TOS I DE STATE DE LA CONTROL D FROM THE EARTH Abpap Dallpa bold. Va

From the earliest drum beat to modern arrangements, music reflects human culture and history. From the beginning, metals and minerals from the Earth have helped create music.

Mining Makes It Happen!

 ΔO^{-1} bacca porca acriba, pora POUNTIES PRADE PARTIES Λ<Γ.Ι·ΔΦ. ·∇Λ σCL, Λ·ΔΛΦΦ 64 ~σ.Σ·ΔΥσΦ PAPPONTOU POP9. De.

Λ. ΔΛαθ. Δσρ διαριβρο θασσί

PERCUSSION L.UAba

Percussion instruments produce sound when struck, scraped, or rubbed by hand or a beater, or when shaken. They provide rhythm, as well as melody and harmony.

L·UΔ60 UΠ<6Γ6 V<60

N·△∧db.

D°ΓΟΛΦΙσ•Δ•Φ CΛ°Φ •ΦΛΙΟσι,

USOC Ora 9L V<60 9das.

POCOTION COT OF. LOS

dosavo, L·UDbaa Dordsaa

LUDbo depres. Asalpha

Q6/9Δ9 PDP9·Δσ6, FNd6 9L

D5.416. LbU.416 b4 DCb16.

ΓΛο 64 ΔΔ·Δ· ·Δ>Δ·Δ, ·ΔΛ6σ, 9L

9L Prodoc 9L by programmer and co רשכיף שלב שכמאנה. בסרים השלים ו

TRACK NO. 1 Drums

Going back to 6000 BCE, drums have been used to communicate, celebrate culture, accompany ceremonies, and prepare for battle.

Drums around the world are made from various materials such as clay, terracotta or various alloys.

The voice of the Creator to North America's Indigenous peoples, the drum PLL-A PORbo-do, 209-71Pbob, 64 is comprised of wood and animal hide, clay, or metal pots.

Drum kits, featured in orchestral, rock, and jazz music, have shells constructed of wood or metal, including steel, brass, bronze, and aluminum.

PPa. drrba CL 1 L. UAbaa

TD 5 6000 CdΛ> 1 Po C·ΔPL. L·UΔ606 ΡΔ0<Γ46σ·Δ·46 VDP bboonas.db, VDP JPPZas.db **βΔΓΛΙΠΤΩσ. 46, ΡΓΔΓ 19. Δσ6, 64**



Originating in Asia, a gong is a suspended bronze disc that is struck with a mallet. Ancient uses included healing, communication, and calls to meditation and ceremonies. Gongs are now used in orchestras worldwide.

Zhong, or Chinese bells, first made of clay, then bronze, were originally hand struck with a mallet. Suspended bells later evolved. Handbells, usually brass or bronze, come in tuned sets ranging from 25 to 97 bells.

PPa-drrba ora 2 L.U2rbab b4 L.U2rbobb

VN> APP GCL PDPDNAPQ.App. F.NYLPP Q.AQLPY FPNAVAP 64 < PUΔbt ΔtP< PUΔbe. 70% PΛΔQ< CCbt P9Δ· V· Δσb, bbρση·Δσο, οι Λιοσιδηιιών οι σαισιδ Δλιαιδο. Dal

·40, 9L Utor L. Utoboto, och pordorbeta .andoro, ra.a LbU·d∧db, σCL P<PUΔbd DdPCdJPbdb bDCdJPbdb. bo·7dPbd·db L.U.Proat VPaarrox. pcda.c L.U.Proat. Drox. pro.r.p. DY-AND 9L LOU-AND, ANDOL-AD VCO PANCAL ADO 25 Λσω 97 L·Urrbab.

TRACK no.3 Cymbals

Originating in Central Asia, cymbals are thin, plateshaped brass or bronze discs. Long used in religious rituals and to accompany dancers, different cymbals have different sounds, depending on the copper to tin or zinc ratio.

PPa. 4PPba ora 3 PD. VANbaba

∇υρ αρι αςι ρριρνιριοίνοι, ροιδανργροί aPL-Ap CV29 Dapa DJ-AVAp dr PPN-AVAp DΓDΓΡΟΚΙΘΕ. ΔαΓΔ·Δσο ΡΛΓΔ<ΓΓΡΟΚΙΘΟ ΓDΓ σΓ. 49. 4 νσΓο, νζο ΡΟ. ναλοδο νζο AGCOZIOS. AAL DOPONTOZIOS DIIONOS PL ·

CHORDOPHONES POPbab

Chordophones produce sound through the vibration of chords, or strings, tightly stretched over a soundboard. Vibration occurs with bowing, plucking, striking, strumming, or blowing the strings.

