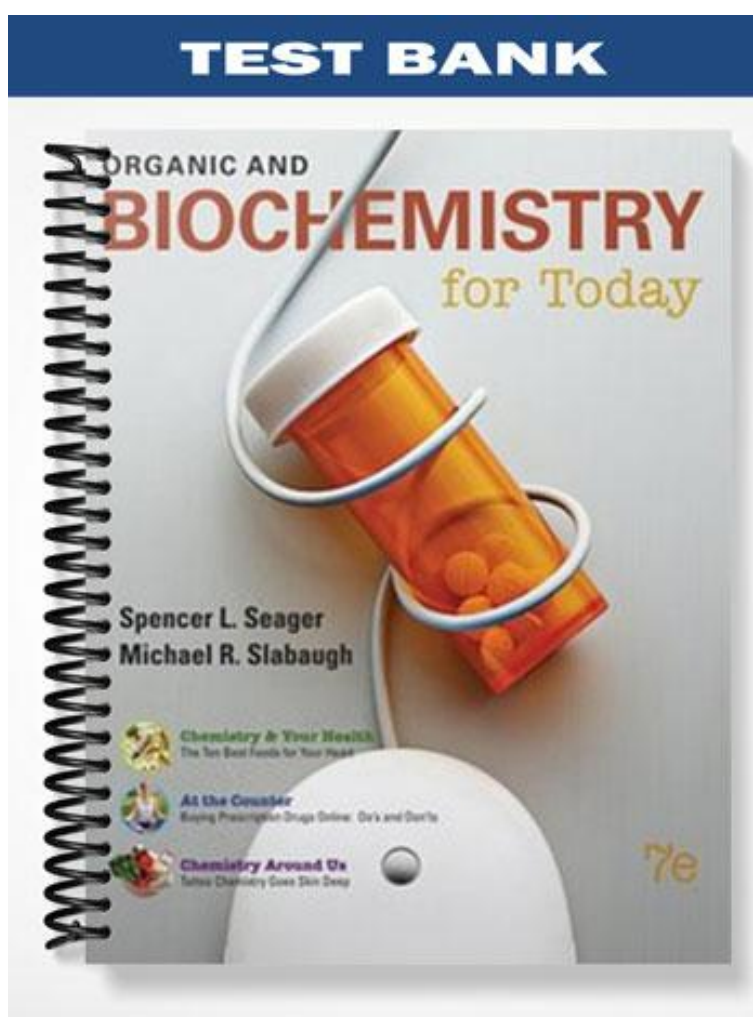


# TEST BANK



## Chapter 2--Atoms and Molecules

Student: \_\_\_\_\_

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  - C. a capital letter means a new symbol
  - D. both are incorrect as the symbol should be CaOx
2. What is the meaning of the two in ethyl alcohol, C<sub>2</sub>H<sub>5</sub>OH?
  - A. all alcohol molecules contain two carbon atoms
  - B. there are two carbon atoms per molecule of ethyl alcohol
  - C. carbon is diatomic
  - D. all of these are correct statements
3. The symbols for elements with accepted names
  - A. consist of a single capital letter
  - B. consist of a capital letter and a small letter
  - C. consist of either a single capital letter or a capital letter and a small letter
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4. A molecular formula
  - A. is represented using the symbols of the elements in the formula
  - B. is represented using a system of circles that contain different symbols
  - C. cannot be represented conveniently using symbols for the elements
  - D. is represented using words rather than symbols
5. Which of the following uses the unit of "u"?
  - A. atomic weights of atoms
  - B. relative masses of atoms
  - C. molecular weights of molecules
  - D. more than one response is correct
6. What is meant when the symbol C-12 is used?
  - A. the carbon atom weighs 12 grams
  - B. the carbon atom weighs 12 pounds
  - C. the carbon atom weighs 12 amu
  - D. the melting point of carbon is 12°C

