

Chemistry I PERIODIC TABLE
PRACTICE QUIZ
Mr. Scott

Select the best answer.

1)

The idea of arranging the elements in the periodic table according to their chemical and physical properties is attributed to

- | | |
|---------------|-------------|
| a) Mendeleev. | b) Moseley. |
| c) Bohr. | d) Ramsay. |

2)

Mendeleev left spaces in his periodic table and predicted several elements and their

- | | |
|--------------------|-------------------|
| a) atomic numbers. | b) colors. |
| c) properties. | d) radioactivity. |

3)

Mendeleev attempted to organize the chemical elements based on their

- | | |
|--------------------|-----------------------------|
| a) symbols. | b) properties. |
| c) atomic numbers. | d) electron configurations. |

4)

Mendeleev noticed that properties of elements usually repeated at regular intervals when the elements were arranged in order of increasing

- | | |
|-------------------|-----------------|
| a) atomic number. | b) density. |
| c) reactivity. | d) atomic mass. |

5)

Mendeleev is credited with developing the first successful

- | | |
|----------------------------|--|
| a) periodic table. | b) method for determining atomic number. |
| c) test for radioactivity. | d) use of X rays. |

6)

Mendeleev did not always list elements in his periodic table in order of increasing atomic mass because he grouped together elements with similar

- | | |
|----------------|--------------------|
| a) properties. | b) atomic numbers. |
| c) densities. | d) colors. |

7)

In developing his periodic table, Mendeleev listed on cards each element's name, atomic mass, and

- a) atomic number.
- b) electron configuration.
- c) isotopes.
- d) properties.

8)

Mendeleev predicted that the spaces in his periodic table represented

- a) isotopes.
- b) radioactive elements.
- c) permanent gaps.
- d) undiscovered elements.

9)

Mendeleev's table was called periodic because the properties of the elements

- a) showed no pattern.
- b) occurred at repeated intervals called periods.
- c) occurred at regular time intervals called periods.
- d) were identical.

10)

The person whose work led to a periodic table based on increasing atomic number was

- a) Moseley.
- b) Mendeleev.
- c) Rutherford.
- d) Cannizzaro.

11)

Moseley's work led to the realization that elements with similar properties occurred at regular intervals when the elements were arranged in order of increasing

- a) atomic mass.
- b) density.
- c) radioactivity.
- d) atomic number.

12)

Who used his experimental evidence to determine the order of the elements according to atomic number?

- a) Meyer
- b) Ramsay
- c) Stas
- d) Moseley

13)

The most useful source of general information about the elements for anyone associated with chemistry is a

- a) calculator.
- b) table of metric equivalents.
- c) periodic table.
- d) table of isotopes.

14)

The periodic table

- a) permits the properties of an element to be predicted before the element is discovered.
- b) will be completed with element 118.
- c) has been of little use to chemists since the early 1900s.
- d) was completed with the discovery of the noble gases.

15)

Evidence gathered since Mendeleev's time indicates that a better arrangement than atomic mass for elements in the periodic table is an arrangement by

- a) mass number.
- b) atomic number.
- c) group number.
- d) series number.

16)

What are the elements whose discovery added an entirely new row to Mendeleev's periodic table?

- a) noble gases
- b) radioactive elements
- c) transition elements
- d) metalloids

17)

What are the radioactive elements with atomic numbers from 90 to 103 in the periodic table called?

- a) the noble gases
- b) the lanthanides
- c) the actinides
- d) the rare-earth elements

18)

What are the elements with atomic numbers from 58 to 71 in the periodic table called?

- a) the lanthanide elements
- b) the noble gases
- c) the actinide elements
- d) the alkali metals

19)

Argon, krypton, and xenon are

- a) alkaline earth metals.
- b) noble gases.
- c) actinides.
- d) lanthanides.

20)

Which two periods have the same number of elements?

