***Chemistry: Structure and Properties* (Tro)**
Chapter 2 Measurement, Problem Solving, and the Mole Concept

2.1 Multiple Choice Questions

1) What mass (in mg) does 2.63 moles of nickel have?
A) 44.8 mg
B) 2.23×10^{4} mg
C) 129 mg
D) 3.56×10^{5} mg
E) 1.54×10^{5} mg
Answer: E
Diff: 3 Var: 1 Page Ref: 2.8
LO: 2.7
Global: G4

2) How many moles of Kr are contained in 398 mg of Kr?
A) 4.75×10^{-3} moles Kr
B) 33.4 moles Kr
C) 2.11×10^{-4} moles Kr
D) 2.99×10^{-3} moles Kr
E) 1.19×10^{-4} moles Kr
Answer: A
Diff: 3 Var: 1 Page Ref: 2.8
LO: 2.7
Global: G4

3) How many moles of Cs are contained in 595 kg of Cs?
A) 2.23×10^{2} moles Cs
B) 4.48×10^{3} moles Cs
C) 7.91×10^{4} moles Cs
D) 1.26×10^{3} moles Cs
E) 5.39×10^{2} moles Cs
Answer: B
Diff: 3 Var: 1 Page Ref: 2.8
LO: 2.7
Global: G4

4) How many iron atoms are contained in 354 g of iron?
A) 2.62×10^{25} Fe atoms
B) 2.13×10^{26} Fe atoms
C) 4.69×10^{24} Fe atoms
D) 3.82×10^{24} Fe atoms
E) 9.50×10^{22} Fe atoms
Answer: D
Diff: 3 Var: 1 Page Ref: 2.8
LO: 2.7
Global: G4

5) How many phosphorus atoms are contained in 158 kg of phosphorus?
A) 3.07×10^{27} phosphorus atoms
B) 2.95×10^{27} phosphorus atoms
C) 3.25×10^{28} phosphorus atoms
D) 1.18×10^{24} phosphorus atoms
E) 8.47×10^{24} phosphorus atoms
Answer: A
Diff: 3 Var: 1 Page Ref: 2.8
LO: 2.7
Global: G4

6) Calculate the mass (in kg) of 4.87×10^{25} atoms of Zn.
A) 5.29 kg
B) 1.89 kg
C) 8.09 kg
D) 1.24 kg
E) 1.09 kg
Answer: A
Diff: 4 Var: 1 Page Ref: 2.8
LO: 2.7
Global: G4

7) Calculate the mass (in ng) of 2.33×10^{20} atoms of oxygen.
A) 6.19×10^{6} ng
B) 1.62×10^{7} ng
C) 2.25×10^{3} ng
D) 3.73×10^{6} ng
E) 4.69×10^{7} ng
Answer: A
Diff: 4 Var: 1 Page Ref: 2.8
LO: 2.7
Global: G4

8) How many xenon atoms are contained in 2.36 moles of xenon?
A) 3.92×10^{24} xenon atoms
B) 2.55×10^{23} xenon atoms
C) 1.42×10^{24} xenon atoms
D) 7.91×10^{25} xenon atoms
E) 1.87×10^{26} xenon atoms
Answer: C
Diff: 2 Var: 1 Page Ref: 2.8
LO: 2.7
Global: G4

9) How many argon atoms are contained in 7.66×10^{5} mmol of argon?
A) 4.61×10^{26} Ar atoms
B) 1.84×10^{28} Ar atoms
C) 1.15×10^{28} Ar atoms
D) 7.86×10^{20} Ar atoms
E) 3.24×10^{26} Ar atoms
Answer: A
Diff: 2 Var: 1 Page Ref: 2.8
LO: 2.7
Global: G4

10) Determine the density of an object that has a mass of 149.8 g and displaces 12.1 mL of water when placed in a graduated cylinder.
A) 8.08 g/mL
B) 1.38 g/mL
C) 12.4 g/mL
D) 18.1 g/mL
E) 11.4 g/mL
Answer: C
Diff: 2 Var: 1 Page Ref: 2.3
LO: 2.2
Global: G4

11) Determine the volume of an object that has a mass of 455.6 g and a density of 19.3 g/cm^3.
A) 87.9 mL
B) 42.4 mL
C) 18.5 mL
D) 23.6 mL
E) 31.2 mL
Answer: D
Diff: 2 Var: 1 Page Ref: 2.3
LO: 2.2
Global: G4