7. Refer to a periodic table and tell how many helium atoms (He) would be needed to get close to the same mass as an average oxygen atom (O).
- A. six
  - B. four
  - C. twelve
  - D. one-fourth
8. Determine the molecular weight of hydrogen peroxide,  $\text{H}_2\text{O}_2$ , in u.
- A. 17.01
  - B. 18.02
  - C. 34.02
  - D. 33.01
9. Using whole numbers, determine the molecular weight of calcium hydroxide,  $\text{Ca}(\text{OH})_2$ .
- A. 56
  - B. 57
  - C. 58
  - D. 74
10. The average relative mass of an ozone molecule is 48.0 u. An ozone molecule contains only oxygen atoms. What does this molecular weight indicate about the formula of the ozone molecule?
- A. It is monoatomic.
  - B. It is diatomic.
  - C. It is triatomic.
  - D. The data tells nothing about the formula of an ozone molecule.
11. Which of the following pairs are about equal in mass?
- A. proton and electron
  - B. electron and neutron
  - C. proton and neutron
  - D. nucleus and surrounding electron
12. Which of the following particles is the smallest?
- A. proton
  - B. electron
  - C. neutron
  - D. they are all the same size

13. How many electrons are in a neutral atom of carbon-13,  $^{13}\text{C}$ ?
- A. 6
  - B. 18
  - C. 12
  - D. no way to tell
14. Which of the following carries a negative charge?
- A. a proton
  - B. a neutron
  - C. an electron
  - D. both proton and neutron
15. Which of the following is located in the nucleus of an atom?
- A. protons
  - B. neutrons
  - C. electrons
  - D. protons and neutrons
16. Atoms are neutral. How can they have no charge?
- A. equal numbers of protons and neutrons
  - B. equal numbers of protons and electrons
  - C. equal numbers of neutrons and electrons
  - D. any charge has been drained out of the atom
17. Isotopes differ from each other in what way?
- A. They have different numbers of protons in the nucleus.
  - B. They have different numbers of neutrons in the nucleus.
  - C. They have different numbers of electrons outside the nucleus.
  - D. More than one response is correct.
18. What is the reason that U-238 is different from U-235?
- A. three more electrons
  - B. three more protons
  - C. three more neutrons
  - D. there is no difference
19. How many protons are found in the nucleus of a boron-11 (B) atom?
- A. 11
  - B. 6
  - C. 5
  - D. 4

20. How many neutrons are found in the nucleus of a boron-11 (B) atom?
- A. 11
  - B. 6
  - C. 5
  - D. 4
21. What is the mass number of a carbon-13 (C) atom?
- A. 13
  - B. 12
  - C. 6
  - D. 7
22. Naturally occurring neon (Ne) has the following isotopic composition (the mass of each isotope is given in parenthesis). Calculate the atomic weight of neon in u from these data.  
neon-20, 90.92% (19.99 u); neon-21, 0.257% (20.99 u); neon-22, 8.82% (21.99 u)
- A. 28.97
  - B. 37.62
  - C. 2017
  - D. 20.17
23. Naturally occurring lithium (Li) consists of only two isotopes, Li-6 (6.02 u) and Li-7 (7.02 u), where the isotopic masses are given in parentheses. Use the periodic table and determine which isotope is present in the larger percentage in the natural element.
- A. Li-6
  - B. Li-7
  - C. each is present at 50%
  - D. cannot be determined from the information available
24. What mass of arsenic (As) in grams contains the same number of atoms as 39.95 g of argon (Ar)?
- A. 33.0
  - B. 74.92
  - C. 4.16
  - D. 149.84
25. The number of Cr atoms in a 26.0 g sample of chromium is x. How many atoms, expressed in terms of x, would be contained in 26.98 g of aluminum (Al)?
- A. x
  - B.  $x/2$
  - C.  $2x$
  - D.  $x+2$

