

Earth: An Introduction to Physical Geology, Cdn 4e (Tarbuck)
Chapter 2 Minerals: The Building Blocks of Rocks

2.1 Multiple-Choice Questions

- 1) Which manufactured products contain minerals or elements extracted from mineral resources?
A) wooden chair
B) jacket
C) beer
D) aluminum pop cans, "pencil lead," baby powder, concrete

Answer: D

Diff: 1

Topic: Minerals

- 2) Which of the following best defines a mineral and a rock?
A) A rock has an orderly, repetitive, geometric, internal arrangement of minerals; a mineral is a lithified or consolidated aggregate of rocks.
B) A mineral consists of its constituent atoms arranged in a geometrically repetitive structure; in a rock, the atoms are randomly bonded without any geometric pattern.
C) In a mineral the constituent atoms are bonded in a regular, repetitive, internal structure; a rock is a lithified or consolidated aggregate of minerals.
D) A rock consists of atoms bonded in a regular, geometrically predictable arrangement; a mineral is a consolidated aggregate of different rock particles.

Answer: C

Diff: 2

Topic: Minerals

- 3) Which is not a requirement? To be a mineral it must be or have _____.
A) naturally occurring
B) well formed external crystal shapes
C) orderly regular atomic or ionic structure
D) definite chemical composition

Answer: B

Diff: 2

Topic: Minerals

- 4) Minerals consist of an ordered array of atoms or ions that are _____.
A) all the same size and charge
B) always packed together in cubes or octahedra
C) chemically bonded in a regular crystalline structure
D) physically attached to each other by shared protons

Answer: C

Diff: 2

Topic: Minerals

5) Which one of the following is false for minerals?

- A) They have a specific, internal, crystalline structure.
- B) They can be a liquid, solid, or glass.
- C) They have a specific, predictable chemical composition.
- D) They can be identified by characteristic physical properties.

Answer: B

Diff: 2

Topic: Minerals

6) Which of the following rock types are not comprised mostly of minerals.

- A) limestone and rock salt
- B) coal, obsidian, and pumice
- C) sandstone and conglomerate
- D) granite and basalt

Answer: B

Diff: 1

Topic: Minerals

7) While there are 90 naturally occurring elements, these combine in various proportions and structures to make nearly _____ minerals.

- A) 470
- B) 4,700
- C) 47,000
- D) 470,000

Answer: B

Diff: 1

Topic: The Composition of Minerals

8) Which of the following is not a fundamental particle found in atoms?

- A) neutron
- B) selectron
- C) electron
- D) proton

Answer: B

Diff: 1

Topic: The Composition of Minerals

9) Which of the following denotes the tiny, but very massive, central part of an atom?

- A) inner shell
- B) core mass
- C) valence shell
- D) nucleus

Answer: D

Diff: 1

Topic: The Composition of Minerals

10) Which of the following denotes the massive, positively charged, nuclear particles?

- A) protons
- B) electrons
- C) isotrons
- D) neutrons

Answer: A

Diff: 1

Topic: The Composition of Minerals

11) What, basic, atomic particles occupy space in an atom outside of the nucleus?

- A) morons
- B) electrons
- C) protons
- D) neutrons

Answer: B

Diff: 1

Topic: The Composition of Minerals

12) What are the lightest or least massive of the basic atomic particles?

- A) uranium nuclei
- B) protons
- C) electrons
- D) neutrons

Answer: C

Diff: 1

Topic: The Composition of Minerals

13) Atoms of the same element, carbon for example, always have the same _____.

- A) number of electrons in the nucleus
- B) number of protons in the nucleus
- C) number of neutrons in its chemical bonds
- D) atomic weight

Answer: B

Diff: 2

Topic: The Composition of Minerals

14) In a neutral atom such as helium or native copper, the number of protons in the nucleus _____.

- A) is usually greater than the number of neutrons
- B) is different for each isotope
- C) is equal to the number of electrons in the outer shells
- D) increases from element to element by even multiples of 8

Answer: C

Diff: 2

Topic: The Composition of Minerals

15) Which element is the first and lightest element in the periodic chart?

- A) sodium
- B) hydrogen
- C) oxygen
- D) helium

Answer: B

Diff: 2

Topic: The Composition of Minerals

16) The electrons in the outermost shell of an element are referred to as _____.

- A) aberrant electrons
- B) positrons
- C) non-bonding electrons
- D) valence electrons

Answer: D

Diff: 1

Topic: The Composition of Minerals

17) When two or more elements combine to form a mineral, they do so in definite proportions represented by a simple chemical formula for that _____.

- A) compound
- B) isomer
- C) isotope
- D) polymorph

Answer: A

Diff: 1

Topic: The Composition of Minerals

18) Generally ions end up with the stable, noble-gas, configuration having _____ electrons in their outermost shell.

- A) no
- B) two
- C) eight
- D) twelve

Answer: C

Diff: 1

Topic: The Composition of Minerals

19) An atom's atomic weight is 13 and its atomic number is 6. How many neutrons are in its nucleus?

- A) 19
- B) 7
- C) 13
- D) 6

Answer: B

Diff: 2

Topic: The Composition of Minerals

20) What is the name given to an atom that gains or loses electrons in a chemical reaction?

- A) molecule
- B) ion
- C) proton
- D) nucleon

Answer: B

Diff: 1

Topic: The Composition of Minerals

21) In _____ bonding one atom gives up electrons to another that receives them.

- A) covalent
- B) ionic
- C) metallic
- D) polymorphic

Answer: B

Diff: 2

Topic: The Composition of Minerals

22) Which of the following is an accurate description of ionic bonding?

