**Chemistry in Focus A Molecular View of Our World**

**The Chemist's Toolbox**

**MULTIPLE CHOICE**

1. Significant figures represent the \_\_\_\_\_\_\_\_\_\_\_ of a measurement.

|  |  |
| --- | --- |
| a. | accuracy |
| b. | precision |
| c. | both precision and accuracy |
| d. | neither precision nor accuracy |

ANS: B

2. When adding and subtracting the number of significant figures in the answer is determined by \_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| a. | the most precise number |
| b. | the least precise number |
| c. | the number with the most significant figures in the calculation |
| d. | the number with the fewest significant figures in the calculation |

ANS: B

3. When multiplying and dividing, the number of significant figures in the answer is determined by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| a. | the most precise number |
| b. | the least precise number |
| c. | the number with the most significant figures in the calculation |
| d. | the number with the fewest significant figures in the calculation |

ANS: D

4. How many significant figures are there in the number 10.00?

|  |  |
| --- | --- |
| a. | 1 |
| b. | 2 |
| c. | 3 |
| d. | 4 |

ANS: D

5. How many significant figures are there in the number 10,100?

|  |  |
| --- | --- |
| a. | 1 |
| b. | 3 |
| c. | 4 |
| d. | 5 |

ANS: B

6. Calculate the density with the correct number of significant figures of a 50.0 g sample of mercury with a volume of 3.66 mL.

|  |  |
| --- | --- |
| a. | 13.66 g/mL |
| b. | 13.7 mL |
| c. | 183 g/mL |
| d. | 0.0732 g/mL |
| e. | 0.073 g/mL |

ANS: B

7. Calculate the density to the correct number of significant figures of a 100.0 g sample of mercury which occupies a volume of 7.36 cm3.

|  |  |
| --- | --- |
| a. | 13.7 g/mL |
| b. | 13.66 g/mL |
| c. | 183 g/mL |
| d. | 0.0732 g/mL |
| e. | 0.073 g/mL |

ANS: A

8. Determine the mass in grams of a gold sample which occupies a volume of 16.39 mL? Gold has a density of 19.3 g/mL.

|  |  |
| --- | --- |
| a. | 0.118 g |
| b. | 0.316 g |
| c. | 0.849 g |
| d. | 1.18 g |
| e. | 316 g |

ANS: E

9. Determine the volume occupied by 1.5 g of ethyl alcohol. The density of ethyl alcohol is 0.789 g/mL.

|  |  |
| --- | --- |
| a. | 1.9 mL |
| b. | 1.3 mL |
| c. | 0.53 mL |
| d. | 0.526 mL |
| e. | 1.331 mL |

ANS: A

10. Chloroform is a commonly used anesthetic with a density of 1.483 g/mL. Determine the volume of chloroform needed to deliver a 9.37 g sample of the anesthetic.

|  |  |
| --- | --- |
| a. | 0.158 g |
| b. | 6.32 g |
| c. | 13.9 g |
| d. | 13.89 g |
| e. | 0.0632 g |

ANS: B

11. If 15.0 mL of a metal has a mass of 103.0 g, what is the density of the metal?

|  |  |
| --- | --- |
| a. | 6.87 g/mL |
| b. | 1550 g/ mL |
| c. | 0.146 g/mL |
| d. | 1.46 g/mL |
| e. | None of these. |

ANS: A

12. The density of gold is 19.3 g/mL. If the current price of gold is $56.75 per gram, what is the volume of a nugget of gold worth $150.00?

|  |  |
| --- | --- |
| a. | 1.15 mL |
| b. | 0.868 mL |
| c. | 1.72 mL |
| d. | 1.27 mL |
| e. | 0.137 mL |

ANS: E

13. Which is the standard SI unit for mass?

|  |  |
| --- | --- |
| a. | gram |
| b. | pound |
| c. | ounce |
| d. | kilogram |
| e. | ton |

