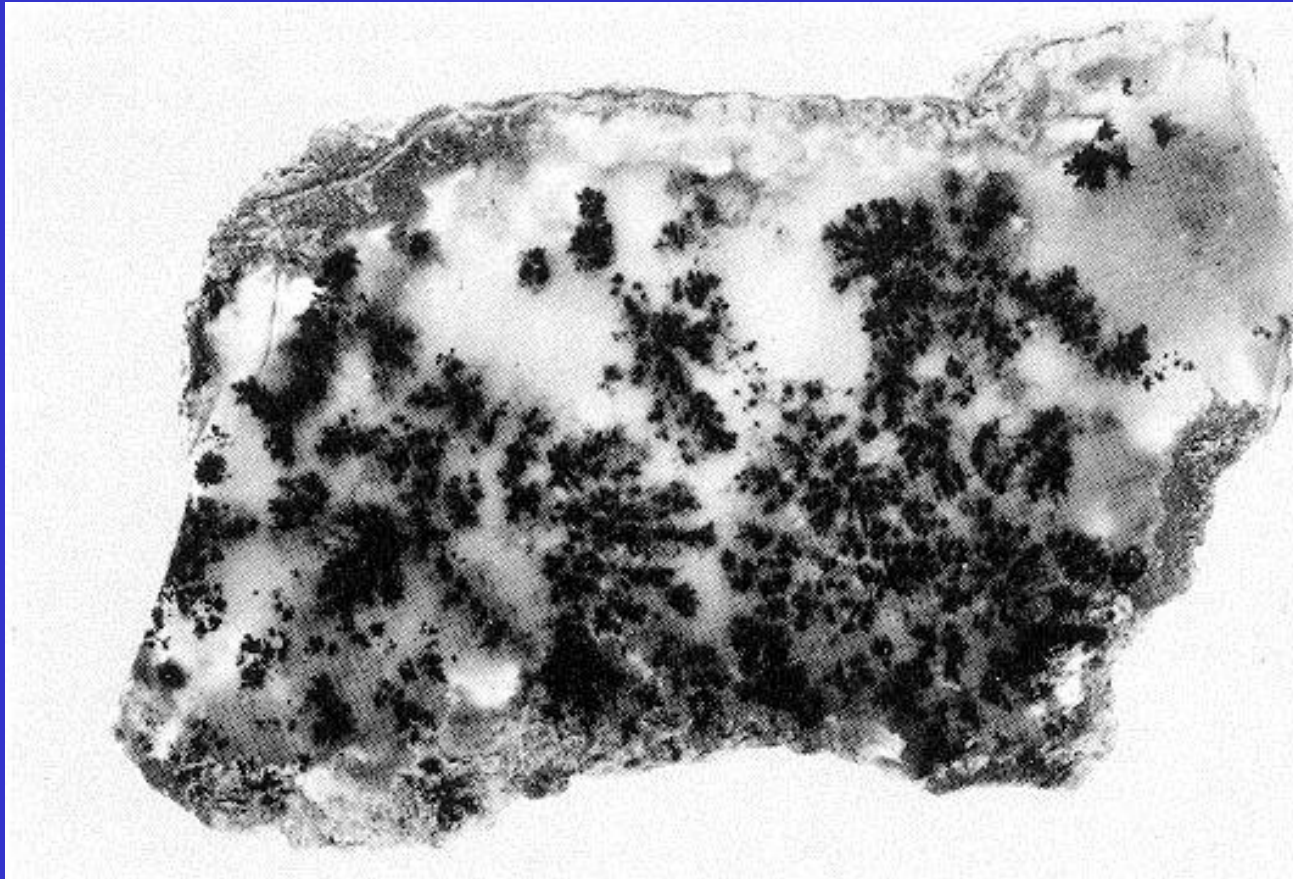
Hábito Botrioidal

Hematita

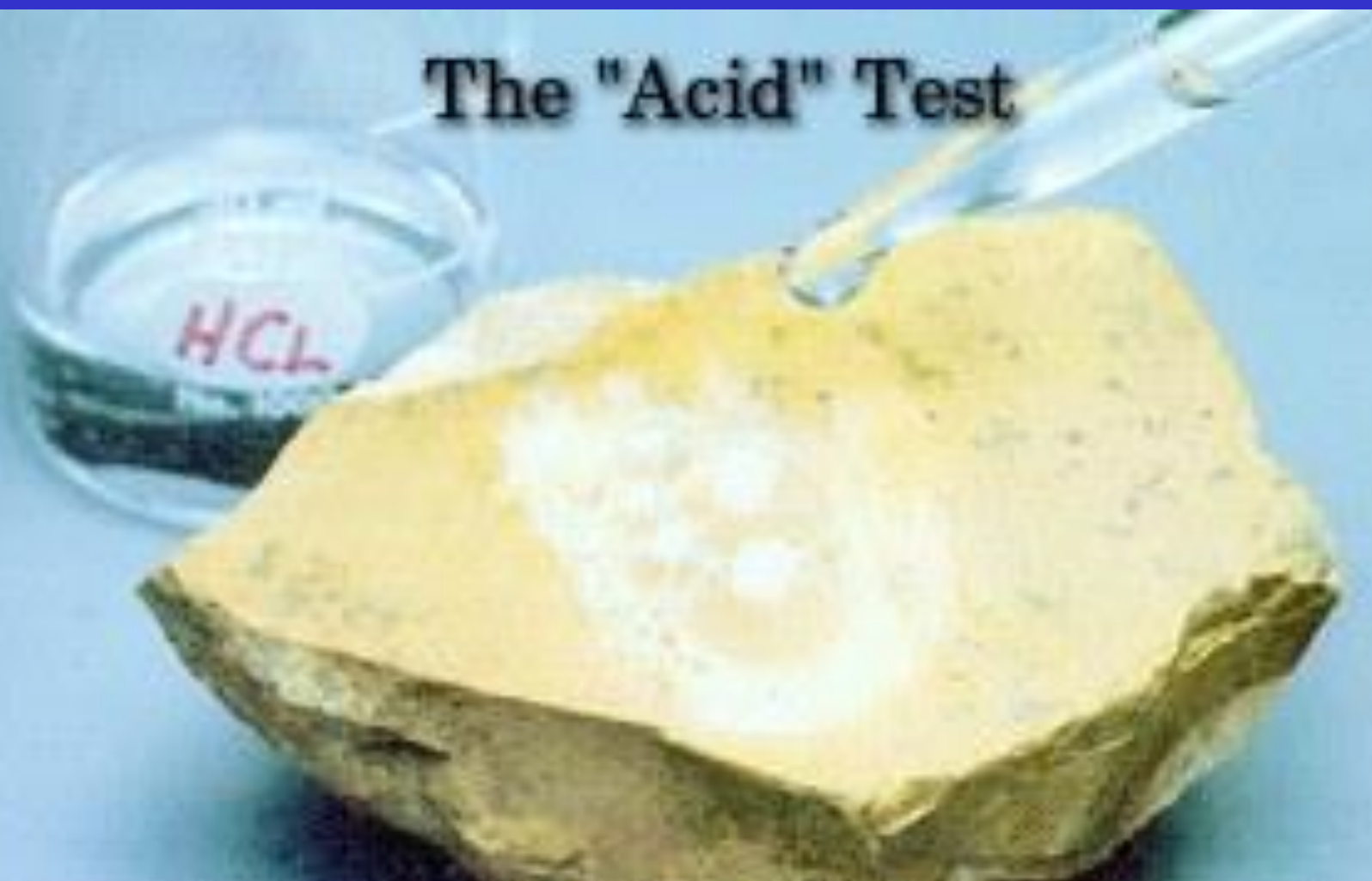




Dendritos de Óxido de Manganês



The "Acid" Test

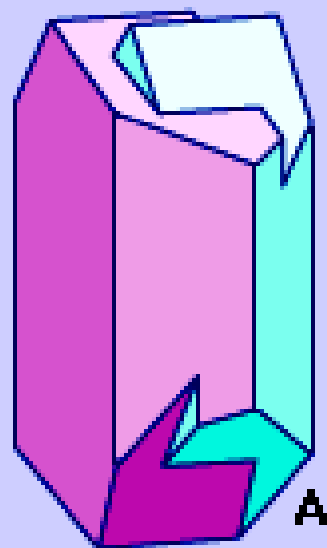


DENSIDADE RELATIVA

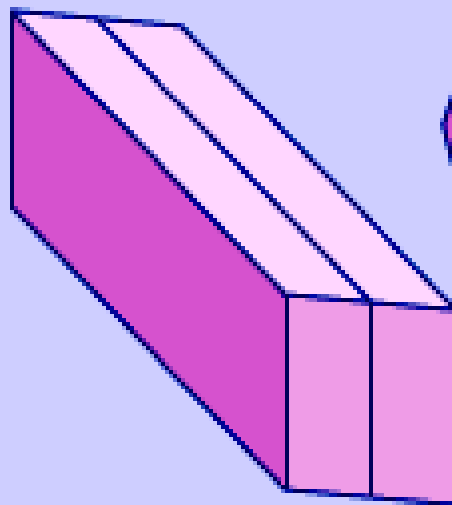
- Indica quantas vezes certo volume do mineral é mais pesado que o mesmo volume de água destilada, à temperatura de 4°C.
- Minerais formadores de rocha têm densidade entre 2,5 a 3,3.
- Minerais com elementos de alto peso atômico (Ba, Pb, Sr...) têm densidade > que 4.