DY-AND POLD LIPY DOLO TO DE DE LA POLO DE LA

JGLΛC, CPL>a, <val>>CPba b4 J<. Þ5·4Λdb b4 ∇9bL ·4Λ\bΛdb ÞPÞJPbZ·40, ΔΥΓΣΟΕσ•◊• ΒΡΓ>CΓΒΑΙ Τ>Cabσ•Δι, ΓΔC•δι. ΒΡΓ<<σορβΑι V<δ• ΔσCdλ.

ΡϽΓοο οδος • ΘΕΟΣΑΙ ΘΕΟΙΙΑΙ ΘΕΟΙΙΑΙ ΕΙΘΙΙΑΙ ΕΙ ΡϽΓbσͻΛb6, ϒCΛ9Λα·Ϥδ bDΓΩC·δδ. ΓΔL ∇DΓ ΩCdγδ bas/Λ9/Λι, 666/Λ9/Ωι, ρ<6/Αγρι, ρδυσυριή δε b>CቦbUPን የጋቦbσንለ₉.

TRACK NO.6 Lutes

NEROPHONES

Aerophones are instruments in which air is the

>CLPGa DULPY-dp PVL>CLPY-dr LVT

primary vibrating medium used to produce sound.

CHA TREE

WEST FOR I

-

>Crbaa

TRACK no.4 Brass

different pitches.

Brass instruments, or horns, include the bugle,

trumpet, trombone, French horn, and tuba. Made

of brass, or sometimes silver, they are played by

pressing the lips to a mouthpiece and blowing, creating a vibration. Valves or slides produce

PPa·4ΓΓ60 σ·Δ0 4 D1·4Λ6

Lutes feature strings stretched along a neck and over an enclosed sound chamber, or resonator.

The guitar uses strings of bronze, nickel, nickel-plated steel, or stainless steel wound over a core of steel.

The violin family—including the violin, viola, cello, and bass—use a variety of strings, a metal, gut, or synthetic core wrapped with metals such as aluminum, chrome steel, tungsten, and silver.

PPa-drrba od-Cr 6 L.U>N9Nrba

L·U7Λ9ΛΓ6Q6 σΛυσλ91Γ6υ·σο ρ·Qd·67·7Γ62 ΔΔL

L·U7Λ9ΛΓ606 DΓDΓΓ62·46 L6U·4Λd6, ·4Λ66Λd6, L°6.4Λ6 Δ.Γ.Δ.9σ6U Λ.4Λd><.

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TRACK NO.7 Harps

Today's triangular frame harp originated in medieval Europe, with strings made of copper and brass. Modern strings could include bronze, steel, nylon, and silver.

PPa-drrba o.47 7 PDrbothb

DOL PUDP POLIPORY BOURDAY DCL BUDL JDP ΔΡ

Αρ

Αρ</p 64 dCb D5.4Adb. odl PDPbodAa DPDSPbU.da LbU·ΔΛdb, L°b·ΔΛdb, b٢Λ\bΛ9>b b4 ·ΔΛ°bΛb.

TRACK NO.8 LYTES

A strummed instrument, it was important in ancient Babylonia, Egypt, and Greece, and is still played widely in east Africa. Today's lyres feature nylon or steel strings.

PPa-drrba סיטר 8 בלטל L·Uלאחארbaa

TRACK no.5 Woodwinds

Woodwind instruments, originally wood, now

use brass and silver, they are played by blowing across or into a mouthpiece. Opening and

closing the holes changes the pitch. Woodwinds

include the flute, oboe, clarinet, and bassoon.

Among North American Indigenous peoples, flutes and whistles were instruments made from

PPa-drrba aga 5 Fnd>Crbaa

DY-AV9 OF -AV2PVAP DUDULPA-9, VLU79

P.<Abd bor>Crbd r<<bacddr. Fnd>Crbaa

dosavo DPDPDsd.do >CPbao PPbF.dodo,

Dr>Crbd 9L AAL bor>Crbd. <Pobd 64

FNd>Crbaa, FNdbb PDrDJrbd.db, DdL

b4 Δ√σbd·db <>>, b>, bcnσc b4 <da.

reeds, clay, wood, or bone.

·ΔΛοσο, ΓΛοσο 9L Doσο.

dCb baseby L. Uynaneba, ane depected a 700 < 100, Dre by and dre app apy Ls. LbU·Δ54 Δρ6 Δ<ΠΖ. Δσ6 ΡΟΓ6σ5ΛΦ DCDCCPU-da ρ5Λ/ργορο ΔΓ γ-αγαργα.

TRACK no.9 Zithers

Zithers are stringed instruments that can be plucked or struck. The zheng, a plucked zither, is one of China's oldest instruments and the precursor to other Asian instruments.