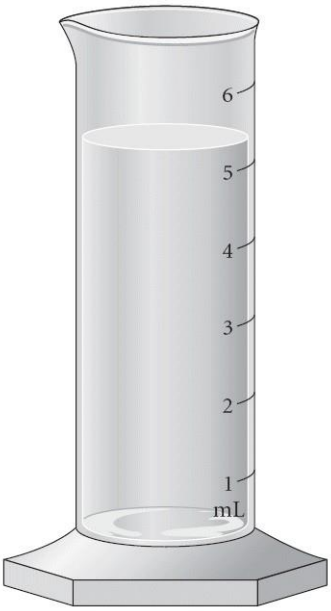
12) A student performs an experiment to determine the density of a sugar solution. She obtains the following results: 1.11 g/mL, 1.81 g/mL, 1.95 g/mL, 1.75 g/mL. If the actual value for the density of the sugar solution is 1.75 g/mL, which statement below best describes her results?
A) Her results are precise, but not accurate.
B) Her results are accurate, but not precise.
C) Her results are both precise and accurate
D) Her results are neither precise nor accurate.
E) It isn't possible to determine with the information given.
Answer: D
Diff: 1 Var: 1 Page Ref: 2.3
LO: 2.2
Global: G9

13) A student performs an experiment to determine the density of a sugar solution. She obtains the following results: 1.71 g/mL, 1.73 g/mL, 1.67 g/mL, 1.69 g/mL. If the actual value for the density of the sugar solution is 1.40 g/mL, which statement below best describes her results?
A) Her results are precise, but not accurate.
B) Her results are accurate, but not precise.
C) Her results are both precise and accurate
D) Her results are neither precise nor accurate.
E) It isn't possible to determine with the information given.
Answer: A
Diff: 1 Var: 1 Page Ref: 2.3
LO: 2.2
Global: G9

14) A student performs an experiment to determine the density of a sugar solution. She obtains the following results: 1.79 g/mL, 1.81 g/mL, 1.80 g/mL, 1.81 g/mL. If the actual value for the density of the sugar solution is 1.80 g/mL, which statement below best describes her results?
A) Her results are precise, but not accurate.
B) Her results are accurate, but not precise.
C) Her results are both precise and accurate
D) Her results are neither precise nor accurate.
E) It isn't possible to determine with the information given.
Answer: C
Diff: 1 Var: 1 Page Ref: 2.3
LO: 2.2
Global: G9

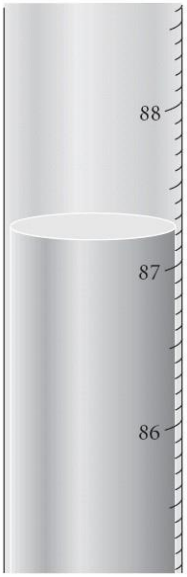
15) Systematic error is defined as
A) error that tends to be too high or too low.
B) error that has equal probability of being too high and too low.
C) error that averages out with repeated trials.
D) error that is random.
Answer: A
Diff: 1 Var: 1 Page Ref: 2.2
LO: 2.1
Global: G1

16) Read the water level with the correct number of significant figures.



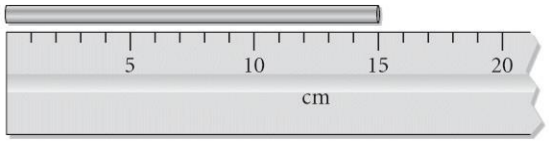
A) 5 mL
B) 5.3 mL
C) 5.32 mL
D) 5.320 mL
E) 5.3200 mL
Answer: B
Diff: 2 Var: 1 Page Ref: 2.2
LO: 2.1
Global: G3

17) Read the temperature with the correct number of significant figures.



A) 87°C
B) 87.2°C
C) 87.20°C
D) 87.200°C
E) 87.2000°C
Answer: C
Diff: 2 Var: 1 Page Ref: 2.2
LO: 2.1
Global: G3

18) Read the length of the metal bar with the correct number of significant figures.



A) 20 cm
B) 15 cm
C) 15.0 cm
D) 15.00 cm
E) 15.000 cm
Answer: C
Diff: 2 Var: 1 Page Ref: 2.2
LO: 2.1
Global: G3

19) Read the length of the metal bar with the correct number of significant figures.