- A) Nuclei of bonding atoms exchange electrons; the resulting ions are bonded together by the attractive forces between the two electrons.
- B) Atoms of two different elements share electrons and protons; the resulting compound is bonded together by the strong, binding energy of shared protons.
- C) Nuclei of two different atoms share electrons and the resulting compound is tightly bonded by the very strong, induced, ionic nuclear bonds.
- D) Atoms of different elements, having gained or lost electrons, are held together by their opposite charges.

Answer: D

Diff: 2

Topic: The Composition of Minerals

23) The two main types of bonding that form the structures in minerals are _____.

- A) covalent and ionic
- B) magnetic and gravitational
- C) double and triple
- D) radioactive and unstable

Answer: A

Diff: 1

Topic: The Composition of Minerals

24) In ionic compounds, _____ have lost one or more electrons to acquire positive charge and a smaller radius than their neutral atom, while _____ have gained one or more electrons to acquire a negative charge and a larger radius than their neutral atom.

- A) anions, cations
- B) cations, anions
- C) daughter isotopes, parent isotopes
- D) stable isotopes, unstable isotopes

Answer: B

Diff: 2

Topic: The Composition of Minerals

25) In which type of chemical bonding are electrons shared between adjacent atoms?

- A) ionic
- B) subatomic
- C) covalent
- D) isotopic

Answer: C

Diff: 1

Topic: The Composition of Minerals

26) When elements or compounds combine in the same proportions but in more than one structural arrangement, relative to each other, those mineral structures are called _____.

- A) amorphous
- B) bimorphs
- C) isotopes
- D) polymorphs

Answer: D

Diff: 1

Topic: The Structure of Minerals

27) Minerals like diamond and graphite exist because of _____.

- A) amorphous crystallization
- B) different physical and chemical conditions or environments within the earth
- C) the law of polymorphism
- D) the metamorphism of coal

Answer: B

Diff: 2

Topic: The Structure of Minerals

28) _____ is the external expression of orderly internal arrangement of atoms in a mineral crystal.

- A) Lustre
- B) Streak
- C) Habit
- D) Colour

Answer: C

Diff: 1

Topic: Physical Properties of Minerals

29) Which of the following describes the light reflecting characteristics of a mineral?

- A) lustre
- B) streak
- C) virtual absorption
- D) fluorescence

Answer: A

Diff: 1

Topic: Physical Properties of Minerals

30) The quality of light reflected from a mineral surface is called _____.

- A) translucency
- B) lustre
- C) polish
- D) reflectance

Answer: B

Diff: 1

Topic: Physical Properties of Minerals

31) The true colour of a mineral as seen in its powdered form is called it's _____.

- A) birefringence
- B) chatoyancy
- C) iridescence
- D) streak

Answer: D

Diff: 1

Topic: Physical Properties of Minerals

32) A mineral's hardness is determined by the number and the strength of chemical bonds, but how is it actually determined?

- A) by whether or not it cleaves.
- B) by weighing it on a Mohs scale.
- C) by looking at its streak.
- D) by its resistance to scratching or abrasion by other materials of known hardness.

Answer: D

Diff: 2

Topic: Physical Properties of Minerals

33) What mineral is the hardest known substance in nature?

- A) silicate
- B) native gold
- C) diamond
- D) muscovite

Answer: C

Diff: 1

Topic: Physical Properties of Minerals

34) Which minerals that make up the Mohs scale are harder than a glass plate?

- A) beryl, garnet, tourmaline
- B) calcite, fluorite, apatite
- C) feldspar, quartz, topaz, corundum, diamond
- D) gypsum and talc

Answer: C

Diff: 2

Topic: Physical Properties of Minerals

35) Which minerals that make up the Mohs scale are softer than your fingernail?

- A) beryl, garnet, tourmaline
- B) calcite, fluorite, apatite
- C) feldspar, quartz, topaz, corundum, diamond
- D) gypsum and talc

Answer: D

Diff: 2

Topic: Physical Properties of Minerals

36) Which minerals that make up the Mohs scale are softer than a glass plate but harder than your fingernail?

- A) beryl, garnet, tourmaline
- B) calcite, fluorite, apatite
- C) feldspar, quartz, topaz, corundum, diamond
- D) gypsum and talc

Answer: B

Diff: 2

Topic: Physical Properties of Minerals

37) Which one of the following minerals has the greatest hardness on the Mohs hardness scale?

- A) feldspar
- B) calcite
- C) gypsum
- D) topaz

Answer: D

Diff: 1

Topic: Physical Properties of Minerals

38) The property of _____ is controlled by planes of few or weak bonds within the mineral structure.

- A) absorbency
- B) bondage
- C) cleavage
- D) well formed crystal faces

Answer: C

Diff: 1

Topic: Physical Properties of Minerals

39) The strong tendency of certain minerals to break along smooth, parallel planes is known as _____.

- A) streak
- B) cleavage
- C) flat busted
- D) crystal form

Answer: B

Diff: 1

Topic: Physical Properties of Minerals

40) Which one of the following describes a mineral's response to mechanical impact?

- A) lustre
- B) cleavage
- C) streak
- D) crystal form

Answer: B

Diff: 1

Topic: Physical Properties of Minerals

41) Cleavage is determined by _____ and _____ well formed planes of weakness in a stressed mineral structure

- A) the iridescence, shape of
- B) the hardness, thickness of
- C) the number, angles between
- D) the twinning, separation of

Answer: C

Diff: 2

Topic: Physical Properties of Minerals

42) The tendency for a mineral like quartz to break in a smoothly curved manner is termed _____.