26. The mass of mercury (Hg), a liquid at room temperature, is 200.6 amu/mol. A 200.6 gram sample of mercury is heated until it boils. What is the mass of one mole of mercury vapor (gas)?
- A. less than 200.6 or it would not be a gas
  - B. the same as Avogadro's number
  - C. the same as when it is a liquid
  - D. none of the answers is correct
27. The formula for dinitrogen monoxide is  $\text{N}_2\text{O}$ . If a sample of the oxide was found to contain 0.0800 g of oxygen, how many grams of nitrogen would it contain?
- A. 0.140
  - B. 0.280
  - C. 0.560
  - D. 0.0700
28. Avogadro's number of iron (Fe) atoms would weigh
- A. 55.9 g.
  - B.  $6.02 \times 10^{23}$  g.
  - C. 55.9 u.
  - D.  $6.02 \times 10^{-23}$  g.
29. How many atoms are contained in a sample of krypton, Kr, that weighs 8.38 g?
- A. Avogadro's number
  - B. one-tenth Avogadro's number
  - C. one
  - D. one-tenth
30. Which of the following has the largest mass?
- A. 5.0 mol  $\text{H}_2\text{O}$
  - B. 3.5 mol  $\text{NH}_3$
  - C. 8.0 mol C
  - D. 6.0 mol  $\text{C}_2\text{H}_2$
31. How many silicon atoms (Si) are contained in a 12.5 g sample of silicon?
- A.  $2.68 \times 10^{23}$
  - B.  $5.83 \times 10^{-22}$
  - C.  $1.35 \times 10^{24}$
  - D.  $1.71 \times 10^{21}$

32. What is the number of hydrogen atoms in a 18.016 gram sample of water?
- A. 2.000
  - B.  $6.022 \times 10^{23}$
  - C. 18.02
  - D.  $1.204 \times 10^{24}$
33. How many moles of oxygen atoms are in one mole of  $\text{CO}_2$ ?
- A. 1
  - B. 2
  - C.  $6.02 \times 10^{23}$
  - D.  $12.04 \times 10^{23}$
34. How many hydrogen atoms are in 1.00 mole of  $\text{NH}_3$ ?
- A. 3.00
  - B.  $6.02 \times 10^{23}$
  - C.  $12.0 \times 10^{23}$
  - D.  $18.1 \times 10^{23}$
35. How many moles of hydrogen molecules ( $\text{H}_2$ ) would be required to produce two moles of hydrogen peroxide ( $\text{H}_2\text{O}_2$ )?
- A. 1
  - B. 2
  - C. 3
  - D. 4
36. Calculate the weight percentage of hydrogen in water.
- A. 33.3
  - B. 66.7
  - C. 2.00
  - D. 11.1
37. What is the weight percentage of nitrogen in urea,  $\text{CN}_2\text{H}_4\text{O}$ ?
- A. 46.7
  - B. 30.4
  - C. 32.6
  - D. 16.3
38. How many carbon atoms are contained in 5.50 g of ethane,  $\text{C}_2\text{H}_6$ ?
- A.  $2.75 \times 10^{22}$
  - B.  $3.29 \times 10^{24}$
  - C.  $1.10 \times 10^{23}$
  - D.  $2.21 \times 10^{23}$

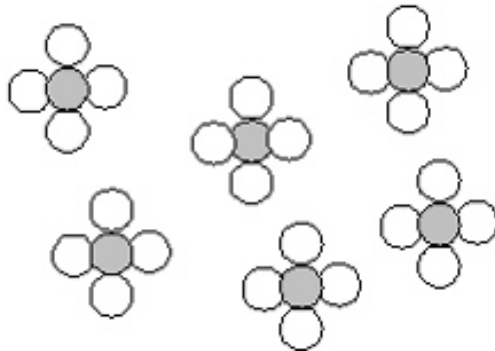
39. Which element is approximately 65 percent of sulfuric acid by weight?
- A. hydrogen
  - B. sulfur
  - C. oxygen
  - D. any of these
40. How many moles of  $\text{N}_2\text{O}$  contain the same number of nitrogen atoms as 4.60 g of  $\text{NO}_2$ ?
- A. 0.500
  - B. 0.0500
  - C. 0.100
  - D. 0.200
41. How many grams of iron (Fe) is contained in 15.8 g of  $\text{Fe}(\text{OH})_3$ ?
- A. 12.1
  - B. 8.26
  - C. 11.8
  - D. 5.21
42. The symbol for bromine is
- A. B
  - B. Br
  - C. Be
  - D. none of these
43. The weight % of S in  $\text{K}_2\text{SO}_4$  is
- A. 14.2%
  - B. 18.4%
  - C. 54.4%
  - D. 22.4%
44. What is the number of moles of water in one liter of water if one gram of water takes up one milliliter of space?
- A. 1
  - B. 18
  - C. 55.6
  - D. 1000
45. How many neutrons are in an atom that has a mass number of 75 and contains 35 protons?
- A. 40
  - B. 35
  - C. 75
  - D. no way to know



