Chapter 02
Atoms, Elements, and Minerals

True / False Questions

1. A mineral is defined as a crystalline solid that is naturally occurring, has a specific chemical composition and forms through geologic processes.
TRUE

Bloom's Level: 1. Remember
Topic: Earth Materials

2. The innermost energy level in the standard model of an atom is full when it possesses eight electrons.
FALSE

Bloom's Level: 2. Understand
Topic: Earth Materials

3. The atomic mass number is equal to the number of neutrons in an atom.
FALSE

Bloom's Level: 1. Remember
Topic: Earth Materials

4. The atomic number of an element is equal to the number of protons in each atom.
TRUE

Bloom's Level: 1. Remember
Topic: Earth Materials

5. Rocks are defined as naturally-formed aggregates of minerals or mineral-like substances.
TRUE

Bloom's Level: 1. Remember
Topic: Earth Materials

6. The number of neutrons in an atom controls the chemical behavior of an element.
FALSE

Bloom's Level: 1. Remember
Topic: Earth Materials

7. Silica is a term for oxygen combined with silicon.
TRUE

Bloom's Level: 1. Remember
Topic: Earth Materials

8. It is clear that exposure to white asbestos causes cancer among non-smoking asbestos workers.
FALSE

Bloom's Level: 2. Understand
Topic: Earth Materials

9. Both graphite and diamond are made of carbon.
TRUE

Bloom's Level: 1. Remember
Topic: Earth Materials

10. All of the most common rock-forming minerals in Earth's crust are silicate minerals.
TRUE

Bloom's Level: 1. Remember
Topic: Earth Materials

11. Clay minerals are very common in the Earth's upper mantle.
FALSE

Bloom's Level: 1. Remember
Topic: Earth Materials

12. Calcite (calcium carbonate) is the most common non-silicate mineral in the Earth's crust.
TRUE

Bloom's Level: 1. Remember
Topic: Earth Materials

13. Non-silicate minerals are more abundant in the deeper parts of Earth's crust than in the crust as a whole.
FALSE

Bloom's Level: 1. Remember
Topic: Earth Materials

14. The quality and intensity of light that is reflected from the surface of a mineral is termed luster.
TRUE

Bloom's Level: 1. Remember
Topic: Earth Materials

15. A mineral specimen with a Mohs hardness of 5 can scratch a mineral specimen with a hardness of 3.
TRUE

Bloom's Level: 2. Understand
Topic: Earth Materials

16. Minerals that have the same chemical composition but have different crystalline structures exhibit polymorphism
TRUE

Bloom's Level: 2. Understand
Topic: Earth Materials

17. Color is the least reliable physical property in mineral identification.
TRUE

Bloom's Level: 2. Understand
Topic: Earth Materials

18. Diamond has no cleavage.
FALSE

Bloom's Level: 1. Remember
Topic: Earth Materials

19. Specific gravity is the ratio of a mass of a substance to the mass of an equal volume of air.
FALSE

Bloom's Level: 1. Remember
Topic: Earth Materials

20. The crystal form of a mineral is a set of faces that have a definite geometric relationship to one another.
TRUE

Bloom's Level: 1. Remember
Topic: Earth Materials

Multiple Choice Questions

21. In order for a particular type of material to be classified as a mineral, it must ____.
A. be a solid
B. occur naturally
C. have a crystalline structure
D. have a definite chemical composition
E. All of the answers are correct.

Bloom's Level: 2. Understand
Topic: Earth Materials

22. The atomic number of an element equals the number of _____ in each atom.
A. electrons
B. neutrons
C. protons
D. Answers neutrons and protons are both correct; answer a is not correct.
E. Answers electrons, neutrons and protons are all correct.