- a) 2 and 4
- b) 3 and 4
- c) 4 and 5
- d) 5 and 6

21)

The discovery of the noble gases changed Mendeleev's periodic table by adding a new

- a) period.
- b) series.
- c) group.
- d) sublevel block.

22)

In the modern periodic table, elements are ordered according to

- a) decreasing atomic mass.
- b) Mendeleev's original design.
- c) increasing atomic number.
- d) the date of their discovery.

23)

The periodic law states that the physical and chemical properties of elements are periodic functions of their atomic

- a) masses.
- b) numbers.
- c) radii.
- d) structures.

24)

The periodic law states that the properties of elements are periodic functions of their atomic numbers. This means that the _____ determines the position of each element in the periodic table.

- a) mass number
- b) number of neutrons
- c) number of protons
- d) number of nucleons

25)

The principle that states that the physical and chemical properties of the elements are periodic functions of their atomic numbers is

- a) the periodic table.
- b) the periodic law.
- c) the law of properties.
- d) Mendeleev's law.

26)

The periodic law allows some properties of an element to be predicted based on its

- a) position in the periodic table.
- b) number of isotopes.
- c) symbol.
- d) color.

27)

The periodic law states that

- a) no two electrons with the same spin can be found in the same place in an atom.
- b) the physical and chemical properties of the elements are functions of their atomic numbers.
- c) electrons exhibit properties of both particles and waves.
- d) the chemical properties of elements can be grouped according to periodicity but physical properties cannot.

28)

Elements in a group or column in the periodic table can be expected to have similar

- a) atomic masses.
- b) atomic numbers.
- c) numbers of neutrons.
- d) properties.

29)

A horizontal row of blocks in the periodic table is called a(n)

- a) group.
- b) period.
- c) family.
- d) octet.

30)

The atomic number of lithium, the first element in Group 1, is 3. The atomic number of the second element in this group is

- a) 4.
- b) 10.
- c) 11.
- d) 18.

31)

For groups 1, 2, and 18, the atomic number of the fourth element in the group is _____ more than the preceding element.

- a) 3
- b) 4
- c) 18
- d) 20

32)

Krypton, atomic number 36, is the fourth element in Group 18. What is the atomic number of xenon, the fifth element in Group 18?

- a) 54
- b) 68
- c) 72
- d) 90

33)

Barium, atomic number 56, is the fifth element in Group 2. What is the atomic number of radium, the next element in Group 2?

- a) 64
- b) 74
- c) 88
- d) 103

34)

For elements in Groups 1, 2, and 18, the increase in atomic number for successive elements follows the pattern 8, 8, 18, _____, 32.

- a) 18
- b) 20
- c) 24
- d) 26

1 H Hydrogen 1.01			Group 18 2 He Helium 4.00	
Group 1 3 Li Lithium 6.94	Group 2 4 Be Beryllium 9.01	Group 17 9 F Fluorine 19.00		
11 Na Sodium 22.99	12 Mg Magnesium 24.30	17 Cl Chlorine 35.45	18 Ar Argon 39.95	
19 K Potassium 39.10	20 Ca Calcium 40.08	35 Br Bromine 79.90	36 Kr Krypton 83.80	
37 Rb Rubidium 85.47	38 Sr Strontium 87.62	53 I Iodine 126.90	54 Xe Xenon 131.29	
55 Cs Cesium 132.90	56 Ba Barium 137.33	85 At Astatine (209.99)	86 Rn Radon (222.02)	
87 Fr Francium (223.02)	88 Ra Radium (226.02)			

35)

To which group do lithium and potassium belong? Refer to the figure above.

- a) alkali metals b) transition metals
c) halogens d) noble gases

36)

Refer to the figure above. To which group do fluorine and chlorine belong?

- a) alkaline-earth metals b) transition elements
c) halogens d) actinides

37)

The electron configuration of aluminum, atomic number 13, is $[\text{Ne}] 3s^2 3p^1$. Aluminum is in Period

- a) 2. b) 3.
c) 6. d) 13.