ANS: D

14. Which is the standard SI unit for length?

|  |  |
| --- | --- |
| a. | meter |
| b. | feet |
| c. | mile |
| d. | kilometer |
| e. | centimeter |

ANS: A

15. Which is the correct SI unit for time?

|  |  |
| --- | --- |
| a. | meter |
| b. | hour |
| c. | second |
| d. | minute |
| e. | gram |

ANS: C

16. Which of these represents the SI prefix for micro ()?

|  |  |
| --- | --- |
| a. | 106 |
| b. | 103 |
| c. | 109 |
| d. | 102 |
| e. | 106 |

ANS: A

17. Which of these represents the SI prefix for centi (c)?

|  |  |
| --- | --- |
| a. | 106 |
| b. | 103 |
| c. | 101 |
| d. | 102 |
| e. | 106 |

ANS: D

18. Which of these represents the SI prefix for mega (M)?

|  |  |
| --- | --- |
| a. | 109 |
| b. | 106 |
| c. | 103 |
| d. | 102 |
| e. | 106 |

ANS: B

19. The diameter of the nucleus of an atom is approximately 1  1013 meters. If 1 nm is equal to 10 Angstroms, what is the diameter of the nucleus in Angstroms? (1 nm = 1 x 109 meter)

|  |  |
| --- | --- |
| a. | 1  1021 A |
| b. | 1  106 A |
| c. | 1  105 A |
| d. | 1  104 A |
| e. | 1  103 A |

ANS: E

20. Convert 89.5 meters to millimeters.

|  |  |
| --- | --- |
| a. | 8.95  104 mm |
| b. | 8.95  104 mm |
| c. | 8.95  102 mm |
| d. | 8.95  102 mm |
| e. | None of these. |

ANS: A

21. Which of the following is not true.

|  |  |
| --- | --- |
| a. | 1 cm = .01 m |
| b. | 100 cm = 1 m |
| c. | 1 cm = 100m |
| d. | .01 cm = .0001m |
| e. | 10000 cm = 100 m |

ANS: C

22. Given that 1 in = 2.54 cm, which of the following is true?

|  |  |
| --- | --- |
| a. | 1 in2 = 2.54 cm2 |
| b. | 1 in2 = 5.08 cm2 |
| c. | 1 in2 = 6.45 cm2 |
| d. | 1 in2 = 1.27 cm2 |
| e. | None of these. |

ANS: C

23. One m3 equals \_\_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| a. | 1000 mm3 |
| b. | 1,000,000 mm3 |
| c. | 1,000,000,000 mm3 |
| d. | 1,000,000,000,000 mm3 |

ANS: C

24. One milliliter is equal to \_\_\_\_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| a. | 2.54 cubic inches |
| b. | 1000 liters |
| c. | 1 cubic centimeter |
| d. | 16.39 cubic inches |

ANS: C

25. 1.00 in3 equals \_\_\_\_\_\_\_\_.

|  |  |
| --- | --- |
| a. | 2.54 cm3 |
| b. | 7.62 cm3 |
| c. | 16.4 cm3 |
| d. | .394 cm3 |

ANS: C

26. The long jump record is 8.90 m. What is the length in inches? (1 m = 39.37 inches)

|  |  |
| --- | --- |
| a. | 9.73 inches |
| b. | 293 inches |
| c. | 350 inches |
| d. | 4204 inches |
| e. | 5000 inches |

ANS: C

27. The long jump record is 8.90 m. What is the length in yards? (1 yd = 0.9144 m)

|  |  |
| --- | --- |
| a. | 9.73 inches |
| b. | 293 inches |
| c. | 350 inches |
| d. | 4204 inches |
| e. | 5000 inches |

ANS: A

28. A football field is 100.0 yards long. What is its length in meters? (1 yd = 0.9144 m)

|  |  |
| --- | --- |
| a. | 0.09144 m |
| b. | 91.44 m |
| c. | 274.32 m |
| d. | 334 m |
| e. | 9.144  103 m |