- A) anomalous cleavage
- B) conchoidal fracture
- C) elliptical breakage
- D) spherical cleavage

Answer: B

Diff: 1

Topic: Physical Properties of Minerals

43) _____ is the ratio of a weight of mineral to a volume of water of equal weight.

- A) Absolute mass
- B) Characteristic volume
- C) Specific gravity
- D) Wet weight

Answer: C

Diff: 1

Topic: Physical Properties of Minerals

44) Minerals like native gold or galena have high specific gravities because _____.

- A) they are too dense for any water or air to fit into their structures
- B) both are very strong and hard
- C) they contain heavy elements
- D) they both lack any cleavage

Answer: C

Diff: 2

Topic: Physical Properties of Minerals

45) A cubic centimetre of quartz, olivine, and gold weigh 2.5, 3.0, and 19.8 grams respectively. This indicates that _____.

- A) gold has a higher specific gravity than quartz and olivine
- B) gold is six to seven times harder than olivine and quartz
- C) gold and olivine are silicates, quartz is elemental silicon
- D) olivine and quartz powders are harder than metallic gold

Answer: A

Diff: 2

Topic: Physical Properties of Minerals

46) Which of the following has the highest specific gravity?

- A) wood
- B) water
- C) gold
- D) quartz

Answer: C

Diff: 1

Topic: Physical Properties of Minerals

47) Which of the following denotes the purity of gold used in jewelry?

- A) carnot
- B) carette
- C) karat
- D) carlot

Answer: C

Diff: 2

Topic: Physical Properties of Minerals

48) Which mineral is easily soluble in water at room temperature conditions?

- A) diamond
- B) talc
- C) halite
- D) olivine

Answer: C

Diff: 2

Topic: Physical Properties of Minerals

49) Which carbonate mineral reacts readily with cool, dilute hydrochloric acid to produce visible bubbles of carbon dioxide gas?

- A) calcite
- B) quartz
- C) dolomite
- D) plagioclase

Answer: A

Diff: 1

Topic: Physical Properties of Minerals

50) Which of the following will react readily with acids such as hydrochloric?

- A) calcite
- B) quartz
- C) diamond
- D) talc

Answer: A

Diff: 1

Topic: Physical Properties of Minerals

51) Real kryptonite is a(n) _____ while jadarite is a(n) _____.

- A) mineral, element
- B) metal, rock
- C) meteorite, moon
- D) element, mineral

Answer: D

Diff: 2

Topic: Physical Properties of Minerals

52) Jadarite is similar to the fictional mineral kryptonite but lacks _____ in its chemical composition.

- A) lithium
- B) fluorine
- C) boron
- D) sodium

Answer: B

Diff: 2

Topic: Physical Properties of Minerals

53) What element is the most abundant in the Earth's crust by weight?

- A) carbon
- B) chlorine
- C) oxygen
- D) sodium

Answer: C

Diff: 1

Topic: Mineral Classes

54) The eight most abundant elements in the Earth's crust by weight are: _____.

- A) Ba, Ca, Cl, Cu, F, H, Li, U
- B) C, K, N, P, S, Sc, Ti, V
- C) O, Si, Al, Fe, Ca, Na, K, Mg
- D) Pb, Mo, Ag, Pt, Au, Ni, Cr, Zr

Answer: C

Diff: 2

Topic: Mineral Classes

55) Which group of minerals are the most abundant in the Earth's crust?

- A) sulphides
- B) carbonates
- C) silicates
- D) chlorides

Answer: C

Diff: 1

Topic: Mineral Classes

56) All silicate minerals contain which two elements?

- A) iron, silicon
- B) silicon, sodium
- C) oxygen, carbon
- D) silicon, oxygen

Answer: D

Diff: 1

Topic: Mineral Classes

57) The ion at the centre of a silicon-oxygen tetrahedron is surrounded by _____.

- A) 4 oxygen ions
- B) 6 oxygen ions
- C) 4 sodium ions
- D) 6 sodium ions

Answer: A

Diff: 1

Topic: Mineral Classes

58) Which response describes the geometric attributes of a tetrahedron?

- A) 4 plane faces, each an equilateral triangle, 6 edges, and 4 corners
- B) 6 plane faces, each a rectangle, 4 edges, and 8 corners
- C) 6 plane faces, each a square, 12 edges, and 8 corners
- D) 8 plane faces, each an equilateral triangle, 12 edges, and 6 corners

Answer: A

Diff: 2

Topic: Mineral Classes

59) Which group of silicates has the most sharing of corner oxygen atoms?

- A) single chain like pyroxene
- B) double chain like amphibole
- C) sheet like mica
- D) framework like feldspar

Answer: D

Diff: 2

Topic: Mineral Classes

60) Aluminum ions have what charge in most rock-forming minerals?

- A) 3+
- B) 4-
- C) 2+
- D) 4+

Answer: A

Diff: 1

Topic: Mineral Classes

61) Which element forms the strongest bonds with oxygen, based on its size and charge?

- A) aluminum
- B) calcium
- C) potassium
- D) silicon

Answer: D

Diff: 2

Topic: Mineral Classes

62) Which common group of rock forming minerals has simultaneous double substitution of Na^+ for Ca^{+2} and Si^{+4} for Al^{+3} in its structure and chemical formula?

- A) carbonates
- B) micas
- C) plagioclase feldspars
- D) pyroxenes

Answer: C

Diff: 2

Topic: Mineral Classes

63) In feldspars, what element can be thought of as substituting for silicon in the tetrahedral ionic sites?

- A) carbon
- B) aluminum
- C) sodium
- D) potassium

Answer: B

Diff: 2

Topic: Mineral Classes

64) Plagioclase feldspars contain significant, variable percentages of which elements?