38)

Identify the sublevels in a period that contains 32 elements.

- | | |
|-------------------|----------------------|
| a) <i>s, f</i> | b) <i>s, p</i> |
| c) <i>s, p, d</i> | d) <i>s, p, d, f</i> |

39)

How many elements are in a period in which only the *s* and *p* sublevels are filled?

- | | |
|-------|-------|
| a) 2 | b) 8 |
| c) 18 | d) 32 |

40)

The electron configuration of cesium, atomic number 55, is $[\text{Xe}] 6s^1$. In what period is cesium?

- | | |
|-------------|--------------|
| a) Period 1 | b) Period 6 |
| c) Period 8 | d) Period 55 |

41)

The length of each period in the periodic table is determined by the

- | | |
|---|--|
| a) atomic masses of the elements. | b) atomic numbers of the elements. |
| c) sublevels being filled with electrons. | d) number of isotopes of the elements in the period. |

42)

Because the first energy level contains only the $1s$ sublevel, the number of elements in this period is

- | | |
|-------|-------|
| a) 1. | b) 2. |
| c) 4. | d) 8. |

43)

In Period 3 there are 8 elements. What sublevel(s) is (are) being filled?

- | | |
|--------------------------|--------------------------|
| a) <i>s</i> | b) <i>s</i> and <i>d</i> |
| c) <i>s</i> and <i>p</i> | d) <i>d</i> and <i>f</i> |

44)

Period 4 contains 18 elements. How many of these elements have electrons in the d sublevel?

- a) 8
b) 10
c) 16
d) 18

45)

The period of an element can be determined from its

- a) reactivity.
b) density.
c) symbol.
d) electron configuration.

46)

Calcium, atomic number 20, has the electron configuration $[\text{Ar}] 4s^2$. In what period is calcium?

- a) Period 2
b) Period 4
c) Period 8
d) Period 20

Group 3	Group 4	Group 5	Group 6
21 Sc Scandium 44.96	22 Ti Titanium 47.88	23 V Vanadium 50.94	24 Cr Chromium 52.00
39 Y Yttrium 88.90	40 Zr Zirconium 91.22	41 Nb Niobium 92.91	42 Mo Molybdenum 95.94

47)

In the elements shown in the figure above, the s sublevel of the highest occupied energy level

- a) always contains one electron.
b) always contains two electrons.
c) varies in the number of electrons it contains.
d) is always empty.

48)

Elements to the right side of the periodic table (p -block elements) have properties most associated with

- a) gases.
b) nonmetals.
c) metals.
d) metalloids.

49)

Neutral atoms with an s^2p^6 electron configuration in the highest energy level are best classified as

- a) metalloids.
- b) metals.
- c) nonmetals.
- d) gases.

50)

Elements in which the d -sublevel is being filled have the properties of

- a) metals.
- b) nonmetals.
- c) metalloids.
- d) gases.

51)

The elements that border the zigzag line in the periodic table are

- a) inactive.
- b) metals.
- c) metalloids.
- d) nonmetals.

52)

The group of 14 elements in the sixth period that have occupied $4f$ orbitals is the

- a) actinides.
- b) lanthanides.
- c) transition elements.
- d) metalloids.

53)

Within the p -block elements, the elements at the top of the table, compared with those at the bottom,

- a) have larger radii.
- b) are more metallic.
- c) have lower ionization energies.
- d) are less metallic.

54)

The electron configurations of the noble gases from neon to radon in the periodic table end with filled

- a) f orbitals.
- b) d orbitals.
- c) s orbitals.
- d) p orbitals.

61)

Titanium, atomic number 22, has the configuration $[\text{Ar}] 3d^2 4s^2$. To what group does titanium belong?