ANS: B

29. A football field is 100 yards long. What is its length in centimeters? (1 yd = 0.9144 m)

|  |  |
| --- | --- |
| a. | 0.09144 cm |
| b. | 91.44 cm |
| c. | 274.32 cm |
| d. | 334 cm |
| e. | 9.144  103 cm |

ANS: E

30. How many kilograms of calcium are there in a 173 pounds of calcium?(1 pound = 454 grams)

|  |  |
| --- | --- |
| a. | 1.1 kg |
| b. | 78.54 kg |
| c. | 1.1  102 kg |
| d. | 3.8  104 kg |
| e. | 7.85  104 kg |

ANS: E

31. Most races are now measured in kilometers. What is the distance in miles a runner must complete in a 10 kilometer run. (1 km = 0.62137 mile)

|  |  |
| --- | --- |
| a. | 3.1 miles |
| b. | 6.2 miles |
| c. | 16.1 miles |
| d. | 32.2 miles |
| e. | 62.137 |

ANS: B

32. Convert 2.50  104. meters to miles ( 1 mile = 5280 feet).

|  |  |
| --- | --- |
| a. | 76.2 miles |
| b. | 6.35 miles |
| c. | 15.5 miles |
| d. | 155 miles |
| e. | 186 miles |

ANS: C

33. Convert 10.5 mm/s to ft/hr.

|  |  |
| --- | --- |
| a. | 124 ft/hr |
| b. | 9.57  106 ft/hr |
| c. | .0344 ft/hr |
| d. | 37800 ft/hr |
| e. | None of these. |

ANS: A

34. Which of these numbers has the most significant figures?

|  |  |
| --- | --- |
| a. | 0.5071 |
| b. | 0.201 |
| c. | 6.02  1023 |
| d. | 51 |
| e. | 103 |

ANS: A

35. Solve the problem.

3.728 + 6.272

|  |  |
| --- | --- |
| a. | 10 |
| b. | 10.0 |
| c. | 10.00 |
| d. | 10.000 |
| e. | 10.0000 |

ANS: D

36. Solve the problem.

3.72  108  9.26  103

|  |  |
| --- | --- |
| a. | 3.44  106 |
| b. | 4.02  1010 |
| c. | 3.45  105 |
| d. | 3.44  104 |
| e. | 4.02  1010 |

ANS: A

37. Solve the problem.

1.5  103 + 3.14  104   1.21  102 = ?

|  |  |
| --- | --- |
| a. | 3.28  104 |
| b. | 3.30  103 |
| c. | 3.3  104 |
| d. | 3.30  105 |
| e. | 3.43  109 |

ANS: A

38. Solve the problem.

(5.46  107 + 3.13  106)  (7.65  105)

|  |  |
| --- | --- |
| a. | 65.7  1018 |
| b. | 130.7  1018 |
| c. | 4.42  1013 |
| d. | 2.39  1012 |
| e. | 65.7  108 |

ANS: C

39. Solve the problem.

(3.21  1010  3.13  1012)  (7.65  105)

|  |  |
| --- | --- |
| a. | 4.13  106 |
| b. | 2.37  1018 |
| c. | 65.7  1018 |
| d. | 23.7  1017 |
| e. | 4.04  106 |

ANS: E

40. Solve the problem.

(12.67  4.23)  23.42

|  |  |
| --- | --- |
| a. | 2.3 |
| b. | 2.29 |
| c. | 2.228 |
| d. | 2.88 |
| e. | 2.2884 |

ANS: B

41. 0.01% is equivalent to which of the following?

|  |  |
| --- | --- |
| a. | 100 ppm |
| b. | 100 ppb |
| c. | 0.000001 ppm |
| d. | 0.000001 ppb |
| e. | None of these. |

ANS: A

42. Which of these is the correct scientific notation for 6,000,220?

|  |  |
| --- | --- |
| a. | 6.022  105 |
| b. | 6.00022  105 |
| c. | 6.00022  106 |
| d. | 6.00022  105 |
| e. | 6.00022  106 |