- A) calcium and magnesium
- B) sodium and calcium
- C) sodium and sulphur
- D) iron and magnesium

Answer: B

Diff: 1

Topic: Mineral Classes

65) Which of the following minerals are silicates?

- A) hematite, magnetite, and corundum
- B) muscovite, hornblende, and plagioclase
- C) calcite, aragonite, and dolomite
- D) anhydrite, gypsum, and barite

Answer: B

Diff: 2

Topic: Mineral Classes

66) Which common rock forming minerals exhibit cleavage planes at nearly 90° ?

- A) amphiboles like hornblende
- B) feldspars like plagioclase and orthoclase
- C) pyroxenes like augite
- D) both B and C are correct

Answer: D

Diff: 2

Topic: Mineral Classes

67) Which common rock forming minerals exhibit cleavage planes at nearly 60°/120°?

- A) amphiboles like hornblende
- B) feldspars like plagioclase and orthoclase
- C) pyroxenes like augite
- D) micas like muscovite and biotite

Answer: A

Diff: 1

Topic: Mineral Classes

68) Which of the following is a single-chain, ferromagnesian silicate mineral?

- A) clay
- B) olivine
- C) pyroxene
- D) mica

Answer: C

Diff: 2

Topic: Mineral Classes

69) Hornblende and the other amphiboles have what type of silicate structure?

- A) metallic
- B) sheet
- C) 3-D framework
- D) double chains

Answer: D

Diff: 1

Topic: Mineral Classes

70) Which common rock forming minerals exhibit a perfect single basal cleavage?

- A) amphiboles like hornblende
- B) feldspars like plagioclase and orthoclase
- C) pyroxenes like augite
- D) micas like muscovite and biotite

Answer: D

Diff: 2

Topic: Mineral Classes

71) Which of the following best characterizes ferromagnesian silicates?

- A) They contain iron and magnetite, are black in colour, and they have metallic lustres.
- B) They are high temperature black to dark-green minerals containing iron and magnesium.
- C) They are mostly dark, heavy, and rich in the elements manganese and ferron.
- D) They are dark and have a Mohs hardness greater than 7.

Answer: B

Diff: 2

Topic: Mineral Classes

72) All ferromagnesian minerals contain which two elements?

- A) calcium, sodium
- B) iron, magnesium
- C) iron, potassium
- D) chlorine, silicon

Answer: B

Diff: 1

Topic: Mineral Classes

73) Ferromagnesian minerals generally exhibit which of the following properties?

- A) one perfect cleavage, colourless
- B) dark colour, specific gravity higher than quartz
- C) a light colour, metallic lustre
- D) nonmetallic lustre, light colour

Answer: B

Diff: 2

Topic: Mineral Classes

74) Which of the following minerals is a ferromagnesian silicate?

- A) quartz
- B) orthoclase
- C) hornblende
- D) muscovite

Answer: C

Diff: 2

Topic: Mineral Classes

75) Hornblende and the other amphiboles have what type of silicate structure?

- A) metallic
- B) sheet
- C) 3-D framework
- D) double chains

Answer: D

Diff: 1

Topic: Mineral Classes

76) What is the name of dark-coloured mica?

- A) calcite
- B) biotite
- C) quartz
- D) olivine

Answer: B

Diff: 1

Topic: Mineral Classes

77) In silicate minerals, cleavages occur _____.

- A) across the dominant silicate structures
- B) in between the dominant silicate structural units
- C) in random directions, unrelated to the silicate framework
- D) in between mineral crystals

Answer: B

Diff: 2

Topic: Mineral Classes

78) Garnet, a common hard metamorphic mineral used for abrasives, has an internal crystal structure most similar to which other silicate mineral?

- A) augite
- B) biotite
- C) olivine
- D) plagioclase feldspar

Answer: C

Diff: 2

Topic: Mineral Classes

79) Which one of the following is a sodium and calcium feldspar with twinning striations?

- A) orthoclase
- B) microcline
- C) plagioclase
- D) sanidine

Answer: C

Diff: 2

Topic: Mineral Classes

80) Small, parallel grooves (twinning striations) are visible on cleavage surfaces and characteristic of which mineral?

- A) olivine
- B) quartz
- C) plagioclase feldspar
- D) hornblende

Answer: C

Diff: 1

Topic: Mineral Classes

81) The only sure way to identify a plagioclase feldspar from a potassium feldspar on large enough specimen to see with the naked eye is to _____.

- A) compare their colours, plagioclase is always darker
- B) find multiple parallel twinning striations on a cleavage face
- C) measure their exact cleavage angles, plagioclases have 120°
- D) find wormy exsolution lamellae going obliquely across the cleavages

Answer: B

Diff: 2

Topic: Mineral Classes

82) Which mineral is composed of silicon dioxide (SiO₂)?

- A) calcite
- B) diamond
- C) olivine
- D) quartz

Answer: D

Diff: 1

Topic: Mineral Classes

83) Why doesn't quartz have any cleavages, only fractures?

- A) All oxygens are shared between strongly bonded silicons in a 3-D framework.
- B) All of the metallic cations form strong webs between the silicate chains.
- C) It is made of pure silicon which is very strong.
- D) It has strong helical chains in three perpendicular directions.

Answer: A

Diff: 2

Topic: Mineral Classes

84) Which of the following minerals is a silicate?

- A) hematite
- B) muscovite
- C) calcite
- D) halite

Answer: B

Diff: 2

Topic: Mineral Classes

85) Which common silicate mineral was used as window glass in the Middle Ages?

- A) calcite
- B) halite
- C) muscovite
- D) quartz

Answer: C

Diff: 1

Topic: Mineral Classes

86) Which of the following minerals is in the mineral group known as mica?