- a) Group 2
- b) Group 3
- c) Group 4
- d) Group 5

62)

Nitrogen's electron configuration is $1s^2 2s^2 2p^3$. To what group does nitrogen belong?

- a) Group 2
- b) Group 7
- c) Group 15
- d) Group 17

63)

Periods with occupied *f* sublevels

- a) have only Group 1 and 2 elements.
- b) are not assigned group numbers.
- c) have 32 groups.
- d) contain only Group 18 elements.

64)

The electron configuration of an element is $[\text{Kr}] 4d^6 5s^1$. To what group does this element belong?

- a) Group 4
- b) Group 5
- c) Group 7
- d) Group 9

65)

Bromine, atomic number 35, belongs to Group 17. How many electrons does bromine have in its outermost energy level?

- a) 7
- b) 17
- c) 18
- d) 35

66)

Magnesium, atomic number 12, has the electron configuration [Ne] $3s^2$. To what group does magnesium belong?

- a) Group 2
- b) Group 3
- c) Group 5
- d) Group 12

67)

In nature, the alkali metals occur as

- a) elements.
- b) compounds.
- c) complex ions.
- d) gases.

68)

The elements in Group 1 are also known as the

- a) alkali metals.
- b) rare-earth series.
- c) Period 1 elements.
- d) actinide series.

69)

The alkali metals belong to the _____-block in the periodic table.

- a) *s*
- b) *p*
- c) *d*
- d) *f*

70)

The most reactive group of the nonmetals are the

- a) lanthanides.
- b) transition elements.
- c) halogens.
- d) rare-earth elements.

71)

The group of soft, silvery active metals, all of which have one electron in an *s* orbital, is known as the

- a) alkaline-earth metals.
- b) transition metals.
- c) alkali metals.
- d) metalloids.

72)

The first member of the noble gas family, whose highest energy level consists of an octet of electrons, is

- a) helium.
- b) argon.
- c) neon.
- d) krypton.

73)

Among the alkali metals below, which has the lowest melting point?

- a) sodium (atomic number 11)
- b) potassium (atomic number 19)
- c) rubidium (atomic number 37)
- d) cesium (atomic number 55)

74)

The most characteristic property of the noble gases is that they

- a) have low boiling points.
- b) are radioactive.
- c) are gases at ordinary temperatures.
- d) are largely unreactive.

75)

Compared to the alkali metals, the alkaline-earth metals

- a) are less reactive.
- b) have lower melting points.
- c) are less dense.
- d) combine more readily with nonmetals.

76)

When determining the size of an atom by measuring the distance between identical adjacent nuclei, the radius of an atom is

- a) equal to the distance between nuclei.
- b) one-half the distance between nuclei.
- c) twice the distance between nuclei.
- d) one-fourth the distance between nuclei.

77)

When an electron is added to a neutral atom, a certain amount of energy is

- a) always absorbed. b) always released.
c) either released or absorbed. d) burned away.

78)

Atomic size is determined by measuring the

- a) radius of an individual atom. b) distance between nuclei of adjacent atoms.
c) diameter of an individual atom. d) volume of the electron cloud of adjacent atoms.

79)

Which represents a neutral atom acquiring an electron in an exothermic process?

- a) $A + e^- + \text{energy} \rightarrow A^-$ b) $A + e^- \rightarrow A^- - \text{energy}$
c) $A + e^- \rightarrow A^- + \text{energy}$ d) $A^- + \text{energy} \rightarrow A + e^-$

80)

The energy required to remove an electron from an atom is the atom's

- a) electron affinity. b) electron energy.
c) electronegativity. d) ionization energy.

81)

A measure of the ability of an atom in a chemical compound to attract electrons is called

- a) electron affinity. b) electron configuration.
c) electronegativity. d) ionization potential.

82)

The element that has the greatest electronegativity is

- a) oxygen. b) sodium.
c) chlorine. d) fluorine.