The piano is a "keyed zither." Both a percussion and string instrument, with 220 to 250 copperwound strings, a piano produces sound through keys that cause hammers to strike the strings.

PPa. Arrba saby 9 LLdoba

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PULGOPY PULP 475. CV29 PULP4-40 L·UCΔ6° 64 ΡΟΓ95Λ9Λα6σ·Δ, VdC° 220 dda6 250 D5.4Ad6 PDP94A9APba9, .dd LLdσba Droc.ba ρογολα LLdσbσb b<PUZPa <PUZPboha PDP95A9APbaa.

MUSIC AND ELECTRONICS PDP9. De b4 LLbCAde

Once only experienced through live performance, recorded music has become widely available via electronic technology, from the phonograph to today's digital files.

 $\forall A$ Parbub bcsporgagide, porgidae $\forall \omega$ $\Gamma \nearrow \nabla$ $V < b \in A$ LLbCAdb PCAeU·VZCbU·de, DAL PDCbob b4 DdL bAJa·bPe LLbCAdb bAJba.bC.bPa.

record's grooves, picking up the vibrations to be reconverted to sound.

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It revolutionized electrical technologies, contributing to telephone, television,

movie, and radio innovations. The tube is composed of a combination of glass

(quartz sand), tungsten, nickel, barium, strontium, platinum, and /or molybdenum.

Starting in the 1960s, transistors, which included semiconductors like germanium

ΔΦΡ·bdσ ∇Ρ·Δ·9Φρ 9L ργν·σφρ ρργυπ

VΓC >9C1D9 9·Δ0 PPDVD0 PDPba, VP·4PCAPTDL PDPbaAdo.

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PPa-drrba rch 10 Porba

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TRACK NO.11 Amplifier

and silicon, replaced tube amplifiers.

The Audion, a vacuum tube that amplified electrical signals, was invented in 1906.

ΓΔΙ 6ΡΓΩΟ:66 ΡΟΓΘ:Δα.

TRACK no. 12 Loudspeaker Vacuum tube amplifiers enabled the invention

TRACK no. 10 Phonograph The phonograph, invented in 1877 by Thomas Edison, played tin foil wrapped or wax cylinders. Ten years later, Emile Berliner patented the gramophone, which played flat disks, or records, made from zinc, hard rubber, or a shellac compound. The gramophone stylus, once steel, now a diamond or corundum needle, rides a

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 $\sigma\mathsf{CL}\ \mathsf{bPD}\mathcal{S}\mathsf{PbUb}\ \mathsf{<\mathsf{Y}}\mathsf{\cdot}\mathsf{\nabla}\mathsf{P}\mathsf{Pb}^{\bullet}\ \mathsf{PD}\mathsf{PD}\mathcal{S}\mathsf{PbU}\ \mathsf{b}\cdot\Delta\mathsf{L}\mathsf{<}\mathsf{Abb}\ \mathsf{A}\cdot\mathsf{d}\mathsf{Ab}.\ \mathsf{L}^{\omega}\mathsf{b}\cdot\mathsf{d}\mathsf{Ab},$

TRACK NO. 13 Radio

A radio is comprised of an antenna, a diode, a tuning coil, amplifiers, and speakers. A radio antenna can be made from copper and iron or aluminum. Early radios used lead crystal or vacuum tube

PPa-drrba rcsora 13 Nrarba

 $DD \cdot \nabla$ $A7a \cap ba$ $bD \cap C \cap bU^b$ $Adb \cap bU$ $A \cdot AA^b$ $bD \cap DC \cdot b^b$, $ALAP \sigma ba$,

TRACK NO. 14 Cassette Player

In 1928, Fritz Pfleumer made recording on tape possible by adhering iron oxide powder to cellulose film, creating magnetic tape. In 1979, the cassette-based Sony Walkman®, using samarium-cobalt magnets, became the first self-contained portable music system.

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1928 bh>b, <na <>J5 Pasaby act brdsov rau. Dyrda aal drdrdsoa 7.6 ϤΛ 1979, Λ∘U·∇γγ6∘ ἀσ ·Ϥͽϲͽ, ΡϤ<Ϲͽ Υπαλι ἀιζες Βαγλγ9μ6ρο ΛιαλαΔ, ΓΡ∙∇ σCL βΡΡΛΓβΟυ Λα∪∙∇ΥΓβσί.

TRACK no. 15 CD Player

polycarbonate plastic coated with reflective aluminum and protective acrylic. A CD player rotates the CD, which is read by an optical pick-up assembly and reproduces the content. The optical pick-up assembly is generally made from germanium and silicon.