46. Atoms that have the same atomic number but differ by mass number are called?
- protons
  - neutrons
  - isotopes
  - positrons
47. If you have  $3.011 \times 10^{23}$  atoms of carbon, what would you expect its mass to be?
- 12.01 g
  - 6.005 g
  - 3.003 g
  - 1.000 g
48. What is wrong with the following molecular formula: SOO (sulfur dioxide)?
- OSO is the correct form
  - SO should be So
  - OO should be written as O2
  - OO should be written as O<sub>2</sub>
49. Determine the number of electrons and protons in the following element: Tc
- 43 protons, 43 electrons
  - 43 protons, 56 electrons
  - 56 protons, 43 electrons
  - 99 protons, 43 electrons
50. The system of atomic mass units is based on:
- Assigning C-12 as weighing exactly 12 u & comparing other elements to it.
  - Measuring the true mass of each subatomic particle.
  - Comparing the differences in protons and electrons.
  - Viewing how atoms are affected by electromagnetic fields.
51. How many moles of Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> contain 14 moles of oxygen atoms?
- 2 mol Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>
  - 14 mol Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>
  - 7 mol Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>
  - 1 mol Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>
52. An isotope of a given element has a mass number equal to twice the atomic number. This neutral isotope contains twelve electrons. This isotope is:
- magnesium-12.
  - magnesium-24.
  - chromium-24.
  - chromium-12.

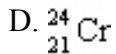
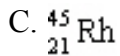
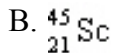
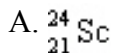
53. Approximately, how many atoms of beryllium would be required to equal the mass of 10 atoms of aluminum?
- 3 atoms of beryllium
  - 10 atoms of beryllium
  - 30 atoms of beryllium
  - 4 atoms of beryllium
54. If calcium carbonate found in limestone is 40.0% calcium, how many grams of calcium are in 485 g of calcium carbonate?
- 12.1 g of calcium
  - 291 g of calcium
  - 19,400 g of calcium
  - 194 g of calcium
55. Which of the following correctly describes subatomic particles?
- Mass:  $e^- < p^+ = n$
  - Magnitude of charge:  $n < e^- = p^+$
  - Location: outside nucleus  $e^-$ ,  $p^+$   
inside nucleus  $n$
- 1 only
  - 2 only
  - 3 only
  - 1 and 2
  - 2 and 3
  - 1 and 3
56. Write the formula for a compound consisting of 3 sodium atoms, 1 phosphorus atom, and 4 oxygen atoms.
- S<sub>3</sub>PO
  - 3NaP<sub>4</sub>O
  - Na<sub>3</sub>P<sub>2</sub>(O<sub>2</sub>)
  - Na<sub>3</sub>PO<sub>4</sub>

57. Consider the representation shown below.



This substance would be classified as:

- A. an element containing 6 atoms.
  - B. a compound containing atoms of two elements.
  - C. a homogenous mixture of two elements.
  - D. a homogenous mixture of two compounds.
58. A neutral isotope of an element contains 21 electrons and 24 neutrons. What is the symbolic representation for this isotope?



59. The symbols for all of the elements are derived from the Latin names.

True False

60. The symbols for all of the elements always begin with a capital letter.

True False

61. The first letter of the symbol for each of the elements is the first letter of its English name.

True False

62. The most accurate way to determine atomic mass is with a mass spectrometer.

True False

63.  $\text{H}_2\text{O}_2$  contains equal parts by weight of hydrogen and oxygen.  
True False
64. Electrons do not make an important contribution to the mass of an atom.  
True False
65. The charge of the nucleus depends only on the atomic number.  
True False
66. Isotopes of the same element always have the same number of neutrons.  
True False
67. Isotopes of the same element always have the same atomic number.  
True False
68. Isotopes of the same element always have the same atomic mass.  
True False
69. A mole of copper contains the same number of atoms as a mole of zinc.  
True False
70. One mole of an element would weigh the same as a mole of an isotope of the same element.  
True False
71. One mole of silver would contain the same number of atoms as a mole of gold.  
True False
72. One mole of  $\text{H}_2\text{O}$  contains two moles of hydrogen atoms.  
True False
73. One mole of  $\text{H}_2\text{O}$  contains 2.0 grams of hydrogen.  
True False
74. One mole of  $\text{O}_3$  weighs 16 grams.  
True False