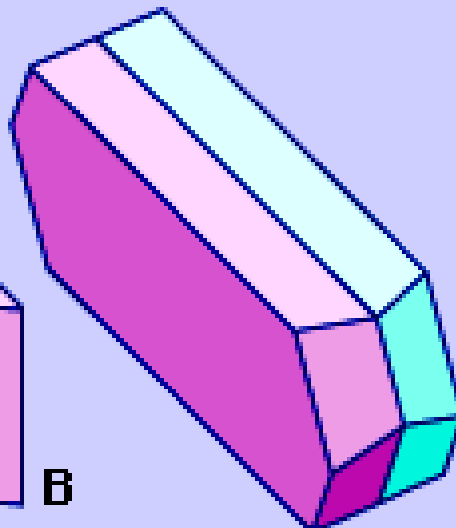




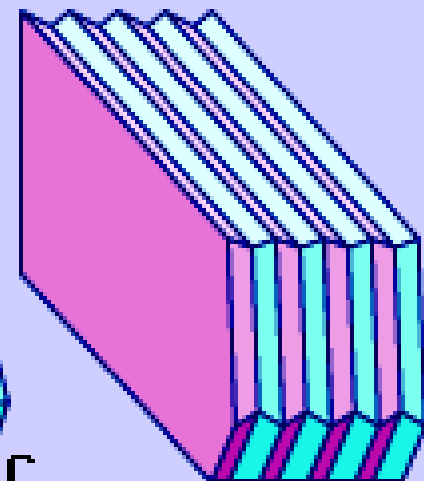
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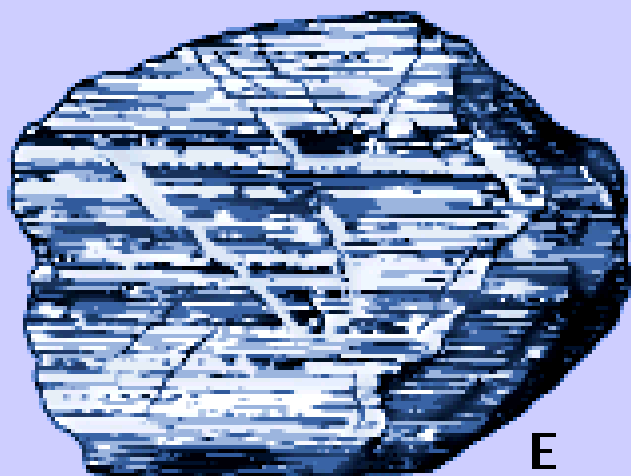
B