A) 20 cm
B) 15 cm
C) 15.0 cm
D) 15.00 cm
E) 15.000 cm
Answer: D
Diff: 2 Var: 1 Page Ref: 2.2
LO: 2.1
Global: G3

20) Identify the exact number.
A) 2
B) 2.0
C) 2.00
D) 2.000
E) 2.0000
Answer: A
Diff: 1 Var: 1 Page Ref: 2.2
LO: 2.1
Global: G2

21) How many significant figures are in the measurement, 20.300 m?
A) 3
B) 4
C) 5
D) 1
E) 2
Answer: C
Diff: 2 Var: 1 Page Ref: 2.2
LO: 2.1
Global: G2

22) What answer should be reported, with the correct number of significant figures, for the following calculation? (433.621 - 333.9) × 11.900
A) 1.19×10^3
B) 1.187×10^3
C) 1.1868×10^3
D) 1.18680×10^3
E) 1.186799×10^3
Answer: A
Diff: 2 Var: 1 Page Ref: 2.2
LO: 2.1
Global: G4

23) What answer should be reported, with the correct number of significant figures, for the following calculation? (249.362 + 41) / 63.498
A) 4.6
B) 4.57
C) 4.573
D) 4.5728
E) 4.57277
Answer: B
Diff: 3 Var: 1 Page Ref: 2.2
LO: 2.1
Global: G4

24) What answer should be reported, with the correct number of significant figures, for the following calculation? (965.43 × 3.911) + 9413.4136
A) 13189
B) 13189.2
C) 1.32×10^4
D) 1.3×10^4
E) 1.319×10^4
Answer: A
Diff: 3 Var: 1 Page Ref: 2.2
LO: 2.1
Global: G4

25) How many mm are in 3.20 cm?
A) 3.20×10^{1} mm
B) 3.20×10^{-1} mm
C) 3.20×10^{-2} mm
D) 3.20×10^{2} mm
E) 3.20×10^{3} mm
Answer: A
Diff: 2 Var: 1 Page Ref: 2.2
LO: 2.1
Global: G4

26) If an object has a density of 8.65 g/cm^3, what is its density in units of kg/m^3?
A) 8.65×10^{-3} kg/m^3
B) 8.65×10^{-7} kg/m^3
C) 8.65×10^{3} kg/m^3
D) 8.65×10^{1} kg/m^3
E) 8.65×10^{-1} kg/m^3
Answer: C
Diff: 3 Var: 1 Page Ref: 2.5
LO: 2.3
Global: G4

27) If the walls in a room are 955 square feet in area, and a gallon of paint covers 15 square yards, how many gallons of paint are needed for the room? (3 ft = 1 yd)
A) 47 gallons
B) 21 gallons
C) 7.1 gallons
D) 24 gallons
E) 2.3 gallons
Answer: C
Diff: 4 Var: 1 Page Ref: 2.5
LO: 2.3
Global: G4, G5

28) Gas is sold for $1.399 per liter in Toronto, Canada. Your car needs 12.00 gallons. How much will your credit card be charged in Canadian dollars?
A) $16.79
B) $67.15
C) $4.44
D) $63.54
Answer: D
Diff: 5 Var: 1 Page Ref: 2.5
LO: 2.3
Global: G4, G5

2.2 Algorithmic Questions

1) Which of the following is the **smallest** volume?
A) 2.6 cm^3
B) 0.065 dL
C) 3.5×10^2 mL
D) 9.0×10^6 nL
Answer: A
Diff: 1 Var: 5 Page Ref: 2.6
Global: G4

2) What symbol is used to represent the factor 10^9?
A) M
B) m
C) μ
D) G
Answer: D
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2

3) The factor 1,000,000 corresponds to which prefix?
A) deka
B) deci
C) mega
D) milli
Answer: C
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2

4) The factor 10^6 corresponds to which prefix?
A) deka
B) deci
C) mega
D) milli
Answer: C
Diff: 1 Var: 5 Page Ref: 2.6
Global: G2

5) What decimal power does the abbreviation p represent?
A) 1×10^{6}
B) 1×10^{9}
C) 1×10^{-1}
D) 1×10^{-12}
E) 1×10^{-15}
Answer: D
Diff: 1 Var: 10 Page Ref: 2.6
Global: G2

6) What decimal power does the abbreviation kilo represent?
A) 1×10^{-1}
B) 1×10^{6}
C) 1×10^{-2}
D) 1×10^{3}
E) 1×10^{-3}
Answer: D
Diff: 1 Var: 10 Page Ref: 2.6
Global: G2

7) Which of the following are examples of intensive properties?
A) boiling point
B) volume
C) mass
D) None of the above are examples of intensive properties.
E) All of the above are examples of intensive properties.
Answer: A
Diff: 1 Var: 5 Page Ref: 2.3
Global: G2

8) Which of the following are examples of extensive properties?
A) volume
B) color
C) density
D) temperature
E) solubility
Answer: A
Diff: 1 Var: 6 Page Ref: 2.3
Global: G2