Bloom's Level: 1. Remember
Topic: Earth Materials

23. The atomic mass number of an atom is the total number of ___ in the atom.
A. electrons
B. neutrons
C. protons
D. protons and neutrons
E. protons, neutrons, and electrons

Bloom's Level: 1. Remember
Topic: Earth Materials

24. _____ of an element are atoms containing different numbers of neutrons but the same number of protons.
A. Ions
B. Classes
C. Particles
D. Isotopes
E. Varieties

Bloom's Level: 1. Remember
Topic: Earth Materials

25. The atomic mass number of common oxygen is 16 because it has ___ protons and ___ neutrons.
A. 7; 9
B. 8; 8
C. 9; 7
D. 5; 11
E. 10; 6

Bloom's Level: 2. Understand
Topic: Earth Materials

26. Carbon-14 has eight __.
A. protons
B. nuclei
C. neutrons
D. isotopes
E. atoms

Bloom's Level: 1. Remember
Topic: Earth Materials

27. The isotope composition of _____ in foraminifera shells from sediment cores are used to determine climate change in Earth history.
A. oxygen
B. carbon
C. uranium
D. lead
E. helium

Bloom's Level: 1. Remember
Topic: Climate, Weather, and Their Influences on Geology
Topic: Earth Materials

28. The two most abundant elements in Earth's crust are __.
A. iron and magnesium
B. carbon and hydrogen
C. carbon and oxygen
D. hydrogen and oxygen
E. oxygen and silicon

Bloom's Level: 1. Remember
Topic: Earth Materials

29. When seawater evaporates, its sodium and chlorine are electronically attracted to one another and crystallize into ___.
A. quartz
B. halite
C. clay
D. calcite
E. hematite

Bloom's Level: 1. Remember
Topic: Earth Materials

30. The mineral ___ reacts with weak hydrochloric acid to produce carbon dioxide gas, i.e., it effervesces (fizzes) in dilute acid.
A. calcite
B. feldspar
C. quartz
D. biotite
E. amphibole

Bloom's Level: 1. Remember
Topic: Earth Materials

31. The _____ group and the ___ group are sheet silicates characterized by one direction of cleavage.
A. amphibole; pyroxene
B. feldspar; quartz
C. olivine; plagioclase
D. mica; clay
E. carbonate; sulfide

Bloom's Level: 1. Remember
Topic: Earth Materials

32. Two examples of framework silicates are _____ and _____.
A. calcite; dolomite
B. olivine; pyroxene
C. quartz; feldspar
D. biotite; muscovite
E. amphibole; olivine

Bloom's Level: 2. Understand
Topic: Earth Materials

33. _____ is the ability of a mineral to break, when struck or split, along preferred planar directions.
A. Cleavage
B. Crystal form
C. Facets
D. Planes
E. Form

Bloom's Level: 1. Remember
Topic: Earth Materials

34. A silica tetrahedron is composed of four atoms of the element ___ and one atom of __.
A. silicon; aluminum
B. silicon; oxygen
C. silicon; iron
D. oxygen; silicon
E. aluminum; silicon

Bloom's Level: 1. Remember
Topic: Earth Materials

35. The common mineral ___ is an example of an isolated silica tetrahedron structure.
A. amphibole
B. feldspar
C. olivine
D. pyroxene
E. mica (biotite, muscovite, etc.)

Bloom's Level: 2. Understand
Topic: Earth Materials

36. Five of the six minerals collectively known as asbestos contain single chains of silica tetrahedral and belong to the _____.
A. amphiboles
B. feldspars
C. olivines
D. pyroxenes
E. micas

Bloom's Level: 2. Understand
Topic: Earth Materials

37. The _____ group of minerals is characterized by two parallel chains of silica tetrahedra in their structure.
A. amphibole
B. feldspar
C. olivine
D. pyroxene
E. mica (biotite, muscovite, etc.)

Bloom's Level: 1. Remember
Topic: Earth Materials

38. The _____ group of minerals are sheet silicates.
A. amphibole
B. feldspar
C. olivine
D. pyroxene
E. mica

Bloom's Level: 1. Remember
Topic: Earth Materials

39. Non-silicate minerals include the halides like _____.
A. calcite
B. halite
C. magnetite
D. pyrite
E. gypsum

Bloom's Level: 1. Remember
Topic: Earth Materials

40. The mineral ___ is an example of a native element.
A. quartz
B. feldspar
C. calcite
D. graphite
E. halite

Bloom's Level: 1. Remember
Topic: Earth Materials

41. A pulverized mineral (usually on a piece of white unglazed porcelain) gives a color called its ____, that is usually more reliable than the color of the specimen itself.
A. dust
B. chroma
C. streak
D. smear
E. powder

Bloom's Level: 2. Understand
Topic: Earth Materials

42. The softest mineral on Mohs' hardness scale is ____.
A. gypsum
B. talc
C. diamond
D. quartz
E. mica

Bloom's Level: 1. Remember
Topic: Earth Materials

43. What is the special property of the mineral halite?
A. It has 5 directions of cleavage.
B. It has a hardness of -3.
C. It can transmit electricity.
D. It tastes like salt.
E. It has an extremely high melting temperature.