- A) orthoclase
- B) muscovite
- C) augite
- D) olivine

Answer: B

Diff: 1

Topic: Mineral Classes

87) Which of the following is not a silicate mineral?

- A) quartz
- B) orthoclase
- C) garnet
- D) calcite

Answer: D

Diff: 1

Topic: Mineral Classes

88) Which of the following silicate minerals have 3-dimensional framework structures?

- A) quartz and halite
- B) feldspars and quartz
- C) hornblende and olivine
- D) micas and gypsum

Answer: B

Diff: 2

Topic: Mineral Classes

89) Which one of the following mineral groups exhibits a sheet-like silicate structure?

- A) carbonates
- B) pyroxenes
- C) clays
- D) feldspars

Answer: C

Diff: 2

Topic: Mineral Classes

90) Most _____ minerals are microscopic crystals of sheet silicates that form by the chemical weathering of feldspars, pyroxenes, amphiboles and micas.

- A) carbonate
- B) clay
- C) hydroxide
- D) salt

Answer: B

Diff: 2

Topic: Mineral Classes

91) Which one of the following is a typical product of chemical weathering of other silicates?

- A) micas
- B) ferromagnesians
- C) feldspars
- D) clays

Answer: D

Diff: 1

Topic: Mineral Classes

92) The principal ore of mercury is _____.

- A) anhydrite
- B) cinnabar
- C) galena
- D) sylvite

Answer: B

Diff: 1

Topic: Mineral Classes

93) The main calcium sulphate mineral gypsum is used to _____.

- A) extract the metal Ca
- B) make cement
- C) make plaster and wallboard
- D) spread directly on soils as a fertilizer

Answer: C

Diff: 2

Topic: Mineral Classes

94) Which mineral is used to make drilling muds denser to prevent blowouts?

- A) barite
- B) halite
- C) galena
- D) pyrite

Answer: A

Diff: 1

Topic: Mineral Classes

95) The main use for most diamond, corundum and garnet is _____.

- A) fillers in industrial products like paint and pharmaceuticals
- B) gemstones of the semiprecious variety
- C) industrial abrasives
- D) semiconductors for the electronics industry

Answer: C

Diff: 2

Topic: Mineral Classes

96) The main use of bauxite is _____.

- A) acid production for batteries
- B) a food additive
- C) the ore of aluminum
- D) the ore of copper

Answer: C

Diff: 1

Topic: Mineral Classes

97) These *non-silicate* minerals are found predominantly in sedimentary rocks.

- A) amphibole, clays, and quartz
- B) calcite, gypsum, and halite
- C) feldspar, fluorite, and malachite
- D) graphite, chromite, and ilmenite

Answer: B

Diff: 2

Topic: Mineral Classes

98) Ruby and sapphire are red and blue forms of the mineral _____.

- A) diamond
- B) turquoise
- C) emerald
- D) corundum

Answer: D

Diff: 1

Topic: Mineral Classes

99) The term *precious gemstone* is reserved for stones of the following types: _____, that are prized for their: rarity, beauty, durability and size. Everything else is considered semi-precious.

- A) agates, alaska black diamonds, carborundum, chrysoberyls, and spinels
- B) alexandrite, cats-eye, jade, topaz, and zircon
- C) diamonds, garnets, moonstones, onyx, and peridots
- D) diamonds, emeralds, rubies, sapphires, and fire opals

Answer: D

Diff: 2

Topic: Mineral Classes

100) Emeralds are gem quality single crystals of the more ordinary mineral _____.

- A) augite
- B) beryl
- C) epidote
- D) olivine

Answer: B

Diff: 1

Topic: Mineral Classes

101) Amethyst, chalcedony, and citrine are gemstone varieties of this common mineral.

- A) alexandrite
- B) corundum
- C) quartz
- D) topaz

Answer: C

Diff: 1

Topic: Mineral Classes

2.2 True/False Questions

1) Rocks are aggregates of one or more minerals.

Answer: TRUE

Diff: 1

Topic: Minerals

2) Coal is a rock formed mostly from fine grained carbon minerals.

Answer: FALSE

Diff: 1

Topic: Minerals

3) All atoms of the same element have the same atomic number.

Answer: TRUE

Diff: 1

Topic: The Composition of Minerals

4) Electrically neutral atoms have equal numbers of electrons and protons.

Answer: TRUE

Diff: 1

Topic: The Composition of Minerals

5) Most of the elements in the periodic table are metals.

Answer: TRUE

Diff: 1

Topic: The Composition of Minerals

6) Positive ions are atoms that have gained electrons during a chemical reaction.

Answer: FALSE

Diff: 1

Topic: The Composition of Minerals

7) In the compound sodium chloride, the negative ions are chlorine.

Answer: TRUE

Diff: 1

Topic: The Composition of Minerals

8) Graphite and diamond have the same chemical composition and different crystalline structures.

Answer: TRUE

Diff: 1

Topic: The Structure of Minerals

9) Diamond and quartz are both minerals composed of a single element.

Answer: FALSE

Diff: 1

Topic: The Structure of Minerals

10) Graphite is used as a natural abrasive.

Answer: FALSE

Diff: 2

Topic: The Structure of Minerals

11) The external expression of internal atomic arrangement in a mineral is called its crystal habit.

Answer: TRUE

Diff: 1

Topic: Physical Properties of Minerals

12) Mineral lustre is broadly classified as either metallic or opaque.

Answer: FALSE

Diff: 1

Topic: Physical Properties of Minerals

13) Colour is one of the most diagnostic properties of minerals.

Answer: FALSE

Diff: 1

Topic: Physical Properties of Minerals

14) Diamond is the hardest mineral; calcite is the softest known mineral.