C



D



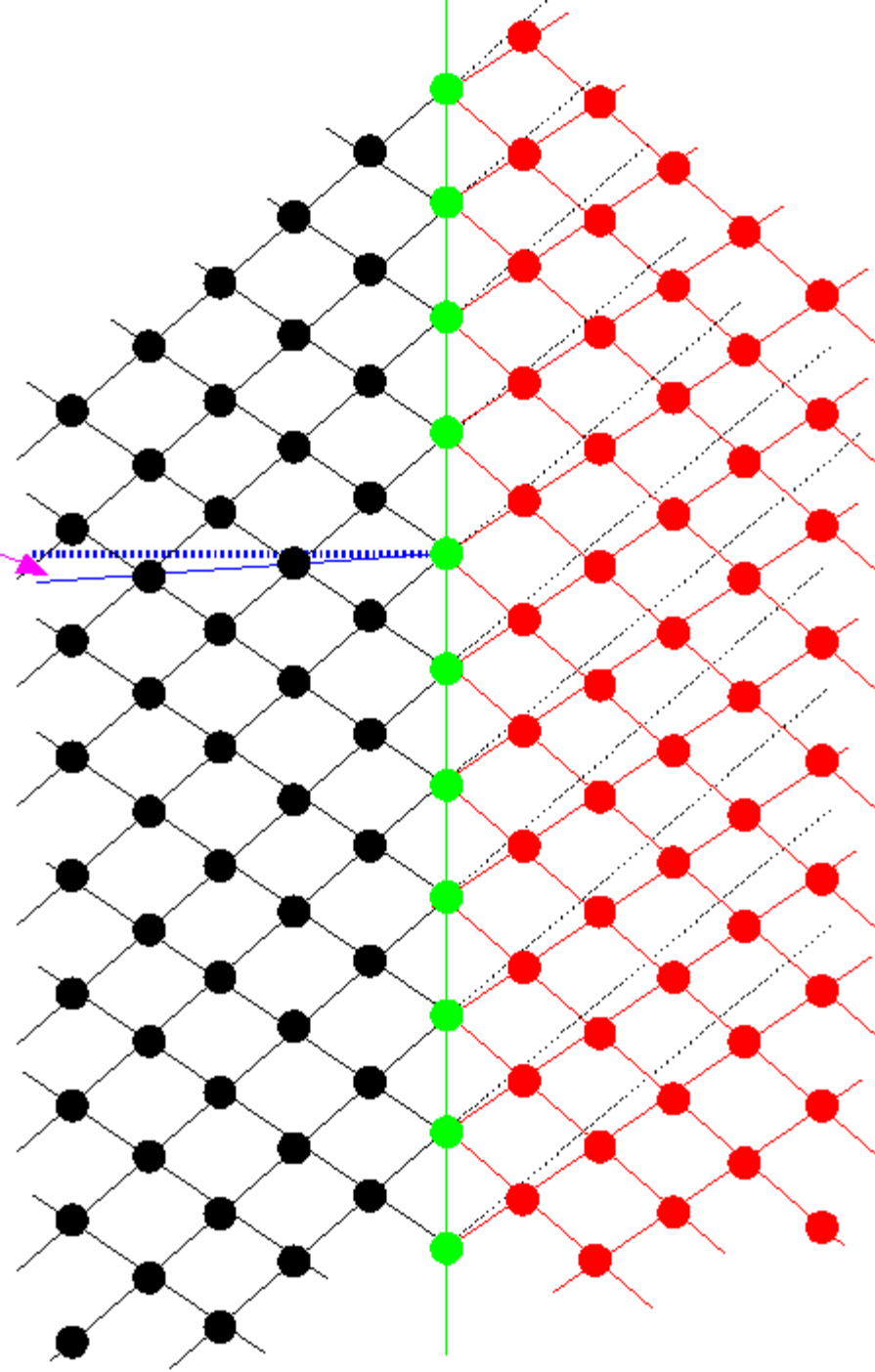
E

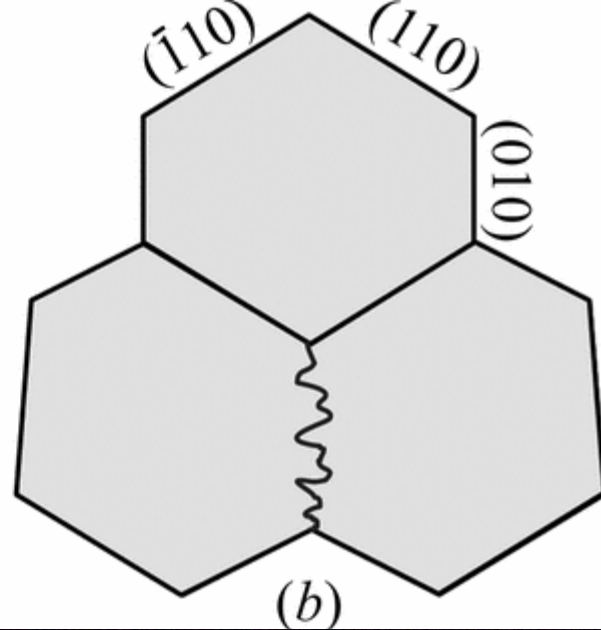
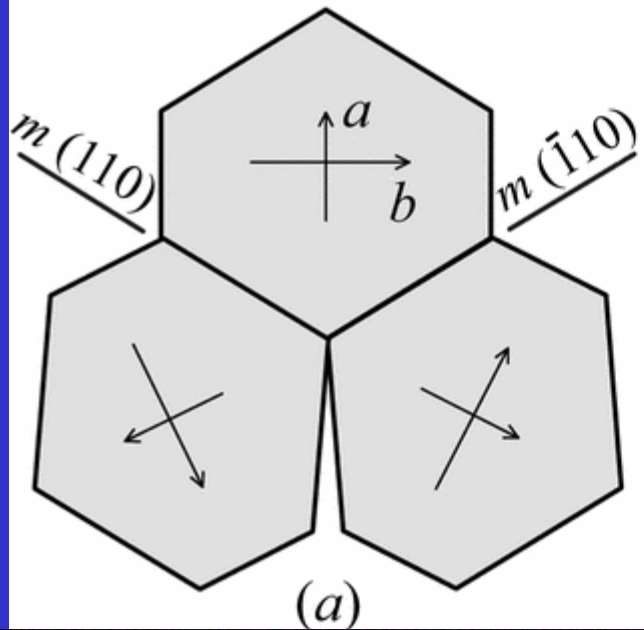
- (A) Carlsbad twinning
- (B) untwinned crystal
- (C) single Albite twin
- (D) multiple Albite twins
- (E) Albite twinning as it appears on a cleavage surface of a plagioclase specimen