9) Identify the common substance that has the highest density.
A) sugar
B) water
C) glass
D) lead
E) aluminum
Answer: D
Diff: 1 Var: 12 Page Ref: 2.3
Global: G2, G5

10) Identify the common substance that has the lowest density.
A) ice
B) aluminum
C) copper
D) table salt
E) sugar
Answer: A
Diff: 1 Var: 9 Page Ref: 2.3
Global: G2

11) What is the volume (in cm^3) of a 9.37 g piece of metal with a density of 4.66 g/cm^3?
A) 2.01
B) 19.5
C) .425
D) 6.65
E) none of the above
Answer: A
Diff: 2 Var: 9 Page Ref: 2.3
LO: 2.2
Global: G4

12) A piece of metal ore weighs 9.25 g. When a student places it into a graduated cylinder containing water, the liquid level rises from 21.25 mL to 26.47 mL. What is the density of the ore?
A) 0.349 g/mL
B) 0.564 g/mL
C) 1.77 g/mL
D) 2.86 g/mL
Answer: C
Diff: 2 Var: 5 Page Ref: 2.3
LO: 2.2
Global: G4

13) A mass of mercury occupies 0.750 L. What volume would an equal mass of ethanol occupy? The density of mercury is 13.546 g/mL and the density of ethanol is 0.789 g/mL.
A) 0.0437 L
B) 0.0777 L
C) 12.9 L
D) 22.9 L
Answer: C
Diff: 2 Var: 5 Page Ref: 2.3
LO: 2.2
Global: G4

14) Determine the mass of an object that has a volume of 88.6 mL and a density of 7.77 g/mL.
A) 96.4 g
B) 0.0877 g
C) 11.4 g
D) 80.8 g
E) 688 g
Answer: E
Diff: 2 Var: 5 Page Ref: 2.3
LO: 2.2
Global: G4

15) How many significant figures are in the measurement 5.3 g?
A) 1
B) 4
C) 3
D) 2
E) 5
Answer: D
Diff: 1 Var: 10 Page Ref: 2.2
LO: 2.1
Global: G2

16) How many significant figures are in 9472345 mL?
A) 3
B) 4
C) 5
D) 6
E) 7
Answer: D
Diff: 2 Var: 5 Page Ref: 2.2
LO: 2.1
Global: G2

17) How many significant figures are in 4.500×10^4 m?
A) 3
B) 4
C) 5
D) 7
E) 8
Answer: B
Diff: 2 Var: 5 Page Ref: 2.2
LO: 2.1
Global: G2

18) How many significant figures are in the measurement, 670000. m?
A) 2
B) 3
C) 4
D) 5
E) 6
Answer: E
Diff: 2 Var: 5 Page Ref: 2.2
LO: 2.1
Global: G2

19) How many significant figures are in the measurement, 0.0004932 g?
A) 4
B) 5
C) 6
D) 7
E) 8
Answer: A
Diff: 2 Var: 5 Page Ref: 2.2
LO: 2.1
Global: G2

20) Round the following number to four significant figures and express the result in standard exponential notation: 0.35462
A) -0.3546
B) 0.3546
C) 3.546×10^1
D) 3.546×10^{-1}
E) 35.46×10^{-2}
Answer: D
Diff: 2 Var: 10 Page Ref: 2.2
LO: 2.1
Global: G2

21) Which of the following numbers has the greatest number of significant figures?
A) 0.8010
B) 0.504
C) 742000
D) 9.05×10^{24}
Answer: A
Diff: 2 Var: 5 Page Ref: 2.2
LO: 2.1
Global: G2

22) How many of the following numbers contain 3 significant figures?
0.509 1.050 0.0500 1.06×10^{24}
A) one
B) two
C) three
D) four
Answer: C
Diff: 2 Var: 5 Page Ref: 2.2
LO: 2.1
Global: G2

23) How many significant figures are there in the answer to the following problem?
$(8.881 \times 2.100) + 0.590 = ?$
A) one
B) two
C) three
D) four
Answer: D
Diff: 2 Var: 5 Page Ref: 2.2
LO: 2.1
Global: G2

24) How many significant figures are there in the answer for the following problem?
$34.2 + 0.6699 + 18 = ?$
A) one
B) two
C) three
D) four
Answer: B
Diff: 2 Var: 5 Page Ref: 2.2
LO: 2.1
Global: G2

25) How many significant figures are there in the answer for the following problem?

$$\frac{[(154.7 - 132) \times 3.07]}{0.700} = ?$$

A) one
B) two
C) three
D) four
Answer: B
Diff: 2 Var: 5 Page Ref: 2.2
LO: 2.1
Global: G2