Answer: FALSE

Diff: 1

Topic: Physical Properties of Minerals

15) Rock-forming silicate minerals have higher specific gravities than water.

Answer: TRUE

Diff: 1

Topic: Physical Properties of Minerals

16) Micas like muscovite and biotite have flexible cleavage flakes that will bend, and when the strain is taken off they relax back to their original position and shape.

Answer: TRUE

Diff: 2

Topic: Physical Properties of Minerals

17) Pyrrhotite (iron sulphide) is the only mineral to exhibit natural magnetism.

Answer: FALSE

Diff: 2

Topic: Physical Properties of Minerals

18) When treated with hydrochloric acid, powdered carbonate minerals release bubbles as a fizz of odorless carbon dioxide.

Answer: TRUE

Diff: 1

Topic: Physical Properties of Minerals

19) Optically transparent calcite exhibits the special property of "double refraction."

Answer: TRUE

Diff: 1

Topic: Physical Properties of Minerals

20) In a silicon-oxygen structural unit, silicon atoms occupy corners of a tetrahedron.

Answer: FALSE

Diff: 1

Topic: Mineral Classes

21) Oxygen ions are larger in size than silicon ions.

Answer: TRUE

Diff: 1

Topic: Mineral Classes

22) As silicate tetrahedra link together in larger units, more oxygens are shared and the size of the negative charge per silicon decreases.

Answer: TRUE

Diff: 1

Topic: Mineral Classes

23) Compared to the 1.4 angstrom size of the O^{2-} anion, most common metallic cations are double to triple that size.

Answer: FALSE

Diff: 1

Topic: Mineral Classes

24) Ferromagnesian silicate minerals contain some magnesium and/or iron.

Answer: TRUE

Diff: 1

Topic: Mineral Classes

25) The micas, biotite and muscovite, both exhibit one direction of cleavage.

Answer: TRUE

Diff: 1

Topic: Mineral Classes

26) Orthoclase and plagioclase feldspars have quite different forms of cleavage.

Answer: FALSE

Diff: 1

Topic: Mineral Classes

27) Nonmetallic minerals like halite and gypsum have no industrial uses.

Answer: FALSE

Diff: 1

Topic: Mineral Classes

28) Calcite and dolomite are both carbonate minerals.

Answer: TRUE

Diff: 1

Topic: Mineral Classes

29) Calcite and halite react with dilute acids to evolve carbon dioxide.

Answer: FALSE

Diff: 2

Topic: Mineral Classes

30) Trace impurities of chromium make corundum into ruby, while traces of titanium and iron make it into sapphire.

Answer: TRUE

Diff: 1

Topic: Mineral Classes

2.3 Short Answer Questions

1) Name a characteristic of a mineral.

Answer: natural, solid, usually inorganic, orderly structure, definite composition

Diff: 1

Topic: Minerals

2) What major characteristic differentiates minerals from natural glasses?

Answer: internal arrangement of atoms

Diff: 2

Topic: Minerals

3) Rocks are aggregates of one or more what?

Answer: minerals

Diff: 1

Topic: Minerals

4) What is the smallest particle of matter that exhibits and defines the distinctive chemical characteristics of the individual elements?

Answer: atom

Diff: 1

Topic: The Composition of Minerals

5) The massive but tiny central core region of an atom is called the what?

Answer: nucleus

Diff: 1

Topic: The Composition of Minerals

6) In atoms, which electrons are involved in chemical bonding?

Answer: valence

Diff: 2

Topic: The Composition of Minerals

7) A compound is a stable chemical substance composed of two or more what?

Answer: elements

Diff: 1

Topic: The Composition of Minerals

8) Where can one view a list of known elements?

Answer: periodic table of the elements

Diff: 1

Topic: The Composition of Minerals

9) What is the basic difference between ionic and covalent bonds?

Answer: electrons are given up by one atom and received by the other with ionic, but are shared in covalent

Diff: 2

Topic: The Composition of Minerals

10) What are two or more minerals called if they have the same chemical composition but different physical properties?

Answer: polymorphs

Diff: 1

Topic: The Structure of Minerals

11) Diamonds are hard because all carbon atoms are held together by equally strong _____ bonds arranged in a face centred cubic structure.

Answer: covalent

Diff: 1

Topic: The Structure of Minerals

12) Graphite has (weak, strong) bonds within its layers but (weak, strong) bonds between its layers.

Answer: strong, weak

Diff: 1

Topic: The Structure of Minerals

13) What is the chemical composition of graphite and diamond?

Answer: carbon

Diff: 1

Topic: The Structure of Minerals

14) The external expression of the internal arrangement of atoms in a mineral is called what?

Answer: crystal habit

Diff: 1

Topic: Physical Properties of Minerals

15) _____ is the appearance or quality of light reflected from the crystal face of a mineral.

Answer: Lustre

Diff: 1

Topic: Physical Properties of Minerals

16) What physical property denotes the colour of a powdered mineral?

Answer: streak

Diff: 1

Topic: Physical Properties of Minerals

17) The Mohs scale is a relative measure of which physical property of minerals?

Answer: hardness

Diff: 1

Topic: Physical Properties of Minerals

18) What is the hardest mineral known?

Answer: diamond

Diff: 1

Topic: Physical Properties of Minerals

19) The physical property denoting a mineral's tendency to crack along parallel, planar surfaces is known as what?

Answer: cleavage

Diff: 1

Topic: Physical Properties of Minerals

20) Most glasses and some minerals exhibit a type of fracture characterized by nested and curved, crack surfaces. What term describes this property?