Geminação

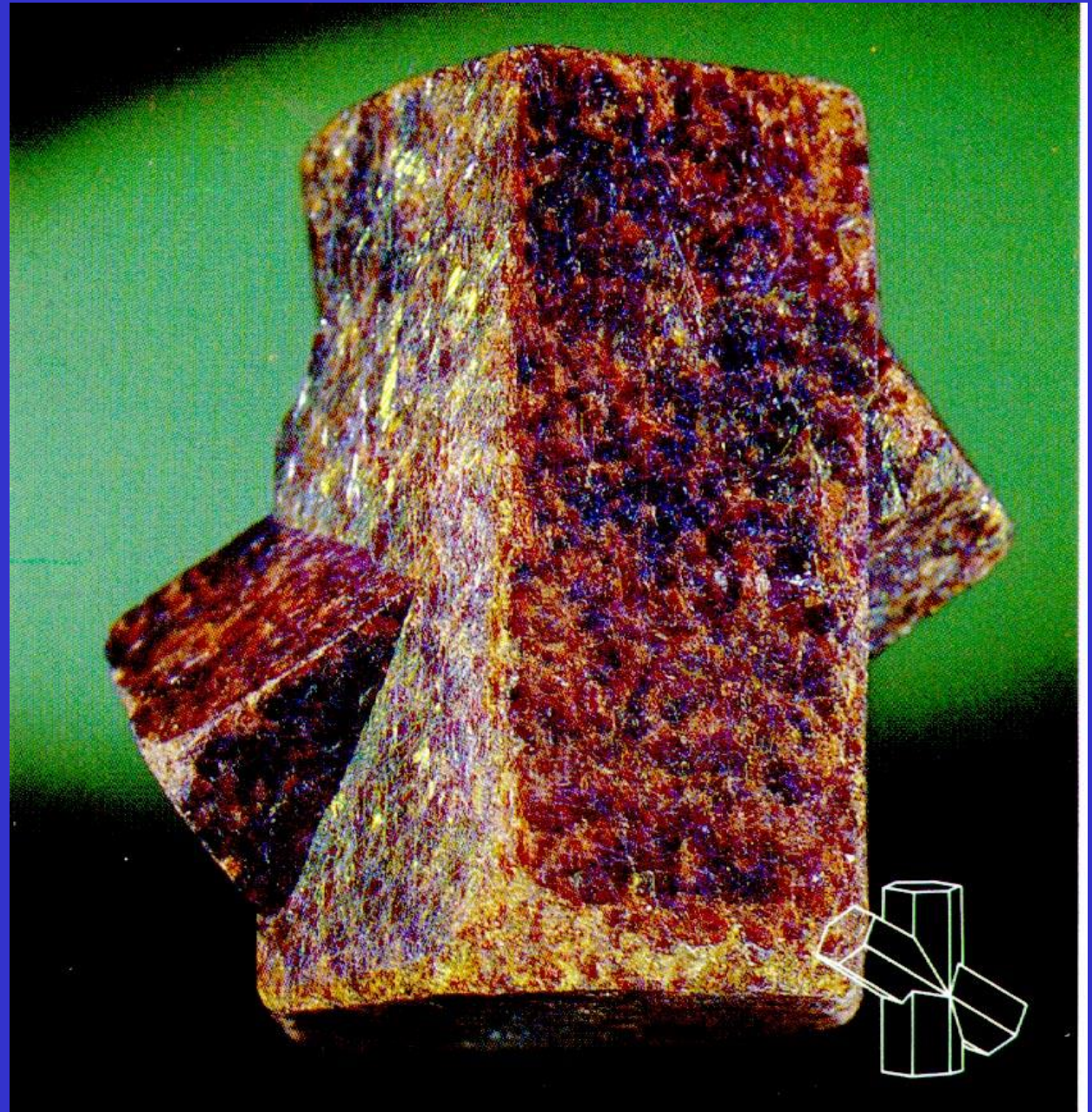
- Intercrescimento mineral de maneira regular
- Pode ser uma propriedade diagnóstica do mineral