ANS: C

43. Which of the following is correctly written in scientific notation?

|  |  |
| --- | --- |
| a. | 50.0  106 |
| b. | 4.02  10216 |
| c. | 1  106.8 |
| d. | 1.005  109.05 |
| e. | 105 |

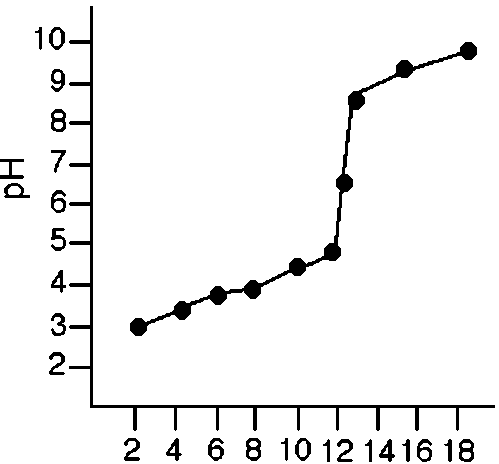
ANS: B

44. Which of these is **incorrectly** matched?

|  |  |
| --- | --- |
| a. | centi c 102 |
| b. | mega M 106 |
| c. | milli m 103 |
| d. | nano n 109 |
| e. | micro  106 |

ANS: D

**Figure 2-1**



45. Refer to Figure 2-1. What is the pH of the solution after 8 mL of base have been added.

|  |  |
| --- | --- |
| a. | 3 |
| b. | 4 |
| c. | 6 |
| d. | 7 |
| e. | 8 |

ANS: B

46. Refer to Figure 2-1. What affect was there on the pH of the solution when the volume of base added was increased from 8 mL to 13 mL?

|  |  |
| --- | --- |
| a. | The pH dropped by a value of 4. |
| b. | The pH increased by a value of 4. |
| c. | The pH remained relatively unchanged. |
| d. | The pH increased by a value of 10. |
| e. | The pH increased by a value of 20. |

ANS: B

47. Refer to Figure 2-1. Which of these statements is **true** based on the data provided by the graph.

|  |  |
| --- | --- |
| a. | The pH of the solution is must be determined algebraically. |
| b. | The pH of the solution is relatively unaffected by the addition of base. |
| c. | The pH of the solution is 7 when approximately 12 mL of base have been added. |
| d. | The pH of the solution is relatively constant with addition of the first 14 mL of base. |
| e. | The pH of the solution rises significantly when the volume is increased from 14 mL to 18 mL. |

ANS: C

48. Which of these numbers has the four significant figures?

|  |  |
| --- | --- |
| a. | 0.3211 |
| b. | 0.201 |
| c. | 6.02  1023 |
| d. | 5100 |
| e. | 0.0103 |

ANS: A

49. Solve the problem.

131.7  1.05

|  |  |
| --- | --- |
| a. | 1.38  103 |
| b. | 1.38  102 |
| c. | 1.3  103 |
| d. | 1.3  103 |
| e. | 1.3  103 |

ANS: B

50. Solve the problem.

33.5  3.011

|  |  |
| --- | --- |
| a. | 1.11  101 |
| b. | 1.11  103 |
| c. | 1.113  101 |
| d. | 1.11  102 |
| e. | 1.112587  101 |

ANS: A

51. Which of these is the correct normal decimal notation for 5.23  104?

|  |  |
| --- | --- |
| a. | 0.0523 |
| b. | 0.00523 |
| c. | 0.0000523 |
| d. | 0.000523 |
| e. | 52,300 |

ANS: D

52. Which of these is the correct normal notation for 7.77  107?

|  |  |
| --- | --- |
| a. | 0.000000777 |
| b. | 0.0777 |
| c. | 7,770 |
| d. | 7,770,000 |
| e. | 77,700,000 |