26) A propane molecule contains 3 atoms of carbon. The number 3 represents how many significant figures?
A) one
B) two
C) three
D) infinite
Answer: D
Diff: 2 Var: 5 Page Ref: 2.2
LO: 2.1
Global: G2

27) Round off 00607507 to four significant figures.
A) 0061
B) 6076
C) 6100
D) 6.075×10^5
Answer: D
Diff: 2 Var: 5 Page Ref: 2.2
LO: 2.1
Global: G2

28) The width, length, and height of a large, custom-made shipping crate are 1.22 m, 3.22 m, and 0.54 m, respectively. The volume of the box using the correct number of significant figures is _____ m^3.
A) 2.12134
B) 2.1
C) 2.12
D) 2.121
E) 2.1213
Answer: B
Diff: 2 Var: 10 Page Ref: 2.2
LO: 2.1
Global: G4

29) Without using a calculator, solve the following problem.

$$\frac{[(1 \times 10^{2}) \times (1 \times 10^{5})]^{2}}{(1 \times 10^{-7})}$$

A) 1×10^{0}
B) 1×10^{7}
C) 1×10^{21}
D) 1×10^{28}
Answer: C
Diff: 1 Var: 5 Page Ref: 2.6
LO: 2.4
Global: G4

30) Without using a calculator, solve the following problem.

$$\frac{[(1 \times 10^{-5}) \times (1 \times 10^{2})]^{2}}{(1 \times 10^{3})}$$

A) 1×10^{0}
B) 1×10^{-3}
C) 1×10^{-9}
D) 1×10^{-12}
Answer: C
Diff: 1 Var: 5 Page Ref: 2.6
LO: 2.4
Global: G4

31) Which of the following is the greatest mass?
A) 100,000 μg
B) 1.000×10^{-2} kg
C) 1.000×10^{-2} cg
D) 1.000×10^{-6} Mg
Answer: B
Diff: 2 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4

32) The mass of a proton is 1.67×10^{-27} kg. What is the mass of a proton in milligrams?
A) 1.67×10^{-27} mg
B) 1.67×10^{-24} mg
C) 1.67×10^{-21} mg
D) 1.67×10^{-18} mg
Answer: C
Diff: 2 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4

33) The mass of a single arsenic atom is 1.244×10^{-22} g. This is the same mass as
A) 1.244×10^{-16} mg.
B) 1.244×10^{-25} kg.
C) 1.244×10^{-28} μg.
D) 1.244×10^{-31} ng.
Answer: B
Diff: 2 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4

34) A student weighed 300.0 μg of sulfur in the lab. This is the same mass as
A) 3.000×10^{-7} g.
B) 3.000×10^{-4} kg.
C) 3.000×10^{-4} mg.
D) 3.000×10^{5} ng.
Answer: D
Diff: 2 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4

35) Convert 5 μm to meters.
A) 5×10^{-9} m
B) 5×10^{-6} m
C) 5×10^{-3} m
D) 5×10^{6} m
Answer: B
Diff: 2 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4

36) The average distance between nitrogen and oxygen atoms is 115 pm in a compound called nitric oxide. What is this distance in centimeters?
A) 1.15×10^{-9} cm
B) 1.15×10^{-8} cm
C) 1.15×10^{12} cm
D) 1.15×10^{16} cm
Answer: B
Diff: 2 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4

37) The diameter of an atom is approximately 1×10^{-10} m. What is the diameter in picometers?
A) 1×10^{-25} pm
B) 1×10^{-22} pm
C) 1×10^{2} pm
D) 1×10^{5} pm
Answer: C
Diff: 2 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4

38) Which of the following volumes is equal to 30 mL?
A) 30 cm^3
B) 30 dm^3
C) 0.30 L
D) 0.00030 kL
Answer: A
Diff: 2 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4

39) Convert 10,000 cm^3 to m^3.
A) 1×10^{-2} m^3
B) 1×10^{2} m^3
C) 1×10^{6} m^3
D) 1×10^{10} m^3
Answer: A
Diff: 2 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4

40) Convert 15 m^3 to liters.
A) 1.5×10^{-2} L
B) 1.5 L
C) 1.5×10^{2} L
D) 1.5×10^{4} L
Answer: D
Diff: 2 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4

41) What wavelength of light would you report in units of nm, if the light had a wavelength of 8.80×10^{-10} m?
A) 8.80×10^{-3} nm
B) 8.80×10^{-19} nm
C) 8.80 nm
D) 0.880 nm
E) 880 nm
Answer: D
Diff: 2 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4