83)

One-half the distance between the nuclei of identical atoms that are bonded together is called the

- a) atomic radius.
- b) atomic diameter.
- c) atomic volume.
- d) electron cloud.

84)

Ionization energy is the energy required to remove _____ from an atom of an element.

- a) the electron cloud
- b) the nucleus
- c) an electron
- d) an ion

85)

When an electron is acquired by a neutral atom, the energy change is called

- a) electron affinity.
- b) electronegativity.
- c) ionization energy.
- d) electron configuration.

86)

A positive ion is known as a(n)

- a) ionic radius.
- b) valence electron.
- c) cation.
- d) anion

87)

A negative ion is known as a(n)

- a) ionic radius.
- b) valence electron.
- c) cation.
- d) anion.

88)

In a row in the periodic table, as the atomic number increases, the atomic radius generally

- a) decreases.
- b) remains constant.
- c) increases.
- d) becomes unmeasurable.

89)

Within a group of elements, as the atomic number increases, the atomic radius

- a) increases.
- b) remains approximately constant.
- c) decreases regularly.
- d) decreases, but not regularly.

90)

In the alkaline-earth group, atoms with the smallest radii

- a) are the most reactive.
- b) have the largest volume.
- c) are all gases.
- d) have the highest ionization energies.

91)

As the atomic number of the metals of Group 1 increases, the ionic radius

- a) increases.
- b) decreases.
- c) remains the same.
- d) cannot be determined.

92)

Across a period in the periodic table, atomic radii

- a) gradually decrease.
- b) gradually decrease, then sharply increase.
- c) gradually increase.
- d) gradually increase, then sharply decrease.

93)

The ionization energies for removing successive electrons from sodium are 496 kJ/mol, 4562 kJ/mol, 6912 kJ/mol, and 9544 kJ/mol. The great jump in ionization energy after the first electron is removed indicates that

- a) sodium has four or five electrons.
- b) the atomic radius has increased.
- c) a *d*-electron has been removed.
- d) the noble gas configuration has been reached.

94)

Which is the best reason that the atomic radius generally increases with atomic number in each group of elements?

- a) The nuclear charge increases.
- b) The number of neutrons increases.
- c) The number of energy levels increases.
- d) A new octet forms.

95)

The ionization energies required to remove successive electrons from one mole of calcium atoms are 590 kJ/mol, 1145 kJ/mol, 4912 kJ/mol, and 6474 kJ/mol. The most common ion of calcium is probably

- a) Ca^+ .
- b) Ca^{2+} .
- c) Ca^{3+} .
- d) Ca^{4+} .

96)

For each successive electron removed from an atom, the ionization energy

- a) increases.
- b) decreases.
- c) remains the same.
- d) shows no pattern.

97)

As you move down the periodic table from carbon through lead, atomic radii

- a) generally increase.
- b) generally decrease.
- c) do not change.
- d) vary unpredictably.

98)

As you move left to right from gallium through bromine, atomic radii

- a) generally increase.
- b) generally decrease.
- c) do not change.
- d) vary unpredictably.

99)

The energy required to remove an electron from an atom _____ as you move left to right from potassium through iron.

- a) generally increases
- b) generally decreases
- c) does not change
- d) varies unpredictably

100)

The force of attraction by Group 1 metals for their valence electrons is

- a) weak.
- b) zero.
- c) strong.
- d) greater than that for inner shell electrons.

101)

The electrons available to be lost, gained, or shared when atoms form molecules are called

- a) ions.
- b) valence electrons.
- c) *d* electrons.
- d) electron clouds.

102)

When chemical compounds form, valence electrons are those that may be

- a) lost only.
- b) gained only.
- c) shared only.
- d) lost, gained, or shared.

103)

Valence electrons are those

- a) closest to the nucleus.
- b) in the lowest energy level.
- c) in the highest energy level.
- d) combined with protons.

104)

The number of valence electrons in Group 1 elements is

- a) 1.
- b) 2.
- c) 8.
- d) equal to the period number.