ω

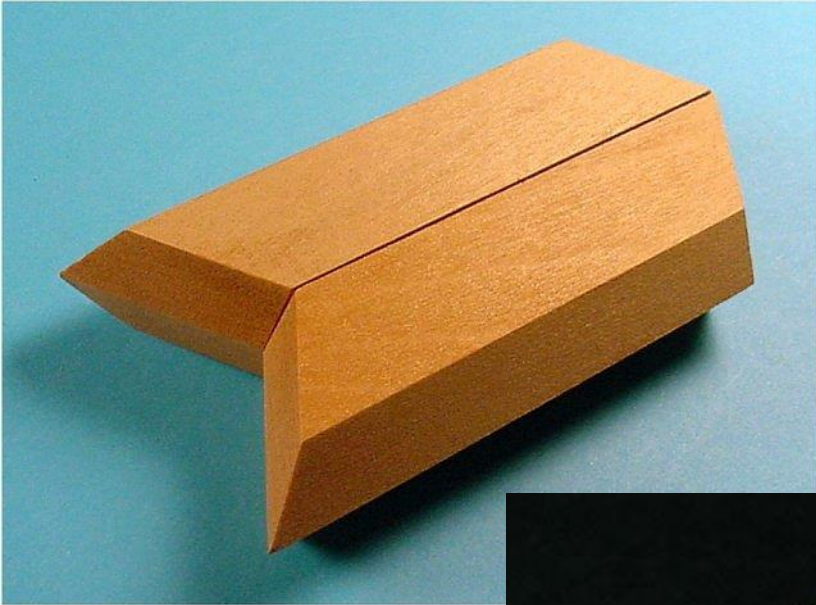


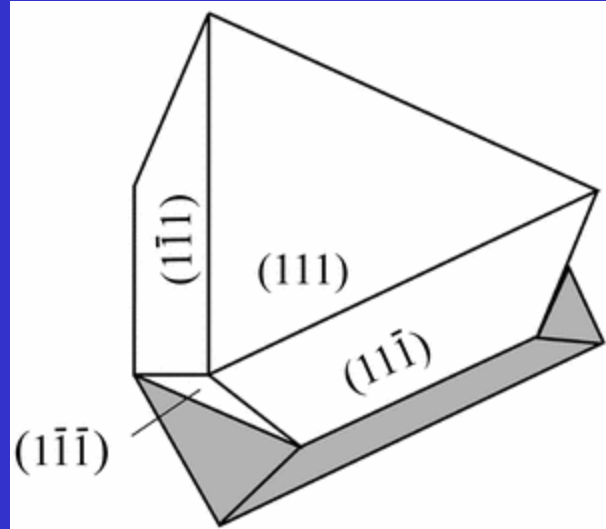


Estauroлита

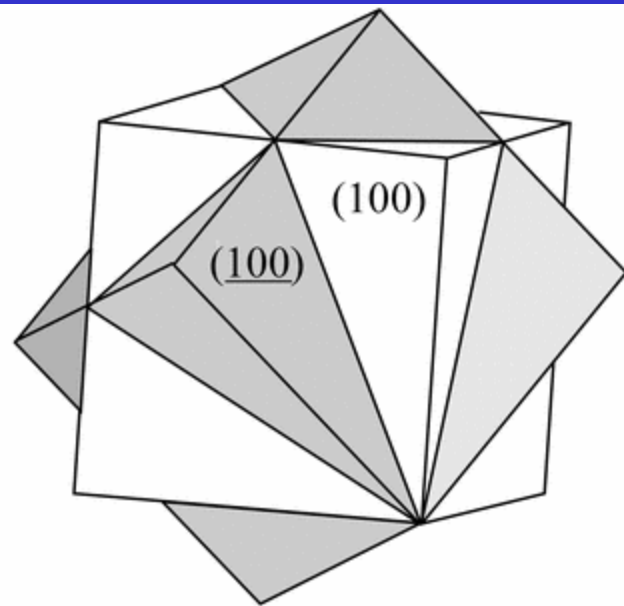




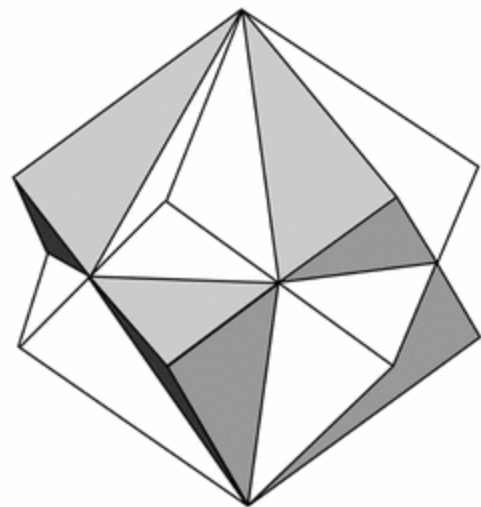




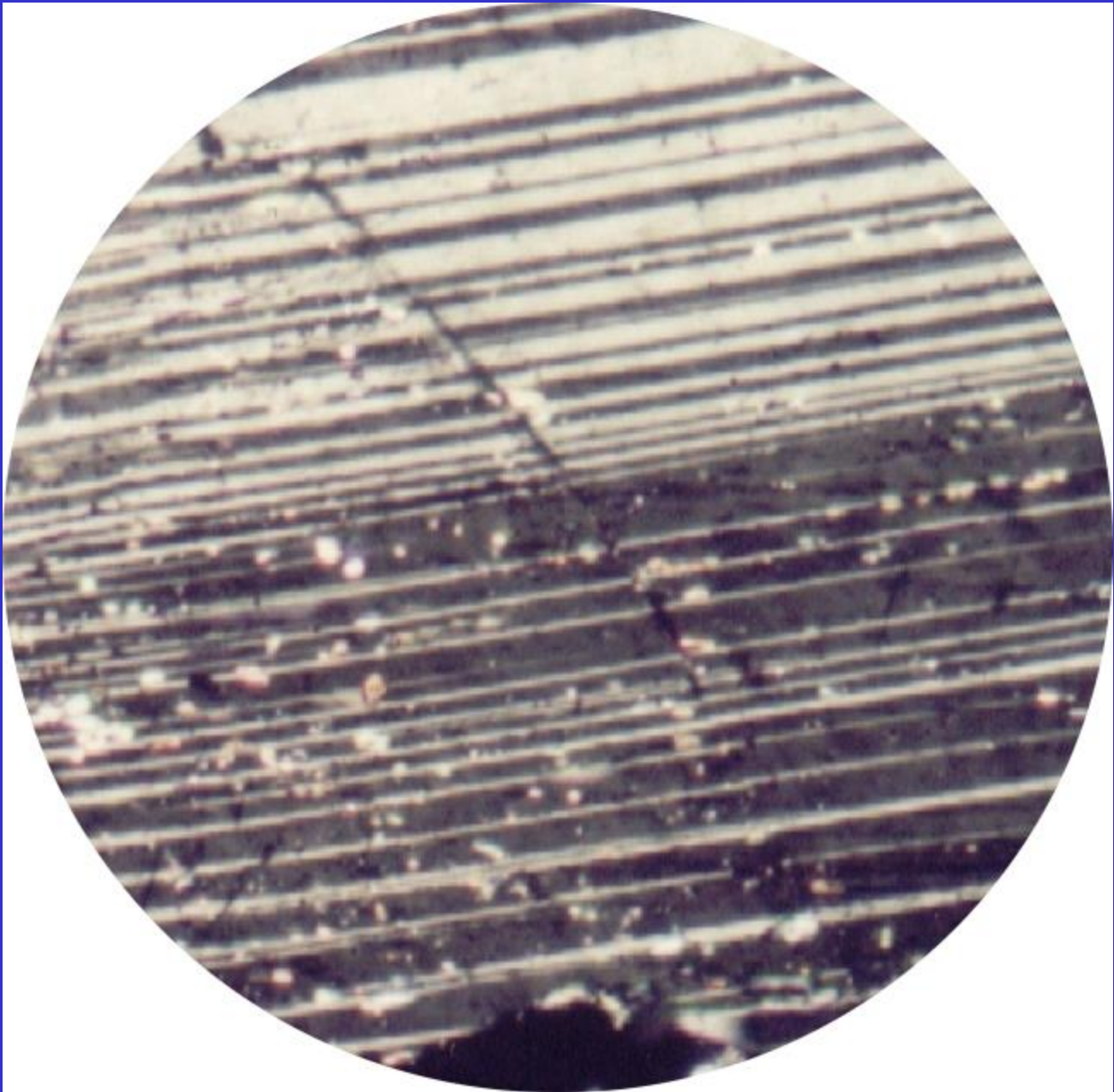
(a)

