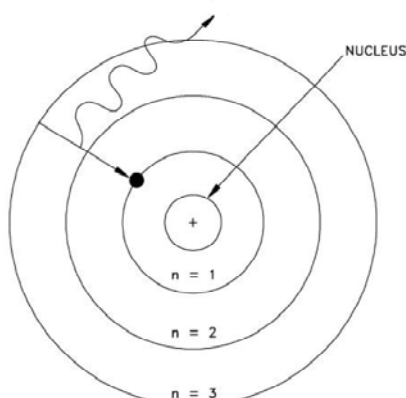


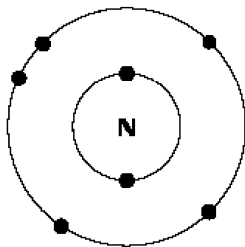
- _____ 13. Bohr's model was successful because
- it could explain the line spectrum of hydrogen
 - it introduced the idea of quantized energy
 - it explained why the atom did not collapse
 - all of the above
- _____ 14. Bohr's model was not the perfect model of the atom because it only explained
- the nucleus
 - the line spectra of the first 20 elements
 - the innermost electrons
 - the line spectrum of hydrogen
- _____ 15. With his model, Bohr hypothesized that there were different energy levels. How many energy levels are there?
- 3
 - 10
 - 15
 - infinite
- _____ 16. Bohr predicted that each energy level could hold a maximum number of electrons. How many electrons could the first three energy levels hold?
- 2, 2, 6
 - 2, 8, 8
 - 2, 4, 6
 - 2, 4, 8



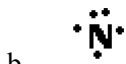
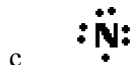
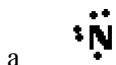
- _____ 17. The diagram above represents an atom whose electron is
- moving from the ground state to an excited state
 - moving from an excited state to the ground state
 - absorbing a quantum of energy
 - none of the above
- _____ 18. In the diagram above, the amount of electromagnetic radiation given off by the electron falling to a lower energy level will depend upon
- the element
 - the number of electrons in the atom
 - the energy difference in the energy levels
 - nothing; it is always the same
- _____ 19. The model of the atom, where electrons are in fixed orbits about the nucleus, was proposed by
- John Dalton
 - J.J. Thomson
 - Ernest Rutherford
 - Niels Bohr

- _____ 20. What is a method for identifying different types of matter using qualitative analysis?
- a. thermal emission spectroscopy
 - b. light spectroscopy
 - c. flame tests
 - d. all of the above
- _____ 21. The ability of a substance to conduct an electric current is known as
- a. electrolysis
 - b. conductivity
 - c. electrolytic
 - d. ionization
- _____ 22. Conductivity is a
- a. physical property
 - b. chemical property
 - c. both a and b
 - d. none of the above
- _____ 23. A compound that is able to conduct a current when placed in water to form a solution is
- a. a nonelectrolyte
 - b. an electrolyte
 - c. a conductor
 - d. an insulator
- _____ 24. A compound that is not able to conduct a current when placed in water to form a solution is
- a. a nonelectrolyte
 - b. an electrolyte
 - c. a conductor
 - d. an insulator
- _____ 25. When an atom gains or loses valence electrons,
- a. a cation is formed
 - b. an anion is formed
 - c. an ion is formed
 - d. a polyatomic ion is formed
- _____ 26. Sodium chloride is an example of
- a. an ionic compound
 - b. an electrolyte
 - c. a salt
 - d. all of the above
- _____ 27. A full outer shell usually means
- a. 2 valence electrons
 - b. 6 valence electrons
 - c. 8 valence electrons
 - d. none of the above
- _____ 28. If an atom gains two extra electrons, it has a charge of
- a. 2+
 - b. 2-
 - c. 1-
 - d. none of the above
- _____ 29. If an atom loses two electrons, it has a charge of
- a. 2+
 - b. 2-
 - c. 1-
 - d. none of the above
- _____ 30. The octet rule states that
- a. atoms must gain or lose 8 valence electrons to be stable
 - b. atoms must lose 8 valence electrons to be stable
 - c. atoms can only be stable when they gain 8 valence electrons
 - d. atoms are stable when they have 8 valence electrons
- _____ 31. If sodium loses one electron, how many valence electrons does it now have?
- a. 1
 - b. 0
 - c. 8
 - d. 7

____ 42.



The Bohr–Rutherford diagram above of nitrogen is best represented by which Lewis diagram?