75. The pure substance, water, contains both hydrogen molecules and oxygen molecules.

True False

76. A diet is planned for a trip on a space ship and is lacking in milk, but is rich in turnips and broccoli. Such a diet could provide a sufficient amount of calcium for adults.

True False

77. Calcium supplements can be taken in 1,000 mg increments.

True False

78. Protons and neutrons have approximately the same mass.

True False

79. Neutral isotopes of the same element have the same number of electrons.

True False

80. An isotope of gallium consisting of 31 protons and 37 neutrons can be represented using the symbol shown below.



True False

## Chapter 2--Atoms and Molecules **Key**

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- A. x
  - B. x/2
  - C. 2x**
  - D. x+2

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- A. Avogadro's number
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- A. 5.0 mol  $\text{H}_2\text{O}$
  - B. 3.5 mol  $\text{NH}_3$
  - C. 8.0 mol C
  - D.** 6.0 mol  $\text{C}_2\text{H}_2$
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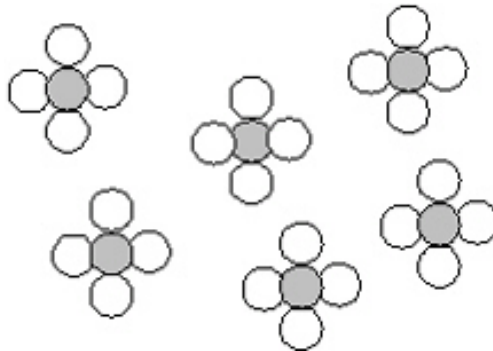
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 B.  $3.29 \times 10^{24}$   
 C.  $1.10 \times 10^{23}$   
**D.**  $2.21 \times 10^{23}$

39. Which element is approximately 65 percent of sulfuric acid by weight?
- A. hydrogen
  - B. sulfur
  - C. oxygen**
  - D. any of these
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- A. 12.1
  - B. 8.26**
  - C. 11.8
  - D. 5.21
42. The symbol for bromine is
- A. B
  - B. Br**
  - C. Be
  - D. none of these
43. The weight % of S in  $\text{K}_2\text{SO}_4$  is
- A. 14.2%
  - B. 18.4%**
  - C. 54.4%
  - D. 22.4%
44. What is the number of moles of water in one liter of water if one gram of water takes up one milliliter of space?
- A. 1
  - B. 18
  - C. 55.6**
  - D. 1000
45. How many neutrons are in an atom that has a mass number of 75 and contains 35 protons?
- A. 40**
  - B. 35
  - C. 75
  - D. no way to know

46. Atoms that have the same atomic number but differ by mass number are called?
- protons
  - neutrons
  - C.** isotopes
  - positrons
47. If you have  $3.011 \times 10^{23}$  atoms of carbon, what would you expect its mass to be?
- 12.01 g
  - B.** 6.005 g
  - 3.003 g
  - 1.000 g
48. What is wrong with the following molecular formula: SOO (sulfur dioxide)?
- OSO is the correct form
  - SO should be So
  - OO should be written as O2
  - D.** OO should be written as O<sub>2</sub>
49. Determine the number of electrons and protons in the following element: Tc
- A.** 43 protons, 43 electrons
  - 43 protons, 56 electrons
  - 56 protons, 43 electrons
  - 99 protons, 43 electrons
50. The system of atomic mass units is based on:
- A.** Assigning C-12 as weighing exactly 12 u & comparing other elements to it.
  - Measuring the true mass of each subatomic particle.
  - Comparing the differences in protons and electrons.
  - Viewing how atoms are affected by electromagnetic fields.
51. How many moles of Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub> contain 14 moles of oxygen atoms?
- A.** 2 mol Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>
  - 14 mol Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>
  - 7 mol Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>
  - 1 mol Na<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>
52. An isotope of a given element has a mass number equal to twice the atomic number. This neutral isotope contains twelve electrons. This isotope is:
- magnesium-12.
  - B.** magnesium-24.
  - chromium-24.
  - chromium-12.