42) How many mg does a 643 kg sample contain?
A) 6.43×10^{-4} mg
B) 6.43×10^{7} mg
C) 6.43×10^{-3} mg
D) 6.43×10^{6} mg
E) 6.43×10^{8} mg
Answer: E
Diff: 2 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4

43) How many kL does a 9.45×10^{8} cL sample contain?
A) 9.45×10^{3} kL
B) 9.45×10^{13} kL
C) 9.45×10^{4} kL
D) 9.45×10^{12} kL
E) 9.45×10^{2} kL
Answer: A
Diff: 2 Var: 6 Page Ref: 2.6
LO: 2.3
Global: G4

44) How many cm^3 are contained in 2.67×10^{4} mm^3?
A) 2.67×10^{4} cm^3
B) 2.67×10^{1} cm^3
C) 2.67×10^{-10} cm^3
D) 2.67×10^{20} cm^3
E) 2.67×10^{6} cm^3
Answer: B
Diff: 2 Var: 6 Page Ref: 2.6
LO: 2.3
Global: G4

45) How many mL are in 5.67 L?
A) 5.67×10^{-3} mL
B) 5.67×10^{1} mL
C) 5.67×10^{3} mL
D) 5.67×10^{-1} mL
E) 5.67×10^{2} mL
Answer: C
Diff: 2 Var: 6 Page Ref: 2.6
LO: 2.3
Global: G4

46) 1.032 lb = _____ grams. (1 lb = 454 g)
Answer: 469
Diff: 4 Var: 10 Page Ref: 2.6
LO: 2.3
Global: G4

47) If 1.4% of the mass of a human body is calcium, how many kilograms of calcium are there in a 185-pound man?
A) 1.2 kg Ca
B) 5.7 kg Ca
C) 1.2×10^{2} kg Ca
D) 5.7×10^{2} kg
Answer: A
Diff: 5 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4, G5

48) A fishing boat accidentally spills 6.0 barrels of diesel oil into the ocean. Each barrel contains 42 gallons. If the oil film on the ocean is 2.5×10^{2} nm thick, how many square meters will the oil slick cover?
A) 3.8×10^{-3} m^2
B) 3.8×10^{6} m^2
C) 3.8×10^{7} m^2
D) none of these
Answer: B
Diff: 5 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4, G5

49) Because of the high heat and low humidity in the summer in Death Valley, California, a visitor requires about one quart of water for every two miles traveled on foot. Calculate the approximate number of liters required for a person to walk 25 kilometers in Death Valley.
A) 7.3 L
B) 295 L
C) 76 L
D) 117 L
Answer: A
Diff: 5 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4, G5

50) The estimated costs for remodelling the interior of an apartment are: three 1-gallon cans of paint at $12.89 each, two paint brushes at $12.22 each, and $145 for a helper. The total estimated cost with the appropriate significant figures is $
A) 208.11
B) 2.1×10^2
C) 208
D) 2×10^2
E) 208.1
Answer: C
Diff: 5 Var: 10 Page Ref: 2.6
LO: 2.3
Global: G4, G5

51) How many liters of wine can be held in a wine barrel whose capacity is 30.0 gal?
1 gal = 4 qt = 3.7854 L.
A) 1.26×10^{-4}
B) 0.126
C) 114
D) 7.93×10^3
E) 7.93
Answer: C
Diff: 5 Var: 10 Page Ref: 2.6
LO: 2.3
Global: G4, G5

52) The recommended adult dose of Elixophyllin®, a drug used to treat asthma, is 6.00 mg/kg of body mass. Calculate the dose in milligrams for a 112-lb person. 1 lb = 453.59 g.
A) 24
B) 1,482
C) 1.5
D) 305
E) 3.0×10^5
Answer: D
Diff: 5 Var: 10 Page Ref: 2.6
LO: 2.3
Global: G4, G5

53) The density of air under ordinary conditions at 25°C is 1.19 g/L. How many kilograms of air are in a room that measures 10.0 ft × 11.0 ft and has an 10.0 ft ceiling? 1 in. = 2.54 cm (exactly); 1 L = 10^3 cm^3
A) 3.32
B) 0.138
C) 3.71×10^4
D) 0.0795
E) 37.1
Answer: E
Diff: 5 Var: 12 Page Ref: 2.7
LO: 2.4
Global: G4, G5

54) How many liters of air are in a room that measures 11.0 ft × 12.0 ft and has an 8.00 ft ceiling? 1 in. = 2.54 cm (exactly); 1 L = 10^3 cm^3
A) 2.99×10^4
B) 111
C) 32.2
D) 3.22×10^7
E) 9.45×10^5
Answer: A
Diff: 5 Var: 12 Page Ref: 2.7
LO: 2.4
Global: G4, G5