Answer: conchoidal

Diff: 1

Topic: Physical Properties of Minerals

21) What are the two most abundant elements, which by themselves account for approximately 75% by weight of the Earth's crust?

Answer: oxygen, silicon

Diff: 1

Topic: Mineral Classes

22) The real kryptonite is not a mineral but a(n) _____.

Answer: element

Diff: 1

Topic: Mineral Classes

23) The real mineral jadarite has the same chemical composition as fictional kryptonite except for what?

Answer: fluorine

Diff: 1

Topic: Mineral Classes

24) Which is the most common mineral class?

Answer: the silicates

Diff: 1

Topic: Mineral Classes

25) The silicon-oxygen tetrahedron has a net charge of _____.

Answer: 4-

Diff: 1

Topic: Mineral Classes

26) _____ oxygen ions occupy the corners of the silicon-oxygen tetrahedron.

Answer: 4

Diff: 1

Topic: Mineral Classes

27) _____ forms the strongest bond with oxygen anions.

Answer: Silicon

Diff: 1

Topic: Mineral Classes

28) What ferromagnesian silicate mineral is named for its green colour?

Answer: olivine

Diff: 1

Topic: Mineral Classes

29) What is the most common member of the pyroxene group of ferromagnesian minerals?

Answer: augite

Diff: 1

Topic: Mineral Classes

30) _____ is the most common variety of the mineral group amphibole.

Answer: Hornblende

Diff: 1

Topic: Mineral Classes

31) Parallel, straight, linear imperfections visible on the cleavage surfaces of plagioclase feldspar are called what?

Answer: striations

Diff: 1

Topic: Mineral Classes

32) _____ is the light coloured member of the mica group of sheet silicate minerals.

Answer: Muscovite

Diff: 1

Topic: Mineral Classes

33) _____ is a common pink variety of the feldspar group of framework silicate minerals.

Answer: Orthoclase

Diff: 1

Topic: Mineral Classes

34) What mineral class forms by the breakdown and weathering of rock-forming silicate minerals and are important constituents of soils?

Answer: clays

Diff: 1

Topic: Mineral Classes

35) Name a common carbonate mineral.

Answer: calcite, dolomite

Diff: 1

Topic: Mineral Classes

2.4 Word Analysis Questions

Examine the words and/or phrases for each question below and determine the relationship among the majority of words/phrases. Choose the option that does not fit the pattern.

1) A) gaseous B) naturally occurring C) solid D) orderly structure

Answer: gaseous

Diff: 1

Topic: Minerals

2) A) electron B) atom C) proton D) neutron

Answer: atom

Diff: 1

Topic: The Composition of Minerals

3) A) ionic B) cation C) anion D) nucleus

Answer: nucleus

Diff: 2

Topic: The Composition of Minerals

4) A) hardness B) streak C) lustre D) cleavage

Answer: lustre

Diff: 2

Topic: Physical Properties of Minerals

- 5) A) muscovite B) biotite C) clay D) olivine
 Answer: olivine
 Diff: 2
 Topic: Physical Properties of Minerals
- 6) A) sodium B) fluorine C) lithium D) boron
 Answer: fluorine
 Diff: 2
 Topic: The Composition of Minerals
- 7) A) feldspars B) silicates C) carbonates D) evaporites
 Answer: feldspars
 Diff: 2
 Topic: Mineral Classes
- 8) A) quartz B) olivine C) feldspar D) calcite
 Answer: calcite
 Diff: 1
 Topic: Mineral Classes
- 9) A) sulphides B) oxides C) garnets D) halides
 Answer: garnets
 Diff: 1
 Topic: Mineral Classes
- 10) A) olivine B) quartz C) amphibole D) pyroxene
 Answer: quartz
 Diff: 2
 Topic: Mineral Classes
- 11) A) galena B) calcite C) gypsum D) halite
 Answer: galena
 Diff: 2
 Topic: Mineral Classes
- 12) A) diamond B) opal C) ruby D) zircon
 Answer: zircon
 Diff: 2
 Topic: Mineral Classes

2.5 Critical Thinking Questions

Use complete sentences, correct spelling, and the information presented in Chapter 2 to answer the question(s) below.

1) Considering the composition and structure of Earth discussed in Chapter 1, do you think all of the possible silicate (and even mineral) structures have been identified by scientists? Explain. Also, does this same reasoning apply to all possible chemical elements of Earth?

Answer: No. Every year new minerals are discovered. As new outcrops of crustal rocks are studied there are bound to be new rocks, new minerals and new even elements discovered as a result of gravitational accretion (Nebular theory) and lighter elements having migrated outwards from Earth's interior during its formation. Also, as minerals transform in the rock cycle, new combinations of elements will be created. Furthermore, as drilling attempts reach into the mantle, new discoveries are also bound to be made.

Diff: 3

Topic: The Structure of Minerals

2) Based on the brief discussion of chemistry and chemical bonding, why do minerals rarely exhibit pure chemical compositions (100% always the same chemical composition)?

Answer: Many cations have similar sizes and can freely substitute for each other as the mineral is forming, resulting in varying compositions of the mineral.

Diff: 2

Topic: The Composition of Minerals

3) Overall, the physical properties of minerals provide a reliable means to identify common minerals. However, certain properties can exhibit a range of characteristics or values making them less useful for identification purposes. Choose three physical properties that might vary considerably between samples of the same mineral and explain why such variability would exist.

Answer: Colour. Some minerals like quartz exhibit different colours due to tiny amounts of impurities. Crystal habit. Some minerals have multiple habits depending on whether or not they can grow in free space, or the pressure-temperature conditions under which they formed. Fracture. Most minerals break unevenly along surfaces other than cleavage planes.