Bloom's Level: 2. Understand
Topic: Earth Materials

44. ____ has the property of generating electricity when squeezed in a certain crystallographic direction.
A. Copper
B. Mica
C. Amphibole
D. Gold
E. Quartz

Bloom's Level: 1. Remember
Topic: Earth Materials

45. The hardest mineral has a hardness of ___ on Mohs' relative hardness scale.
A. 1
B. 10
C. 100
D. 1000
E. 10000

Bloom's Level: 1. Remember
Topic: Earth Materials

46. Calcite has ___ direction of cleavage.
A. 1
B. 2
C. 3
D. 4
E. 6

Bloom's Level: 1. Remember
Topic: Earth Materials

47. In some minerals the bonds are equally strong in all directions, therefore they have no cleavage but instead _____ along irregular surfaces that are commonly curved.
A. luminesce
B. chip
C. flatten
D. bend
E. fracture

Bloom's Level: 2. Understand
Topic: Earth Materials

48. The third most abundant element in the Earth's crust is _____; it is more common than iron.
A. magnesium
B. aluminum
C. calcium
D. fluorine
E. tin

Bloom's Level: 1. Remember
Topic: Earth Materials

49. The mineral ___ is strongly magnetic.
A. calcite
B. pyrite
C. magnetite
D. magnesite
E. quartz

Bloom's Level: 1. Remember
Topic: Earth Materials

50. _____ and sapphire are both varieties of the common mineral corundum.
A. Emerald
B. Turquoise
C. Ruby
D. Beryl
E. Peridot

Bloom's Level: 1. Remember
Topic: Earth Materials

51. _____ is an expansive (swells when wet) clay mineral.
A. Quartz
B. Olivine
C. Pyroxene
D. Montmorillonite
E. Mica

Bloom's Level: 1. Remember
Topic: Earth Materials

52. ____ is the most common element in the Earth's crust.
A. Oxygen
B. Iron
C. Magnesium
D. Hydrogen
E. Fluorine

Bloom's Level: 1. Remember

53. Some minerals have the same chemical composition but different crystal structures, a phenomenon termed _____.
A. alteration
B. recrystallization
C. metamorphism
D. isotopes
E. polymorphism

Bloom's Level: 2. Understand
Topic: Earth Materials

54. ____, a Danish naturalist, was the first to note that the angle between two adjacent faces of a crystal of quartz is always exactly the same.
A. Einstein
B. Steno
C. Plummer
D. McGeary
E. Carlson

Bloom's Level: 1. Remember
Topic: Earth Materials

55. Specific gravity is the ratio of the mass of a mineral to the mass of an equal volume of __.
A. liquid water
B. solid water
C. quartz
D. diamond
E. air

Bloom's Level: 2. Understand
Topic: Earth Materials

56. Plagioclase feldspar commonly exhibits __, straight, parallel lines on the flat surfaces of one of the two cleavage directions.
A. parallelograms
B. grooves
C. lamitations
D. striations
E. laminations

Bloom's Level: 1. Remember
Topic: Earth Materials

57. ____ elements make up 98% of the Earth's crust.
A. Fourteen
B. Ninety-two
C. Two
D. Twenty
E. Eight

Bloom's Level: 1. Remember
Topic: Earth Materials

58. _____ are the smallest electrically neutral assemblies of matter and energy that we know of in the universe.
A. Isotopes
B. Atoms
C. Ions
D. Electrons
E. Protons

Bloom's Level: 1. Remember
Topic: Earth Materials

59. The most common minerals in the Earth's crust are the _____.
A. silicates
B. carbonates
C. halides
D. sulfides
E. sulfates

Bloom's Level: 1. Remember
Topic: Earth Materials

60. On Mohs' scale of hardness your fingernail has a value of ____.
A. 12
B. 5
C. 2½
D. 6½
E. 9

Bloom's Level: 2. Understand
Topic: Earth Materials