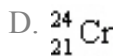
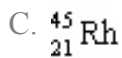
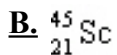
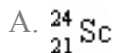
53. Approximately, how many atoms of beryllium would be required to equal the mass of 10 atoms of aluminum?
- A. 3 atoms of beryllium  
 B. 10 atoms of beryllium  
**C. 30 atoms of beryllium**  
 D. 4 atoms of beryllium
54. If calcium carbonate found in limestone is 40.0% calcium, how many grams of calcium are in 485 g of calcium carbonate?
- A. 12.1 g of calcium  
 B. 291 g of calcium  
 C. 19,400 g of calcium  
**D. 194 g of calcium**
55. Which of the following correctly describes subatomic particles?
1. Mass:  $e^- < p^+ = n$
  2. Magnitude of charge:  $n < e^- = p^+$
  3. Location: outside nucleus  $e^-$ ,  $p^+$   
 inside nucleus  $n$
- A. 1 only  
 B. 2 only  
 C. 3 only  
**D. 1 and 2**  
 E. 2 and 3  
 F. 1 and 3
56. Write the formula for a compound consisting of 3 sodium atoms, 1 phosphorus atom, and 4 oxygen atoms.
- A. S<sub>3</sub>PO  
 B. 3<sup>Na</sup>P<sup>4</sup>O  
 C. Na<sub>3</sub>P<sub>2</sub>(O<sub>2</sub>)  
**D. Na<sub>3</sub>PO<sub>4</sub>**

57. Consider the representation shown below.



This substance would be classified as:

- A. an element containing 6 atoms.  
**B.** a compound containing atoms of two elements.  
C. a homogenous mixture of two elements.  
D. a homogenous mixture of two compounds.
58. A neutral isotope of an element contains 21 electrons and 24 neutrons. What is the symbolic representation for this isotope?



59. The symbols for all of the elements are derived from the Latin names.

**FALSE**

60. The symbols for all of the elements always begin with a capital letter.

**TRUE**

61. The first letter of the symbol for each of the elements is the first letter of its English name.

**FALSE**

62. The most accurate way to determine atomic mass is with a mass spectrometer.

**TRUE**

63.  $\text{H}_2\text{O}_2$  contains equal parts by weight of hydrogen and oxygen.  
**FALSE**
64. Electrons do not make an important contribution to the mass of an atom.  
**TRUE**
65. The charge of the nucleus depends only on the atomic number.  
**TRUE**
66. Isotopes of the same element always have the same number of neutrons.  
**FALSE**
67. Isotopes of the same element always have the same atomic number.  
**TRUE**
68. Isotopes of the same element always have the same atomic mass.  
**FALSE**
69. A mole of copper contains the same number of atoms as a mole of zinc.  
**TRUE**
70. One mole of an element would weigh the same as a mole of an isotope of the same element.  
**FALSE**
71. One mole of silver would contain the same number of atoms as a mole of gold.  
**TRUE**
72. One mole of  $\text{H}_2\text{O}$  contains two moles of hydrogen atoms.  
**TRUE**
73. One mole of  $\text{H}_2\text{O}$  contains 2.0 grams of hydrogen.  
**TRUE**
74. One mole of  $\text{O}_3$  weighs 16 grams.  
**FALSE**



75. The pure substance, water, contains both hydrogen molecules and oxygen molecules.

**FALSE**

76. A diet is planned for a trip on a space ship and is lacking in milk, but is rich in turnips and broccoli. Such a diet could provide a sufficient amount of calcium for adults.

**TRUE**

77. Calcium supplements can be taken in 1,000 mg increments.

**FALSE**

78. Protons and neutrons have approximately the same mass.

**TRUE**

79. Neutral isotopes of the same element have the same number of electrons.

**TRUE**

80. An isotope of gallium consisting of 31 protons and 37 neutrons can be represented using the symbol shown below.



**FALSE**