Diff: 3

Topic: Physical Properties of Minerals

4) Given the similar chemical compositions of the real mineral jadarite and the fictional mineral kryptonite, what is different about real kryptonite?

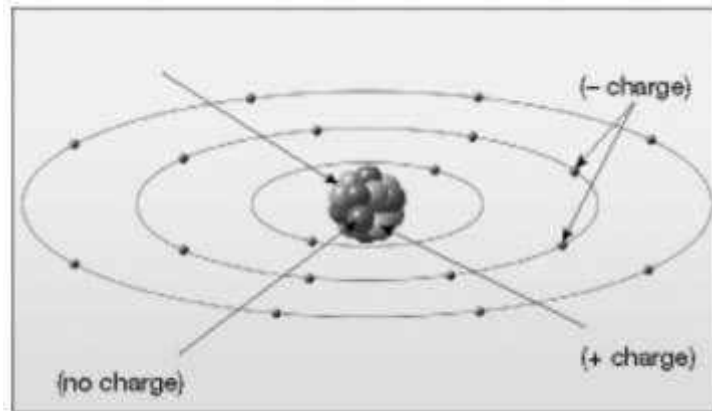
Answer: Real kryptonite is an element in the periodic table, not a mineral.

Diff: 2

Topic: The Composition of Minerals

2.6 Visualization Questions

1) Label the various parts of an atom in the diagram below.

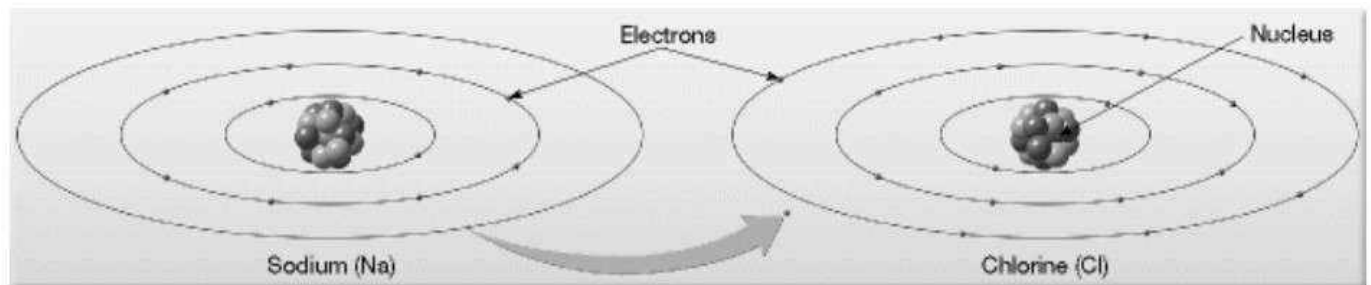


Answer: See figure 2.4B

Diff: 1

Topic: The Composition of Minerals

2) What type of chemical bonding is shown in the diagram below?



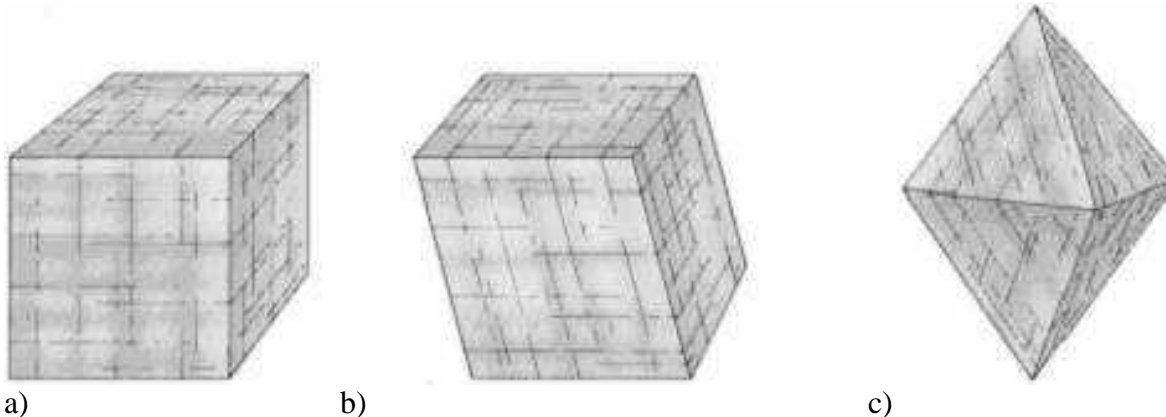
a) covalent b) ionic c) metallic d) hybrid

Answer: b) ionic

Diff: 1

Topic: The Composition of Minerals

3) For each illustration below, note the number of cleavage directions.



a) b)



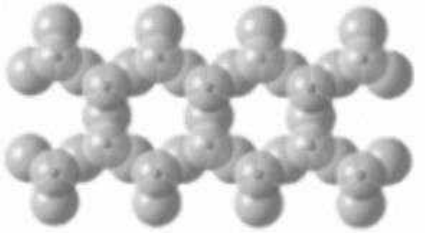
c)

Answer: a) 3 b) 3 c) 4

Diff: 1

Topic: Physical Properties of Minerals

4) Fill in the table below on silicate minerals.

| Silicate structure | Oxygen to silicon ratio | mineral | cleavage |
|---|-------------------------|---------|----------------------------|
|  | 4:1 | olivine | (a) |
|  | (b) | (c) | two planes at right angles |
|  | (d) | (e) | (f) |

Answer: a) none

b) slightly more than 3:1

c) pyroxene group—augite

d) slightly less than 3:1

e) amphibole group—hornblende

f) two planes at 60 and 120 degrees

Diff: 2

Topic: Mineral Classes