55) A recipe requires 2.84 liters of milk for a soup base. How many quarts are needed?
A) 2.69 qts
B) 3.00 qts
C) 2.84 qts
D) 6.25 qts
E) 1.29 qts
Answer: B
Diff: 2 Var: 5 Page Ref: 2.7
LO: 2.4
Global: G4, G5

56) If a room requires 27.8 square yards of carpeting, what is the area of the floor in units of ft^2? (3 ft = 1 yd)
A) 83.4 ft^2
B) 9.27 ft^2
C) 166.8 ft^2
D) 250 ft^2
E) 70.6 ft^2
Answer: D
Diff: 3 Var: 5 Page Ref: 2.7
LO: 2.4
Global: G4, G5

57) A person is 70.00 inches tall. How tall is she in cm?
A) 177.8 cm
B) 27.56 cm
C) 28.00 cm
D) 210.0 cm
E) 140.0 cm
Answer: A
Diff: 3 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4, G5

58) A person weighs 63.5 kg. What is his weight in pounds?
A) 130 pounds
B) 140 pounds
C) 28.8 pounds
D) 25.4 pounds
E) 159 pounds
Answer: B
Diff: 3 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4, G5

59) A person is 2.321 yards tall. How tall is he in cm?
A) 212.2 cm
B) 32.90 cm
C) 0.1638 cm
D) 5.895 cm
E) 17.69 cm
Answer: A
Diff: 3 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4, G5

60) An alligator is 213.4 cm long. How long is he in feet?
A) 7.00 feet
B) 84.0 ft
C) 17.8 ft
D) 45.2 ft
E) 1009 ft
Answer: A
Diff: 3 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4, G5

61) How many cm are in 24.2 ft?
A) 9.53 cm
B) 290 cm
C) 61.5 cm
D) 738 cm
E) 0.794 cm
Answer: D
Diff: 3 Var: 5 Page Ref: 2.6
LO: 2.3
Global: G4

62) Which of the following contains the **most** atoms? You shouldn't need to do a calculation here.
A) 10.0 g Al
B) 10.0 g He
C) 10.0 g Ca
D) 10.0 g Kr
E) 10.0 g Cs
Answer: B
Diff: 1 Var: 50+ Page Ref: 2.8
LO: 2.7
Global: G2

63) Which of the following contains the **fewest** atoms? You shouldn't need to do a calculation here.
A) 10.0 g Mg
B) 10.0 g Li
C) 10.0 g Ca
D) 10.0 g Rb
E) 10.0 g Cs
Answer: E
Diff: 1 Var: 50+ Page Ref: 2.8
LO: 2.7
Global: G2

64) How many Zn atoms are contained in 922 g of Zn?
A) 5.90×10^{25} Zn atoms
B) 7.09×10^{21} Zn atoms
C) 8.49×10^{24} Zn atoms
D) 4.27×10^{22} Zn atoms
E) 4.18×10^{24} Zn atoms
Answer: C
Diff: 3 Var: 5 Page Ref: 2.8
LO: 2.6
Global: G4

65) Calculate the mass (in g) of 2.0×10^{24} atoms of Hg.
A) 3.9×10^{2} g
B) 2.4×10^{2} g
C) 3.2×10^{2} g
D) 1.5×10^{2} g
E) 6.5×10^{2} g
Answer: E
Diff: 3 Var: 5 Page Ref: 2.8
LO: 2.6
Global: G4

66) How many magnesium atoms are contained in 3.75 moles of magnesium?
A) 1.23×10^{24} magnesium atoms
B) 2.26×10^{24} magnesium atoms
C) 1.61×10^{23} magnesium atoms
D) 5.48×10^{25} magnesium atoms
E) 6.50×10^{25} magnesium atoms
Answer: B
Diff: 2 Var: 4 Page Ref: 2.8
LO: 2.5
Global: G4

67) What mass (in g) does 7.98 moles of Kr have?
A) 668 g
B) 952 g
C) 422 g
D) 480 g
E) 288 g
Answer: A
Diff: 2 Var: 5 Page Ref: 2.8
LO: 2.6
Global: G4

68) How many moles of potassium are contained in 150 g of potassium?
A) 3.83 moles
B) 0.720 moles
C) 10.0 moles
D) 7.90 moles
E) 4.85 moles
Answer: A
Diff: 2 Var: 5 Page Ref: 2.8
LO: 2.6
Global: G4

69) How many moles are in 2.16×10^{24} atoms of lead?
A) 35.9 moles
B) 3.59 moles
C) 0.359 moles
D) 6.08 moles
E) 1.79 moles
Answer: B
Diff: 2 Var: 6 Page Ref: 2.8
LO: 2.5
Global: G4