111)

As with main-group elements, ionization energies of *d*-block elements generally _____ across a period.

- a) increase
- b) decrease
- c) remain constant
- d) drop to zero

112)

In contrast to elements in the main group, the first ionization energies of *d*-block elements _____ as one proceeds down each group.

- a) remain constant
- b) decrease
- c) are identical
- d) increase

113)

The first electrons to be removed when *d*-block elements form ions are the

- a) *d* electrons.
- b) *p* electrons.
- c) *s* electrons.
- d) *f* electrons.

114)

Which groups in the main group have lower electronegativity than *d*-block elements?

- a) Groups 1 and 2
- b) Groups 13 through 18
- c) Groups 17 and 18
- d) Groups 13 through 17

115)

Among the *d*-block elements, as atomic radii decrease, electronegativity values

- a) remain constant.
- b) increase.
- c) decrease.
- d) drop to zero.

116)

In compounds, *d*-block elements most often form ions with charge

- a) 2⁻.
- b) 1⁻.
- c) 1⁺.
- d) 2⁺.

Read each question or statement, and write your response in the space provided.

117)

Describe the differences between Mendeleev's periodic table and the modern periodic table.

Read each question or statement, and write your response in the space provided.

118)

In terms of the periodic law, explain which two of these elements are most similar: sodium (element 11), phosphorus (element 15), and sulfur (element 16).

119)

What can you predict about the properties of xenon and helium, both in Group 18 in the periodic table? Why?

- 1) a
- 2) c
- 3) b
- 4) d
- 5) a
- 6) a
- 7) d
- 8) d
- 9) b
- 10) a
- 11) d
- 12) d
- 13) c
- 14) a
- 15) b
- 16) a
- 17) c
- 18) a
- 19) b
- 20) c
- 21) c
- 22) c
- 23) b
- 24) c
- 25) b
- 26) a
- 27) b
- 28) d
- 29) b
- 30) c
- 31) c
- 32) a
- 33) c
- 34) a
- 35) a

- 36) c
- 37) b
- 38) d
- 39) b
- 40) b
- 41) c
- 42) b
- 43) c
- 44) c
- 45) d
- 46) b
- 47) c
- 48) b
- 49) d
- 50) a
- 51) c
- 52) b
- 53) d
- 54) d
- 55) d
- 56) c
- 57) d
- 58) d
- 59) a
- 60) a
- 61) c
- 62) c
- 63) b
- 64) c
- 65) a
- 66) a
- 67) b
- 68) a
- 69) a
- 70) c
- 71) c

- 72) c
- 73) d
- 74) d
- 75) a
- 76) b
- 77) c
- 78) b
- 79) c
- 80) d
- 81) c
- 82) d
- 83) a
- 84) c
- 85) a
- 86) c
- 87) d
- 88) a
- 89) a
- 90) d
- 91) a
- 92) a
- 93) d
- 94) c
- 95) b
- 96) a
- 97) a
- 98) b
- 99) a
- 100) a
- 101) b
- 102) d
- 103) c
- 104) a
- 105) c

106) a

107) d

108) a

109) b

110) b

111) a

112) d

113) c

114) a

115) b

116) d

117) Mendeleev developed a table of periodicity based on atomic mass. It had some inconsistencies because the physical and chemical characteristics of the elements were not functions of atomic mass and some gaps because some elements had not yet been discovered. Moseley refined the table by organizing the elements according to increasing atomic number. The periods in Mendeleev's table were columns. In the modern periodic table, the periods are rows.

118) Their locations in the periodic table indicate that phosphorus and sulfur are nonmetals and sodium is a metal. Nonmetals are a group with characteristic properties, so phosphorus and sulfur are the most similar elements of the three.

119) In the periodic table, elements in the same column or group have similar properties. Because helium and xenon are in the same group, they have similar properties.