PPa-drrba rcsaga 15 PDrbandh rorba

1982 ΒΡΡΦ·Δσ·Φ ΦΛ σCL ΒΡΡΓΡΟΝΟ ΡΟΡΒΦΛΟΙ ΡΟΡΒΦ (CD) 64 dCP1- ΡΟΡΒΦΦ $\mathcal{C} \otimes \Delta b^{a} \cap \mathcal{C} \otimes b \wedge \mathcal{C} \otimes \nabla \mathcal{C} \otimes \nabla \mathcal{C} \otimes \nabla \mathcal{C} \otimes \mathcal$ <<<a>C <a> D <a> C <a> C

TRACK NO. 16 MP3

The MP3 player, offering compressed digital music files, came out in 1998. MP3 players and cellphones were first combined around 2003. High-powered magnets made with rare earth elements neodymium, praseodymium, and dysprosium, along with iron and boron, make speakers vibrate to create sound.

PPa·drrba FCJad·CH 16 PDPbob b<<CdabUb

John Sch PDSCOU 1998. Do Porbose 64 PPD·Δο5° b<<ΓCdσbUP° Pdσ√ΓbU·d° ΓLL·ΦρLbP° 2003 δρροιδσίο, διώδιοριδρα διδοληθίδρα στηιτι, <υττηιτι 64 ης<ρτρι, Cd L664 ρε >60, POPUADPORTAL





of the first electrodynamic speaker. Iron, steel, aluminum, and magnesium can be used for a loudspeaker frame. Aluminum, titanium, or beryllium make up the diaphragm. Copper is used for the wire coil, while neodymium, strontium, or cobalt go into magnets, also used in headphones to generate sound.

·ΔΛ⁶βΛ⁶, Δ²βΛ⁶ β4 L⁶σ⁴β¹ Δ<C² ββΛ²ΓβU⁶ <\²√27βαΛ⁶, Δ²βΛ⁶, C>Ua>L, 9L >9C>L 64 <<Ca UN<Δ <4.72 PbaΛdb. >4.4Λb <<Ca b∩∩<Λ9σbUb, b4 στηιτι, ιςςοητι 9L σιςος ΔαΛ9σbU αρλροσь, 64 ΔΔL ▷C∙◊ββ βαΛώρβ∪β β▷ΓΛγαΓβ∪β.

diodes. Modern radio diodes typically use silicon or selenium.

 $L \cap \nabla < \Delta b^{\circ}$, $b \cap C \cap C \cap b^{\circ}$ by $b \cap C \cap C \cap b^{\circ}$. And $b \cap C \cap C \cap b^{\circ}$ DY: ΔΛΦ ΔΓ Γωρ: ΔΥΡ ΔΓ ΦΥΡΥ. ΔCr PbDr. LPG V5-07-ΡΡΓΡΛΓΡΟΘΑ «ΔΛΑΛΡΙΝ ΔΙΑ 9L ΡΟΔΙΚΛΡΟΒΟ LΓΟΤΚΔΒΑ. ΦάΓ Λλιρά ραζιρζο Γι∙Δζγρά αζίο ζισφ δΓ ζυαλί.

·ΔΠϧͼ ΔͿσδυ, δ·Δ<Λδι δΡΓΓΓ·∇Υι, σCL ΡΡͿΓΟυζε 1906. ΓΔΓ

dCργα βράσρη δυγβυρα Δ^ωdU Lγ·∇<Δβσδ βργασρίβρα, Λσ^ω δρασδυγουρα ρρο·δαα, ΠΛ Lγαυγγοαα, Lγαυγγα·δαα 64 ΡϤσ▷⁰ΡԿ٥ 1960, Λιαροίδ συνυράς, ΡϤ<σ ρρρυμοριρο $\mathsf{C}\mathsf{A}^\omega\mathsf{d}$ $\mathsf{J}^\mathsf{G}\mathsf{L}\mathsf{d}^\mathsf{J}^\mathsf{L}$ b4 $\mathsf{J}^\mathsf{C}\mathsf{d}^\mathsf{G}$, $\mathsf{P}\mathsf{d}\mathsf{d}$ $\mathsf{J}^\omega\cdot\mathsf{b}\mathsf{D}\mathsf{d}\mathsf{d}\mathsf{C}\mathsf{D}\mathsf{U}\cdot\mathsf{d}^\mathsf{G}$ b· $\Delta\mathsf{L}\mathsf{d}\mathsf{d}\mathsf{b}$ S.N.∆74p.

In 1982, compact discs (CDs) and CD players came on the market. CDs are made of Electronic circuit boards incorporate copper components and silicon microchips.

つくして

Magnesite

Lbohtc

Strontianite

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lithium (Li) Atomic Number: 3

Extracted from the minerals spodumene and lepidolite, lithium is a highly reactive element that efficiently conducts heat and electricity. Lithium is used in rechargeable lithium-ion batteries that power portable electronics.