d. not enough information is given

____ 43. When using Lewis symbols, the number of dots represents

a. the total number of electrons

c. only the nonvalence electrons

b. only the valence electrons

d. the number of electrons needed

____ 44. The Lewis symbols of elements down a group of the periodic table have

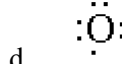
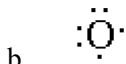
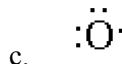
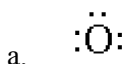
a. the same number of dots

c. a decreased number of dots

b. an increased number of dots

d. an unrelated number of dots

____ 45. The correct Lewis symbol for oxygen is

____ 46. An ion with a -1 charge has

a. one extra electron

c. one missing proton

b. one missing electron

d. one extra proton

____ 47. An ion with a $+1$ charge has

a. one extra electron

c. one missing proton

b. one missing electron

d. one extra proton

____ 48. An ion with a -2 charge has

a. two extra electrons

c. one missing proton, one extra electron

b. two missing electrons

d. two missing protons

____ 49. Ionic bonds form between

a. two metals

c. two nonmetals

b. a metal and a nonmetal

d. all of the above

____ 50. As an ionic bond is formed when

a. two atoms share two electrons

b. two atoms both lose electrons

c. one atom gains electrons from the other atom

d. the electrons are passed back and forth between the two atoms

- _____ 51. Chemical formulas of ionic compounds indicate
- the type of atoms in the compound
 - the ratio of the types of atoms in the compound
 - a formula unit of the compound
 - all of the above
- _____ 52. Ionic compounds form
- molecules
 - crystals
 - polyatomic ions
 - none of the above
- _____ 53. When ionic compounds are dissolved in water, they are
- electrolytes
 - nonelectrolytes
 - semiconductors
 - none of the above
- _____ 54. When ionic compounds dissolve in water, they
- ionize
 - dissociate
 - remain neutral
 - none of the above
- _____ 55. A single covalent bond is formed when
- two atoms share two electrons
 - two atoms both lose electrons
 - one atom gains electrons from the other atom
 - the electrons are passed back and forth between the two atoms
- _____ 56. Covalent compounds form
- molecules
 - crystals
 - polyatomic ions
 - none of the above

Short Answer

57. Define the terms *frequency* and *wavelength* as they relate to electromagnetic energy. Explain how they are related to each other.
58. Distinguish between a continuous spectrum and a line spectrum.
59. Why can a line spectrum be used in qualitative analysis?
60. What is the law of moving charges? How did scientists know that the electron did not follow the law of moving charges?
61. Why did Bohr use hydrogen for his line spectrum experiments?
62. According to Bohr, why do electrons not collapse into the nucleus?
63. Explain how quantization of energy is analogous to a ball on a flight of steps.
64. According to Bohr's theory, how many electrons can be in each of the first three energy levels in order for the atom to be stable?

Name: _____

ID: A

65. Explain how and why an ion is formed.
66. Why does sodium have an octet of electrons when it loses its valence electron? Support your answer with a diagram.
67. Why are ions normally formed in pairs of anions and cations?
68. Why is the term *formula unit* used when referring to the chemical formula of an ionic compound?

SCH4C Practice WS Unit 1
Answer Section

MULTIPLE CHOICE

1. D
2. B
3. D
4. A
5. B
6. C
7. B
8. D
9. C
10. A
11. B
12. C
13. D
14. D
15. D
16. B
17. B
18. C
19. D
20. D
21. B
22. A
23. B
24. A
25. C
26. D
27. C
28. B
29. A
30. D
31. B
32. C
33. D
34. C
35. B
36. C
37. B
38. C
39. A
40. C

41. B
42. B
43. B
44. A
45. B
46. A
47. B
48. A
49. B
50. C
51. D
52. B
53. A
54. B
55. A
56. A

SHORT ANSWER

57. - the frequency of a light wave is the number of cycles that pass a point in one second
- the wavelength is the distance between successive crests and troughs in a wave
- related - as the wavelength decreases the frequency must increase
58. - a continuous spectrum shows all the colours in an uninterrupted pattern, while a line spectrum shows only distinct lines of colour
59. - each element has a characteristic line spectrum
60. - the law of moving charges states that when an electron orbits the nucleus, it should emit energy in the form of electromagnetic radiation
- as the electron runs out of energy, it should collapse into the atom's nucleus
61. - Bohr used hydrogen because it has only one electron
62. - Bohr suggested that the electrons revolve around the atom's nucleus in orbits of fixed energy
63. - the ball on the steps is restricted to specific levels; it cannot sit between steps
- the ball can only possess fixed amounts (quanta) of energy, specific to each step
- 64.

energy level 1	2
energy level 2	8
energy level 3	18

65. - an ion is formed when an atom gains or loses one or more electrons
- atoms form ions in order to become more stable by attaining 8 (an octet of) valence electrons
66. - when sodium loses its one valence electron, its outermost shell is now empty
- the second energy level is full (i.e., it has 8 electrons)
- the diagram should be a Bohr–Rutherford diagram that shows a full second energy level for the sodium ion
67. - an anion is formed when an atom gains one or more electrons
- a cation is formed when an atom loses one or more electrons
- the electrons that the cation loses are the electrons gained by the anion
68. - since an ionic compound is a crystal consisting of many positive and negative ions, the term *formula unit* is used indicate the types of ions and their ratio to each other in the crystal