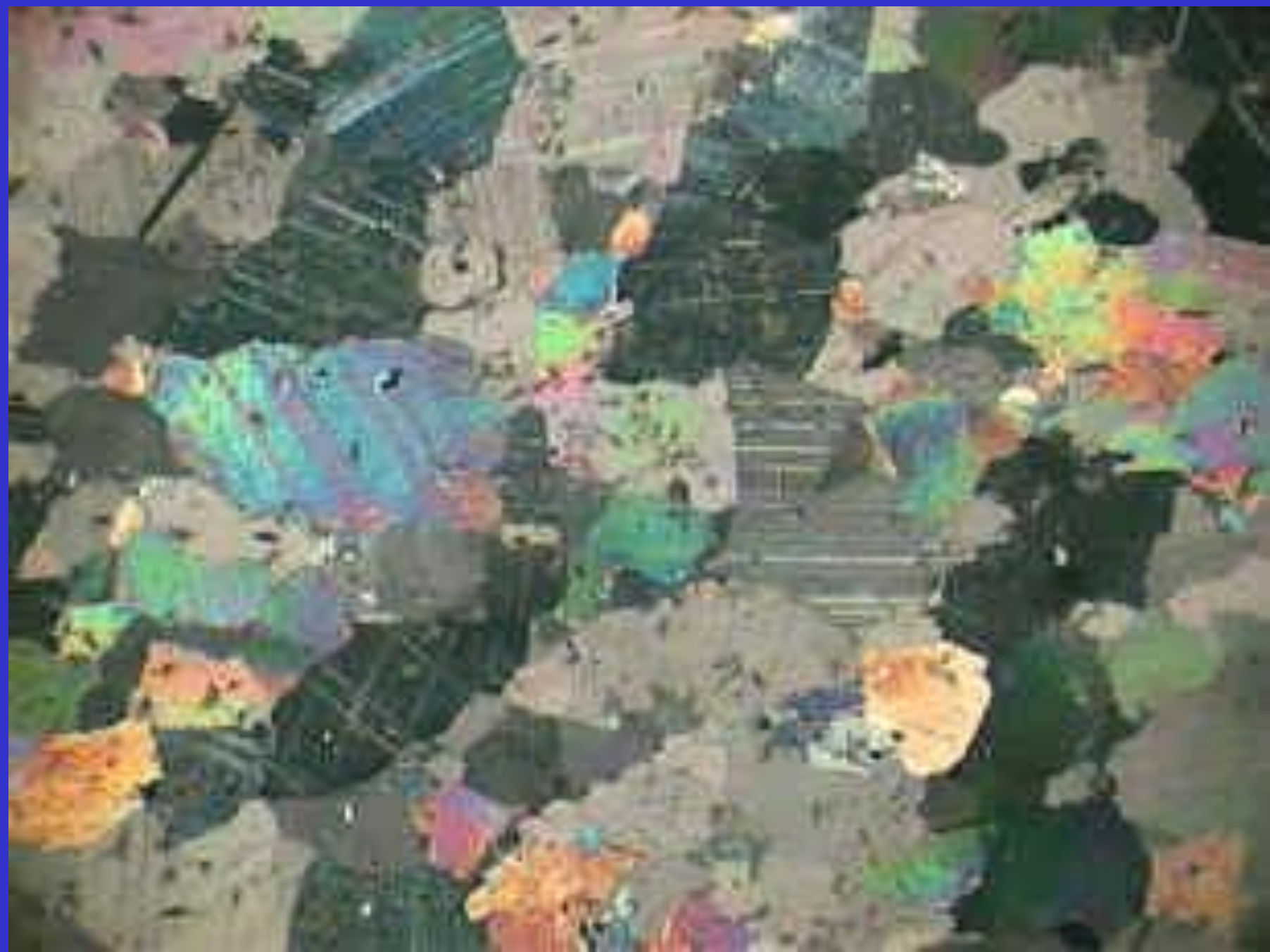


(b)