כחלי (Li) סיכרי סףכלים: 3

ΔΔΙ ΡΦησουίσο ίκορτσ οι πλουίς ανσού, $\Delta^{\omega}dU\cdot\Delta^{d}$. CD^{bL} $\Delta^{d}< C^{d}$ $D^{d}\cdot\nabla$ $\Delta^{\omega}dU\cdot\nabla< D^{d}\cdot C$ ΔσΓΡ56 ΓΡΓΔΩΡΙΕΡΘ Ε<<Cdσ6UPΘ CΛ64

Beryllium (Be) Atomic Number 4

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bordschub.

Beryllium occurs in many minerals, the two principal ores

which combined with its stiffness and low density, makes

being beryl and bertrandite. It conducts sound quickly,

it an excellent material for loudspeaker diaphragms.

DD.V >9CH Darlba V<ba drobb, DP Ly osa

ΔΦΡΙΡΕ • Τ·Δ< ΓΦC916 βΓΙ-ΔΦΡΠ ΓΓΟ-ΔΡ

Magnerium (Mg) Atomic Number 12

Magnesium, a shiny grey solid, occurs in large deposits in

minerals such as magnesite, dolomite, and serpentine,

and is also extracted from seawater and natural brines.

other metals makes strong, lightweight materials used for

Less dense than aluminum, magnesium alloyed with

loudspeaker frames, cellphones, laptops, and tablets.

64 dar 6p<6706, dar Fo4 <4.7766

ביסאלי (Mg) סיכרי סףכאי 12 ביסאלי (Mg) ביכרי בי

dCP50 bLLdσbUPa.

ϤͰσϧρ CV₀9 ΓρΩ^λς' ·C^ΣΓ_λς ρη Ϥ_ενουσ ρη

<\·√/°ba•, PP⊃·Δσ\•, bLLdσbU° bLΛ⊃٩ b4

Strontium (Sr) Atomic Number 38

4cqanta (Sr) d.CLp dbcha 38

<\·∇ረቦbσ⁰ <<CΔΦ \CGΦUbL \·\Φ\db\\Φ.

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Strontium, found in the minerals celestine and strontianite,

is a soft, yellow-tinged silver-white metal that burns in air

and reacts with water. Strontium is used in alloys; strontium

ferrite permanent magnets are used in loudspeakers and

recording media. In an amplifier's triode vacuum tube,

strontium carbonates coat a cathode's wire filaments.

LCGONYL DONOBU 404NO 64 LCGONYOYC OLOBO.

 $\Delta C = \Delta C$

b>5000 <5.√200a b4 Λαυ·720baa. ΔΔL b4



₽₽ГЪ (Cr) Φ·СГ₽ ФРССФ 24

primarily in the mineral chromite. It is tarnish resistant and takes a high polish. Chromium plating gives a hard, polished finish to steel. Audiotapes made with chromium dioxide were the first high fidelity cassettes.

Chromium, a lustrous, hard, steel-grey metal, occurs

Chromium (Cr) Atomic Number 24

ΓΛ·6ΛΡ"6L66 64 • Φλλρη 6~ 6 • Φλίνο 6 • Ελίνο ΡϤ<Ϲͼ ΦΡΓΡΛΓΡΟΡά ΛάΟι-ΣΥΓΡΩΡΑ.



Hematite

 $\Delta LC^{\flat c}$

Iron (Fe) Atomic Number 26

Iron, extracted from the minerals hematite and magnetite, is one of the most abundant elements on Earth. Nearly all mined iron is used to manufacture steel. Iron oxide powder on cellulose film made up the first magnetic tapes for recording. High-powered permanent magnets used in electronics are made with iron. Some pianos have a cast iron frame to anchor the strings.

▷▷∙♡ ◁ϧϩͼ Λ∙Ϥ√ρ ▷ͼ∪ΩρΩ ∇Γζε ρ∢ ΓρΩζερ ΔΥσθο, ΓΥ·∇οΓο σC·Δριδο. 96 δρα δρα δρα διανσιδινο $\Delta \mathcal{N} d < \Omega \mathcal{N} b > \mathcal{N} b \cup \mathcal{N} b \cup \mathcal{N} b \cup \mathcal{N} d = \mathcal{N} b \cup \mathcal{N} d < \mathcal{N} d$ **β**ΦΓΛΓ9L6 Λ·ΔΛ ΒΡΛΓ6U ΛΦU·∇ΥΓ6ΦΦ. $\mathsf{P}\Gamma_{\mathsf{A}}\mathsf{P}\cdot\nabla\mathsf{A}\Gamma\mathsf{P}\mathsf{b}\sigma\ \sigma\mathsf{LV}\mathsf{L}\mathsf{p}\sigma\sigma\ \nabla\nabla\Gamma\ \nabla_{\mathsf{A}}\mathsf{q}\Pi\ \mathsf{LD}\mathsf{L}\mathsf{d}\sigma\mathsf{b}\mathsf{\Gamma}\mathsf{p}\rho$ President des de le de le proposition de la prop 5bΛ9Δbaa.