ANS: E

53. Which of these is the correct normal notation for 8.14  105?

|  |  |
| --- | --- |
| a. | 0.0000814 |
| b. | 0.000814 |
| c. | 81.400 |
| d. | 814,000 |
| e. | 81,400,000 |

ANS: D

54. Which of these series correctly orders the values given from smallest to largest?

|  |  |
| --- | --- |
| I. | 100 cm |
| II. | 1 km |
| III. | 10 m |
| IV. | 100,000 mm |

|  |  |
| --- | --- |
| a. | I < II < III < IV |
| b. | II < I < IV < III |
| c. | I < II = III < IV |
| d. | I < IV < III < II |
| e. | I < III < IV < II |

ANS: E

55. Which of these series correctly orders the values given from smallest to largest?

|  |  |
| --- | --- |
| I. | 0.001 Mg |
| II. | 2,000,000 ng |
| III. | 1 Gg |
| IV. | 100,000 cg |

|  |  |
| --- | --- |
| a. | III < II < II < IV |
| b. | II < I < IV < III |
| c. | II < I = IV < III |
| d. | I < IV = III < II |
| e. | I < III < IV < II |

ANS: C

56. Because of the high heat and humidity in the summer in Death Valley, California, a hiker requires about 1 quart of water for every two miles traveled on foot. If the density of water is 0.999 g/mL at 45(C, how many kilograms of water are required for a person to walk 30 kilometers in Death Valley? (1 L = 1.0567 qt; 1 km = 0.62317 mi)

|  |  |
| --- | --- |
| a. | 8.8 kg |
| b. | 70 kg |
| c. | 350 kg |
| d. | 700 kg |
| e. | 8.8  103 kg |

ANS: A

57. A sample of molten iron occupies of a volume of 7.11  103 L. If the density of iron is 7.86 g/cm3, what is the mass of iron in grams in the sample?

|  |  |
| --- | --- |
| a. | 0.000904 g |
| b. | 0.0559 g |
| c. | 0.904 g |
| d. | 1.105 g |
| e. | 55.85 g |

ANS: E

58. An irregular shaped piece of metal with a mass of 220 g was placed in a graduated cylinder that contained 35.00 mL of water. This raised the water level to 52.50 mL. What is the density of the metal?

|  |  |
| --- | --- |
| a. | 0.285 g/mL |
| b. | 4.19 g/mL |
| c. | 17.5 g/mL |
| d. | 12.6 g/mL |
| e. | 38.5 g/mL |

ANS: D

59. An irregular shaped piece of metal with a mass of 105 g was placed in a graduated cylinder that contained 25.00 mL of water. This raised the water level to 45.35 mL. What is the density of the metal?

|  |  |
| --- | --- |
| a. | 0.238 g/mL |
| b. | 2.3 g/mL |
| c. | 4.2 g/mL |
| d. | 5.16 g/mL |
| e. | 20.35 g/mL |

ANS: D

60. Convert 4.5 inches to **meters**. (2.54 cm = 1 inch)

|  |  |
| --- | --- |
| a. | 0.1143 m |
| b. | 1.77 m |
| c. | 11.43 m |
| d. | 0.0177 m |
| e. | 1143 m |

ANS: A

61. Determine the volume in liters of a 1.00 ounce bottle.(1.06 qt = 1 L; 32 ounces = 1 qt)

|  |  |
| --- | --- |
| a. | 0.0295 L |
| b. | 0.03125 L |
| c. | 0.03313 L |
| d. | 30.2 L |
| e. | 33.9 L |

ANS: A

62. A regulation soccer field is 110.0 yards in length. Calculate the length in millimeters. (1.094 yards = 1 m)

|  |  |
| --- | --- |
| a. | 0.101 mm |
| b. | 1.01 mm |
| c. | 100.5 mm |
| d. | 1.01  104 mm |
| e. | 1.01  105 mm |