(c)





PROPRIEDADES ORGANOLÉPTICAS

- TATO
- ODOR
 - Ex: fétido
- SABOR
 - Ex: salino

Halita





Fisionomia após lamber



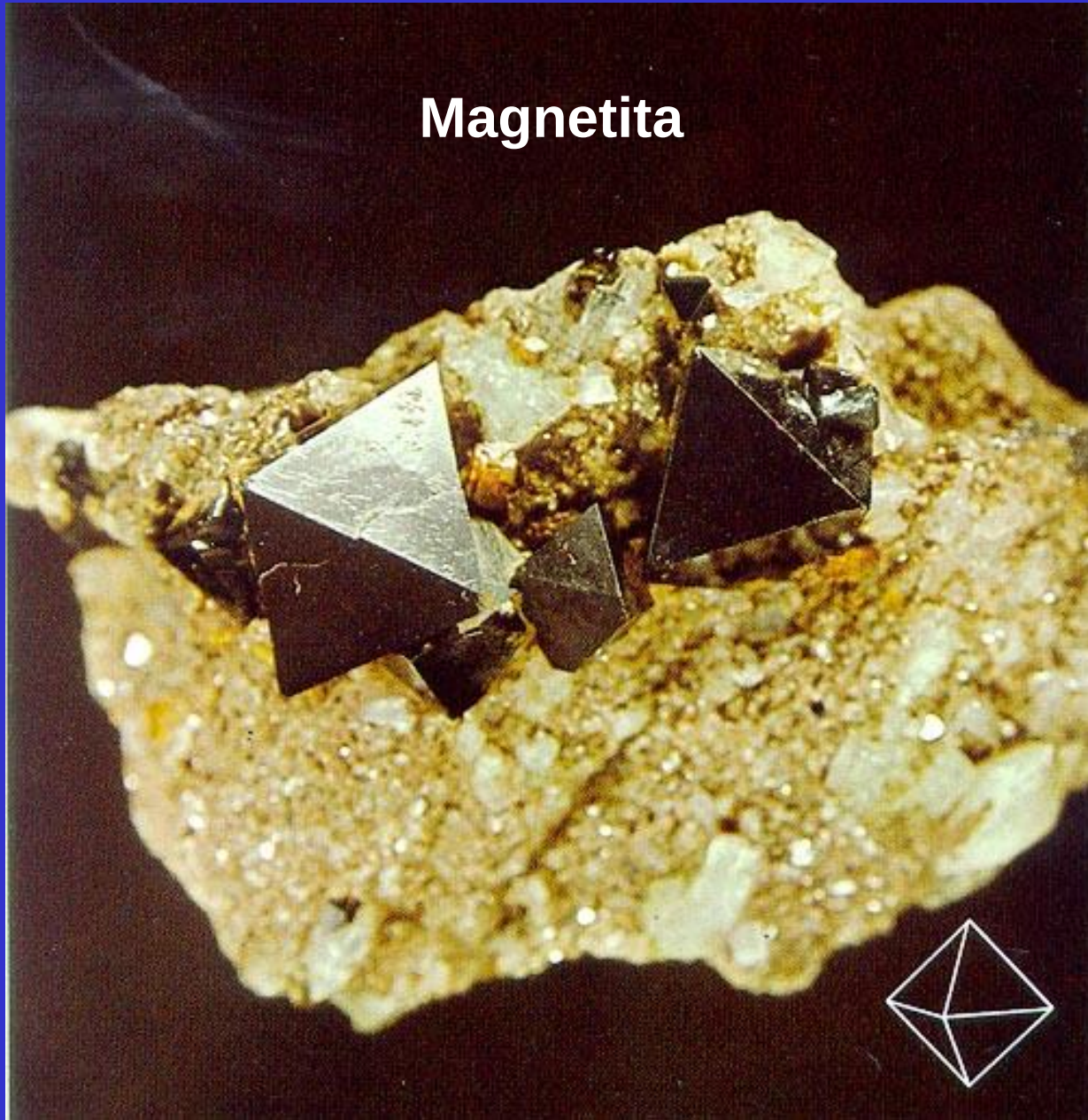
a primeira rocha argilosa...



PROPRIEDADES MAGNÉTICAS

- Minerais que são atraídos por um ímã de mão:
 - magnetita (Fe_3O_4)
 - pirrotita ($\text{Fe}_{<1}\text{S}$)

Magnetita



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