Chalcopyrite

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L⁶σγ⁵^L ·ΔΛΔΛ6^Δ ·ΔΛ⁶β Γ5Λ·6Λ6^Δ, σΛ·Δ σC·ΔΡL6^Δ

Copper (Cu) Atomic Number 29

Copper, the oldest known metal, occurs in elemental form but is most often extracted from ores like chalcopyrite and chalcocite. Brass and bronze, with high copper content, are used for multiple instruments such as horns, cymbals, gongs, bells, and windings on strings. Copper is used in circuit boards and wire coils in various music electronics.



9706. <64 64 <-504, 01.0 C.60 -6>9 D1.01. Δ aCPba bbDCCCDCDDCDDD</ ΡϽ·∇ϤΛЬΔδαΦ, L·U۲Γδαδ, L·U۲Γδσδδ, ΡΔ·ϤΛδ Ϥ<CΦ Λ·ΔΛΔ>< βριδρριβρα ρουβσ ευθολός,



Scheelite ᠸ᠈ᢗ

Tungsten (W) Atomic Number 74

Tungsten, mostly from the minerals wolframite and scheelite, has high corrosion resistance and the highest melting point of all metals. Applications of tungsten include metal wires, electrodes, and contacts in electronics and lighting. Tungsten goes into the wire filament cathode in a triode vacuum tube, and some stringed instruments have tungsten-wrapped strings.

Cabhna (W) d.CFb dPCda 74

 $DD \cdot \nabla$ $DD \cdot \Delta V \cdot \Delta V \cdot D \cdot D \cdot \Delta V \cdot \Delta V \cdot D \cdot \Delta V \cdot \Delta$ $b \cdot \Delta^{\sigma}$ $\Gamma \cdot \Delta^{\sigma} \cdot \Delta^{\sigma$ CΛ^ωd ·ΔΦ dCPγΦ αλσΦ. Cd<PNΦβσ•Δ •αα αλΦ δρλγουρα Λ·Δλαγλα, ·Δγοσγλα ο4 αCργα ·ϤϒϧϭϧΛͼ ϧϟ ·ϤϧϥͽʹͰϧϭϧΛͼ. Λ·ϤΛϥϧΛϤ·Δͼͼ bΛαCΛ9σbUρα b4 bϤσ·bΛρσbUρα Ϥ<Cα Cαυ\Πα



Platinum, a silver-white metal, occurs in river deposits and is also produced as a by-product of copper and nickel refining. Platinum is used in triode vacuum tubes and in many electronic applications, such cellphones, MP3 players, video recorders, and computer hard disks.

Alkali metals | Alkaline earth metals | Transition metals | Basic metals | Metalloids | Non-metals 4-pc V·4Vqa | 4-pc/2 4bp V·4Vqa | Tr. V·4Vqa | a) V·4Vqa | Acp V·4Vqa | pV·4Vqa | pv·4

Platinum <cnqL

Bauxite

$bd \cdot b \wedge b^b \wedge \cdot d \wedge^b$, $\cdot d \wedge^{\circ} b \wedge b^a$, $\triangleright a \cap L b^a b \Delta \mathcal{J} \cdot \wedge \cdot d^b$ $\mathsf{b4} \ \mathsf{DPD}\mathsf{\GammaPU} \ \mathsf{D5}\mathsf{\cdot}\mathsf{d}\mathsf{\Lambda^b} \ \mathsf{b4} \ \mathsf{dC^b} \ \mathsf{\cdot}\mathsf{d}\mathsf{\Lambda^oP} \mathsf{o}\mathsf{\sigma5}\mathsf{\cdot}\mathsf{d}\mathsf{\Lambda^b}$

Λ•ΔΛσελο ος οςΠορο •Δερσελο οδΓσορίδο ba<Λ92ρα CΛ69 ρβΟ·Δσ2α, ΛU·Δ5ρρσ2α, L/QU/ΓβQ 64 βLΛΟς ΛαγΓβQ.

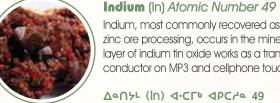


Aluminum, extracted primarily from the rock bauxite, is lightweight, easily shaped, easily machined and cast, and has tremendous corrosion resistance and durability. Its uses related to music production are varied, from snare drum shells, lightweight cases for microphones and MP3 players, and CD reflective surfacing, to bronze alloys, loudspeaker diaphragms, and wrapping for strings.