ANS: E

63. A 5 foot 7 inch track athlete weighs 110 pounds. What his her height in cm and her weight in kilograms? (2.54 cm = 1 inch; 454 g = 1 pound)

|  |  |
| --- | --- |
| a. | 14.5 cm 242 kg |
| b. | 152 cm 49.9 kg |
| c. | 170 cm 49.9 kg |
| d. | 154 cm 242 kg |
| e. | 152 cm 4.99  104 kg |

ANS: C

64. Chemical waste is often shipped in 55-gallon drums. What is the weight in pounds of a 55-gallon drum if the density of the waste is 1.5942 g/cm3? (454 g = 1 pound; 0.9463 L = 1 quart; 4 quarts = 1 gallon)

|  |  |
| --- | --- |
| a. | 130 lbs |
| b. | 730 lbs |
| c. | 810 lbs |
| d. | 4.5  104 lbs |
| e. | 5.9  104 lbs |

ANS: B

65. Solve the problem.

5.6  102  7.41  103 = ?

|  |  |
| --- | --- |
| a. | 232  101 |
| b. | 7.55  105 |
| c. | 2.32  105 |
| d. | 4.1  106 |
| e. | 232  105 |

ANS: D

66. What is the mass in kilograms of a 25.00 pound dumbbell? (454 g = 1 pound)

|  |  |
| --- | --- |
| a. | 1.377  103 kg |
| b. | 1.377 kg |
| c. | 11.35 kg |
| d. | 1.377  103 kg |
| e. | 1.135  107 kg |

ANS: C

67. An international group of zookeepers with successful breeding programs made the following animal exchanges last year. Using the same bartering system, how many monkeys can a zoo obtain in exchange for 15 flamingos?

|  |  |
| --- | --- |
| 3 oryxes = 1 tiger | 2 flamingos = 1 anteater |
| 1 camel = 6 anteaters | 5 lemurs = 1 rhino |
| 1 rhino = 4 monkeys | 3 lemurs = 1 camel |
| 3 monkeys = 1 tiger | 1 rhino = 4 oryxes |

|  |  |
| --- | --- |
| a. | 3 monkeys |
| b. | 5 monkeys |
| c. | 8 monkeys |
| d. | 12 monkeys |
| e. | 15 monkeys |

ANS: A

68. Which of these samples of aluminum will occupy the **greatest** volume?(Density of aluminum = 2.70 g/cm3; 454 g = 1 pound)

|  |  |
| --- | --- |
| a. | 10,000 g |
| b. | 25 pounds |
| c. | 1 kg |
| d. | 5  102 L |
| e. | 2,000 mL |

ANS: B

69. Which of these samples of water will have the **greatest** mass?(Density of water = 1.00 g/cm3; 454 g = 1 pound)

|  |  |
| --- | --- |
| a. | 10,000 g |
| b. | 25 pounds |
| c. | 1 kg |
| d. | 5  102 L |
| e. | 2,000 mL |

ANS: B

70. Solve the following equation for y.

3y + 24 = 6y  3

|  |  |
| --- | --- |
| a. | 3 |
| b. | 6 |
| c. | 7 |
| d. | 8 |
| e. | 12 |

ANS: C

71. Solve the following equation for y.

3y = 24

|  |  |
| --- | --- |
| a. | 3 |
| b. | 6 |
| c. | 7 |
| d. | 8 |
| e. | 12 |

ANS: D

72. Solve the following equation for z.

2(z + 6)  10 = 42

|  |  |
| --- | --- |
| a. | 6 |
| b. | 10 |
| c. | 12 |
| d. | 20 |
| e. | 40 |

ANS: D

73. Solve the following equation for z.

4z  2z + 3 = 30

|  |  |
| --- | --- |
| a. | 2 |
| b. | 6.25 |
| c. | 10 |
| d. | 11 |
| e. | 13.5 |

ANS: E

74. Solve the following equation for x: 13x = x + 156

|  |  |
| --- | --- |
| a. | 13 |
| b. | 20 |
| c. | 1 |
| d. | 7 |
| e. | 12 |

ANS: A