Mike's Box of Minerals

Fused Alumina, Pink

Brits, North West Province, South Africa

Al_2O_3

Synthetic Industrial Mineral: electrofusion of bauxite (+ chromium oxide = pink, and increases hardness)

Uses: abrasives, refractories

Andalusite

Burgersfort, Limpopo Province, South Africa

Al_2SiO_5

Uses: refractories; foundry; ceramics

Asbestos (Crocidolite, blue asbestos)

Northern Cape, South Africa

$Mg_3(Si_2O_5)(OH)_4$

Uses: cement; construction; gaskets; friction products eg. brake linings

Barytes (Barite)

Guizhou, China

$BaSO_4$

Uses: weighting agent in all drilling muds (some cement); chemicals; paints & pigments

Bauxite

Barro Alto, Goiás, Brazil

$Al_2O_3.2H_2O$

⇨ aluminas, fused alumina

Uses: refractories; abrasives; chemicals; cement; water treatment; flame retardants; metallurgy; heavy weight proppants in fracking

Kernite (borate mineral)

Boron, California, USA

$Na_2B_4O_6(OH)_2•3(H_2O)$

⇨ sodium borate (borax) ⇨ sodium perborate etc.

Uses: detergents (1907 Degussa/Henkel created new washing powder using sodium **Per**borate and (bleaching soda) **Sil**icate = **Persil**); fertilisers; animal feed; ceramics; glass; food/pharma; chemicals

Fluorspar (Fluorite)

Las Cuevas, Mexico

CaF_2

⇨ Hydrofluoric Acid ⇨ fluorochemicals, fluoropolymers

Uses: chemicals; toothpaste; Teflon; metallurgy; Li-ion batteries (electrolyte/PVDF binders); cement; ceramics; glass; welding

Greisen

(highly altered granite or pegmatite)

Cornwall, UK

Mainly composed of muscovite mica + quartz; can also host topaz, tourmaline, cassiterite, fluorite, beryl, wolframite, siderite, molybdenite and other sulphides.

⇨ potential source of **lithium** from mica minerals (eg. St. Austell area, Cornwall, British Lithium; Trelavour Hard Rock Lithium Project, Cornwall, Cornish Lithium; Hanns Gully Lithium Project, north Queensland, Boadicea Resources, Australia).

Uses: Li-ion batteries; ceramics; glass; chemicals; pharma

Calcined Kaolin

(Flint Clay, Fire Clay, Refractory Clay, Chamotte)

Tianjin, China (lump); Wrens, Georgia (manufactured proppants)

$Al_2O_3.2SiO_2.2H_2O$

Synthetic Industrial Mineral: calcination of kaolin

Uses: refractories; ceramics; paper; paint; plastics; rubber; lightweight proppants for fracking

Magnesite

Radenthein, Austria (grey); Haicheng, Liaoning, China (white)

$MgCO_3$

⇨ caustic calcined magnesia, dead burned magnesia, fused magnesia

Uses: refractories; steelmaking; animal feed; fertiliser; cements; chemicals; construction; water neutralisation; FGD; flame retardants; food/pharma

Dead Burned (Sintered) Magnesia

Veendam, Netherlands (nedMag99); Brumado, Bahia, Brazil (M-30)

MgO (99% MgO (nedMag99), 98% MgO(M-30))

Synthetic Industrial Mineral: high temperature calcination of magnesite

Uses: refractories; welding; cement

Magnesium metal

Boulder, Colorado, USA

Mg

Synthetic: Garrison Minerals/Big Blue Technologies' Aluminothermal Reduction (ATR) process reacts magnesium-bearing ore (eg. magnesite, serpentinite, olivine) with aluminium to produce Mg metal and MgO-Al_2O_3 spinel by-product.

30 April 2023: Three successful test runs from new pilot plant produced 50lbs Mg metal and >100 lbs of magnesium aluminate spinel.

Uses: aluminium alloys; automobiles; aircraft; lightweight metal products; metallurgy

Fused Magnesia

Dashiqiao, Liaoning, China

MgO (97-98% MgO)

Synthetic Industrial Mineral: electrofusion of magnesite or caustic calcined magnesia

Uses: refractories; heating element coatings; ceramics; foundry

Mica (biotite)

Southern Norway

$K(Mg,Fe)_3AlSi_3O_{10}(F,OH)_2$

Uses: cement; cosmetics; drilling; paints; plastics; rubber

Obsidian (volcanic glass)

Central Oregon, USA

70-75% SiO_2, + Al_2O_3, MgO, Fe_3O_4

Uses: cutting tools; ornamental; gemstone

Silicon Carbide

Delfzijl, Netherlands

SiC (black 99% SiC)

Synthetic Industrial Mineral: electrofusion of quartz/sand + petroleum coke

Uses: abrasives; refractories; metallurgy; filtration

Talc

Pingdu, Shandong, China

$Mg_3Si_4O_{10}(OH)_2$

Uses: ceramics; paint; paper; plastics; cosmetics; rubber; fertiliser

Wollastonite

(with garnet)

Lewis, New York, USA

$CaSiO_3$

Uses: ceramics; plastics; paints; glass

Zeolite (Clinoptilolite)

Ash Meadows, Nevada, USA

$(Na,K,Ca)_{2–3}Al._3(Al,Si)$

Uses: odour control; radioactive clean-up (St. Cloud Mining's Ash Meadows zeolite was responsible for 70% clean-up of the Fukushima Daiichi nuclear disaster, Japan, March 2011); water treatment; cement; construction; animal feed