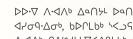
·<657C

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b4 b·ΔΦ ΓΦΦΦΦΦ b4 σΦΦΦ. ΔΔL ΔΓΦΚΕΦ ΡΟΓΦ•Δ 9ασο ρρυρλιρησο ενώς Γ·Λγρον, ρεσφρηρ b▷ΓbΡΡϽΦσ·Ϥρ ρ₹ ΥΠ·Διρομού ρ<<Γ·∇ιρομο ΡΟΓΒαλόζα ΒΔΛΛαυρα ΡΟΓβαα, 64 σΕργα V<βα <\$\\nabla_\rangle b\rangle \rangle \rangle



Indium, most commonly recovered as a by-product of zinc ore processing, occurs in the mineral sphalerite. A layer of indium tin oxide works as a transparent electrical conductor on MP3 and cellphone touchscreens.



AUOYS LL. dbrobood

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Cassiterite

945679

Sphalerite

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Tin, a silvery-white metal derived from the mineral

Tin (Sn) Atomic Number 50

cassiterite, is soft, malleable, ductile, and highly crystalline. Alloys of tin are used for soft solder, pewter, and bronze. Bell bronze, used for cymbals, gongs, and bells, has high tin content. A layer of indium tin oxide works as a transparent electrical conductor on MP3 and cellphone touchscreens.

Πο ΛΟΛΟ ΒΟΛΟΛΟΟ ΡΟΠσΟΟ ΔΙσου ΒΙΟΓΟ, ΔΛΓ DYPY. J. brclb by S>V.JVg. by. br. LPR ΔΛϤ<CΦ ΦΥΡϤϤΠΦΡΦΡ •ϤΛΘΡΥΡΡΥ-ΘΡ b·<</i>ΔΔΔΔDD< VSha I.IJChob SSCa Da A.SAb hs AosCa LLdobUPa.

Brass, an alloy of copper and zinc, has a relatively low melting point and is easily cast. Different ratios of copper to zinc result in brasses with differing hardness, along with different acoustic, mechanical, and electrical properties. Because of its workability, durability, and

acoustic properties, brass is used for horns and some woodwinds and their components.

64 βΔΛΓβΑ·Ν V<βα βΔσC·βρα, DD·V Λ·ΝΛβ ΔΛΝ<β βΕΛΩα·C >CΓβαβ, PD·VΝΛβΛΓβαβ

V

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Brass also goes into percussion instruments such as cymbals, gongs, and bells.



Silicon (Si) Atomic Number 14

Silica (silicon dioxide) in various natural forms, including quartzite, is used to produce silicon ferroalloys and silicon metal. Silicon is a semiconductor and a metalloid, a chemical element with properties between those of typical metals and non-metals. A CD player optical pick-up assembly includes a photodiode made with silicon, and electronic circuit boards incorporate silicon microchips.

רכלם (Si) סיכרש סףכלם 14

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Quartz

Diamond C>Lac

Carbon (C) Atomic Number 6

Diamond, a crystallized form of carbon, is the hardest natural substance. It has extremely high thermal conductivity and low thermal expansion. Diamond needles are used in record players and diamond is used as a heat sink for integrated circuits in electronics because of its high thermal conductivity.

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Sapphire 5<

Corundum (Al₂O₃)

The third-hardest mineral, after diamond and moissanite, corundum occurs naturally in igneous rocks such as syenite, nepheline syenite, and pegmatite, and can be synthesized. Typically grey to brown, corundum occurs in other colours; such as red (ruby), and blue (sapphire). Record players often use a corundum stylus. Clear synthetic corundum protects electronic device screens and goes into lasers, used to play CDs and DVDs.

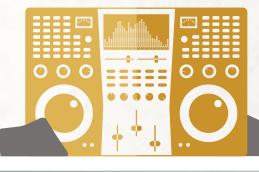
.65°CL (Al2O3)

TD·7 dCb ore dNP bL~b·∆rt dre, CN~d ~ 05-42 64 J.50c, DD.7 .69acl Darlba Δορσι Δισο CΛοσ γρος, σζο γρος 64 D5.45d7 (4<29). .00 070 Da<07 POUDULOR POUPO. POSODAL ALO Δα<Πλ ραφαγρηδη ΓΓς-αναγα ρε Ubrba¢, PDUbJulpp VN·∆hupaVq¢ b4 b√dσbUPª L/aU/°baª.

ALBUM

9년 1년

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ARE ELEMENTS

<ap VC bypa dpb bbrlbpa 9daa

Fifteen lanthanide elements, along with yttrium and scandium, make up the group of rare earth elements (REEs). Generally found together in deposits, REEs are abundant in the Earth's crust but not in large concentrations, so they are difficult to mine. The world's most abundant REE source is bastnäsite. followed by monazite. REEs are usually high-lustre silver, silverywhite, or grey metals.