70) How many atoms are in 2.50 moles of SiO_2?
A) 4.52×10^{24} atoms
B) 1.52×10^{24} atoms
C) 5.02×10^{23} atoms
D) 3.01×10^{24} atoms
E) 7.53×10^{23} atoms
Answer: A
Diff: 3 Var: 5 Page Ref: 2.8
LO: 2.5
Global: G4

71) How many molecules are in 2.50 moles of SiO_2?
A) 4.52×10^{24} atoms
B) 1.51×10^{24} atoms
C) 5.02×10^{23} atoms
D) 3.01×10^{24} atoms
E) 7.53×10^{23} atoms
Answer: B
Diff: 3 Var: 5 Page Ref: 2.8
LO: 2.5
Global: G4

72) How many atoms of carbon are in 2.50 moles of CO_2?
A) 4.52×10^{24} atoms
B) 1.51×10^{24} atoms
C) 5.02×10^{23} atoms
D) 3.01×10^{24} atoms
E) 7.53×10^{23} atoms
Answer: B
Diff: 3 Var: 5 Page Ref: 2.8
LO: 2.5
Global: G4

73) How many atoms of oxygen are in 2.50 moles of SO_2?
A) 4.52×10^{24} atoms
B) 1.51×10^{24} atoms
C) 5.02×10^{23} atoms
D) 3.01×10^{24} atoms
E) 7.53×10^{23} atoms
Answer: D
Diff: 3 Var: 3 Page Ref: 2.8
LO: 2.5
Global: G4

74) What mass (in kg) does 4.77 moles of nickel have?
A) 0.352 kg
B) 0.122 kg
C) 0.820 kg
D) 0.280 kg
E) 0.632 kg
Answer: D
Diff: 3 Var: 5 Page Ref: 2.8
LO: 2.6
Global: G4

2.3 Matching Questions

Match the following.

A) 10^{6}
B) 10^{-9}
C) 10^{3}
D) 10^{-6}
E) 10^{-1}
F) 10^{-3}
G) 10^{-2}

1) kilo
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2

2) centi
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2

3) milli
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2

4) nano
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2

5) micro
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2

6) deci
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2

7) mega
Diff: 1 Var: 1 Page Ref: 2.5
Global: G2

Answers: 1) C 2) G 3) F 4) B 5) D 6) E 7) A

2.4 Short Answer Questions

1) The number 6.022×10^{23} is called
Answer: Avogadro's number.
Diff: 1 Var: 1 Page Ref: 2.9
Global: G2

2) Define energy.
Answer: Energy is the capacity to do work.
Diff: 1 Var: 1 Page Ref: 2.4
Global: G1, G8

3) Define the law of the conservation of energy.
Answer: Energy is neither created or destroyed.
Diff: 1 Var: 1 Page Ref: 2.4
Global: G1, G8

4) Describe the difference between an intensive and extensive property using examples.
Answer: An intensive property does NOT depend on the amount of the substance present, such as color or density. An extensive property is one that does depend on the amount of the substance, such as mass or volume.
Diff: 1 Var: 1 Page Ref: 2.3
Global: G1, G8

5) Since metals expand when heated, what happens to the density of a sample of iron metal as it is heated from room temperature to 100°C? (This is below the melting point of iron.)
Answer: Since the mass of the iron stays constant, but the volume increases as the temperature is raised, the density of the iron decreases upon heating.
Diff: 1 Var: 1 Page Ref: 2.3
Global: G8

6) What does it mean to be an exact number? Give an example of an exact number.
Answer: An exact number has an infinite number of significant figures even though we typically don't write many of them out. If there are 26 people in a classroom, there are exactly 26.00000.... people in that room. There is no possibility of a half person, so this is an exact whole number with no ambiguity.
Diff: 1 Var: 1 Page Ref: 2.2
Global: G1, G8

7) Define random error.
Answer: Random error has an equal probability of being too high or too low.
Diff: 1 Var: 1 Page Ref: 2.2
Global: G1, G8

8) The correct answer (reported to the proper number of significant figures) to the following is
$6.3 \times 3.25 =$ _____
Answer: 20
Diff: 2 Var: 10 Page Ref: 2.2
LO: 2.1
Global: G4

9) The correct answer (reported to the proper number of significant figures) to the following is
$(1712 - 1615) \times (8.66 \times 7.66) =$ _____
Answer: 6400
Diff: 4 Var: 10 Page Ref: 2.2
LO: 2.1
Global: G4