TCJaada cacate apb boplbpa, Cd teat by thent, VC βλρα Δρο βρημορα 9daa (REEs). LL·Δ·da bΓρουρα, Do REEs d>·da ·dρcolo b·Δα co dar $\sigma \land \cdot d$ $\Gamma d \Rightarrow L b \rho e$, $\Delta b e$ $\Gamma \rho L a \Rightarrow \sigma \cdot d U \rho e$. $D o C \circ b < \Gamma a \rho e$ bylbpa REEs Arobu < Charc by dCb Jahr. . ad ala



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Garnierite, Hematite, Lepidolite, Magnesite, Molybdenite, Pendlandite, Platinum, Quartz, Rutile, Sapphire, Scheelite, Smithsonite, Sphalerite, Strontianite Rob Lavinsky/www.iRocks.com/Arkenstone: Bastnäsite, Cassiterite, Monazite Maggie Wilson: Germanite **ለ-ፈለ**ቅ/**ላታሪ**ቅ **L**ታሬ<mark>₽ታሪል</mark>ቅ **ዕዮሩቦበል.1-ላ**ቱ **Þd:** ላኝ፣· ∇ ጋኝ/ዕቦ\ የቦየዖይወፈበስኔቮፅ: ላኝባልበል ሩኝናጵና -ሩ৬ኒጵና >ኝፎሩ, ሁጋ-ዕለናጳና, ቅንዚዩና, ርሃኒልና, ዕሃይናጵና, ΔLርኦና, ϽΛϽϲϷ;, Ιυσήνε, •Lc-«Όανε, Vαεααζύε, «αΠαί, υδεί», Ρζύε, ήζκε, γίλος, γίλανε, γίλαγες, γίαπλανε σε αλανρ/www.iRocks.com/Arkenstone: <\C\a, b<) G+C. Ια, b< LP ·Δ-1α: ηςLa, bc

EDITOR: Victoria Stratton PROJECT COORDINATOR: Lesley Hymers DESIGN: TWGCommunications.com βΡΡαταδίν: Λύστ τίπος Φαρίδα βαγιδίς της Ετίπο Ετσλαίδα: TWGCommunications.com

PDULLEGaubUpa:







Bronze, an alloy of copper and tin, often includes other metals such as aluminum manganese, nickel, or zinc, or non-metals or metalloids like arsenic and phosphorus, to produce alloys with differing hardness, stiffness, ductility, or machinability.

Bell bronze, with high tin content, is the traditional alloy for fine cymbals, many gongs, and bells. Phosphor bronze is used to wrap steel and nylon strings

b4 dCPbb >Crbab.

on stringed instruments and to make some saxophones. $\checkmark \cdot \Pa^{\downarrow}$ $D \uparrow \cdot \P \wedge b$, $L \cdot \Delta \sigma b U$ $D \uparrow \cdot \P \wedge b A$ $b \Delta a b \wedge b A$ $b \wedge A \wedge b A$ $b \wedge A \wedge b A \wedge$ ዓላለቦረለነቴჼ ዓL bለΓለሀቦዓLbPa. L·ህረቦቴa Þጎ·ላለdჼ bÞՐÞ/ንላቴ σ ላ ΓÞL b4 bÞՐÞ/ՐԵረ-ላჼ PJ·Vd/\9/\Pba\$, dCPb\$ <N·a4\$ V<ba L·U/Pba\\$. <\$> >\$ >\$ >\$ >\$\d\\$ Δ \d<Ca >\$\d\9\d\\$b\\$ bL\9\d\b\\$

 Λ - Λ ላ b b4 bታ Λ \ b Λ 9 p e P o P o D o D o D o P o

Steel is one of the most common materials used today. An alloy of iron and carbon, it often includes other elements such as manganese, niobium, or vanadium to give it strength and hardness. Adding nickel and chromium creates stainless steel, a corrosion-resistant alloy. Steel serves in multiple ways to make music: it goes into drum and loudspeaker frames, steel pan drums, triangles, glockenspiel steel-tuned bars,

steel guitars, and wires for a variety of stringed instruments. **δL⁶δ·4Λδ** Λ·4Λδ ΓD·7 δσC4<ΓΓδU⁶ ΔσL δΡΛδδ. LL·ΔσδU 4⁵5α δ4 δ5Λα, δ4 dCP5α CdσbU·4α $\mathsf{C}\mathsf{A}^\mathsf{o}\mathsf{d}$ Lebot, σረላን፥ $\mathsf{Q}\mathsf{L}$ <angle definition of the property of the carban-amplitude. L·U</br>
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