

**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)  $2.23 \times 10^4$  mg
- C) 129 mg
- D)  $3.56 \times 10^5$  mg
- E)  $1.54 \times 10^5$  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)  $4.75 \times 10^{-3}$  moles Kr
- B) 33.4 moles Kr
- C)  $2.11 \times 10^{-4}$  moles Kr
- D)  $2.99 \times 10^{-3}$  moles Kr
- E)  $1.19 \times 10^{-4}$  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)  $2.23 \times 10^2$  moles Cs
- B)  $4.48 \times 10^3$  moles Cs
- C)  $7.91 \times 10^4$  moles Cs
- D)  $1.26 \times 10^3$  moles Cs
- E)  $5.39 \times 10^2$  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)  $2.62 \times 10^{25}$  Fe atoms

B)  $2.13 \times 10^{26}$  Fe atoms

C)  $4.69 \times 10^{24}$  Fe atoms

D)  $3.82 \times 10^{24}$  Fe atoms

E)  $9.50 \times 10^{22}$  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)  $3.07 \times 10^{27}$  phosphorus atoms

B)  $2.95 \times 10^{27}$  phosphorus atoms

C)  $3.25 \times 10^{28}$  phosphorus atoms

D)  $1.18 \times 10^{24}$  phosphorus atoms

E)  $8.47 \times 10^{24}$  phosphorus atoms

Answer: A

Diff: 3 Var: 1 Page Ref: 2.8

LO: 2.7

Global: G4

6) Calculate the mass (in kg) of  $4.87 \times 10^{25}$  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  $2.33 \times 10^{20}$  atoms of oxygen.

A)  $6.19 \times 10^6$  ng

B)  $1.62 \times 10^7$  ng

C)  $2.25 \times 10^3$  ng

D)  $3.73 \times 10^6$  ng

E)  $4.69 \times 10^7$  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)  $3.92 \times 10^{24}$  xenon atoms
- B)  $2.55 \times 10^{23}$  xenon atoms
- C)  $1.42 \times 10^{24}$  xenon atoms
- D)  $7.91 \times 10^{25}$  xenon atoms
- E)  $1.87 \times 10^{26}$  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  $7.66 \times 10^5$  mmol of argon?

- A)  $4.61 \times 10^{26}$  Ar atoms
- B)  $1.84 \times 10^{28}$  Ar atoms
- C)  $1.15 \times 10^{28}$  Ar atoms
- D)  $7.86 \times 10^{20}$  Ar atoms
- E)  $3.24 \times 10^{26}$  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  $19.3 \text{ g/cm}^3$ .

- 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

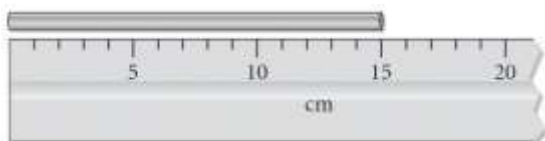
Answer: C

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?  $(433.621 - 333.9) \times 11.900$

- A)  $1.19 \times 10^3$
- B)  $1.187 \times 10^3$
- C)  $1.1868 \times 10^3$
- D)  $1.18680 \times 10^3$
- E)  $1.186799 \times 10^3$

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?  $(965.43 \times 3.911) + 9413.4136$

- A) 13189
- B) 13189.2
- C)  $1.32 \times 10^4$
- D)  $1.3 \times 10^4$
- E)  $1.319 \times 10^4$

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)  $3.20 \times 10^1$  mm
- B)  $3.20 \times 10^{-1}$  mm
- C)  $3.20 \times 10^{-2}$  mm
- D)  $3.20 \times 10^2$  mm
- E)  $3.20 \times 10^3$  mm

Answer: A

Diff: 2 Var: 1 Page Ref: 2.2

LO: 2.1

Global: G4

26) If an object has a density of  $8.65 \text{ g/cm}^3$ , what is its density in units of  $\text{kg/m}^3$ ?

- A)  $8.65 \times 10^{-3} \text{ kg/m}^3$
- B)  $8.65 \times 10^{-7} \text{ kg/m}^3$
- C)  $8.65 \times 10^3 \text{ kg/m}^3$
- D)  $8.65 \times 10^1 \text{ kg/m}^3$
- E)  $8.65 \times 10^{-1} \text{ kg/m}^3$

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)  $2.6 \text{ cm}^3$
- B)  $0.065 \text{ dL}$
- C)  $3.5 \times 10^2 \text{ mL}$
- D)  $9.0 \times 10^6 \text{ nL}$

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)  $\mu$
- 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)  $1 \times 10^6$
- B)  $1 \times 10^9$
- C)  $1 \times 10^{-1}$
- D)  $1 \times 10^{-12}$
- E)  $1 \times 10^{-15}$

Answer: D

Diff: 1 Var: 10 Page Ref: 2.6

Global: G2

6) What decimal power does the abbreviation kilo represent?

- A)  $1 \times 10^{-1}$
- B)  $1 \times 10^6$
- C)  $1 \times 10^{-2}$
- D)  $1 \times 10^3$
- E)  $1 \times 10^{-3}$

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  $\text{cm}^3$ ) of a 9.37 g piece of metal with a density of  $4.66 \text{ g/cm}^3$ ?

- 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  $4.500 \times 10^4$  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)  $3.546 \times 10^1$
- D)  $3.546 \times 10^{-1}$
- E)  $35.46 \times 10^{-2}$

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)  $9.05 \times 10^{24}$

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       $1.06 \times 10^{24}$

- 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?

$$\frac{[(1547 - 132) \times 3.07]}{0.700} = ?$$

- 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)  $6.075 \times 10^5$

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<sup>3</sup>.

- 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)  $1 \times 10^0$
- B)  $1 \times 10^7$
- C)  $1 \times 10^{21}$
- D)  $1 \times 10^{28}$

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)  $1 \times 10^0$
- B)  $1 \times 10^{-3}$
- C)  $1 \times 10^{-9}$
- D)  $1 \times 10^{-12}$

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  $\mu\text{g}$
- B)  $1.000 \times 10^{-2}$  kg
- C)  $1.000 \times 10^{-2}$  cg
- D)  $1.000 \times 10^{-6}$  Mg

Answer: B

Diff: 2 Var: 5 Page Ref: 2.6

LO: 2.3

Global: G4

32) The mass of a proton is  $1.67 \times 10^{-27}$  kg. What is the mass of a proton in milligrams?

- A)  $1.67 \times 10^{-27}$  mg
- B)  $1.67 \times 10^{-24}$  mg
- C)  $1.67 \times 10^{-21}$  mg
- D)  $1.67 \times 10^{-18}$  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  $1.244 \times 10^{-22}$  g. This is the same mass as

A)  $1.244 \times 10^{-16}$  mg.

B)  $1.244 \times 10^{-25}$  kg.

C)  $1.244 \times 10^{-28}$   $\mu$ g.

D)  $1.244 \times 10^{-31}$  ng.

Answer: B

Diff: 2 Var: 5 Page Ref: 2.6

LO: 2.3

Global: G4

34) A student weighed 300.0  $\mu$ g of sulfur in the lab. This is the same mass as

A)  $3.000 \times 10^{-7}$  g.

B)  $3.000 \times 10^{-4}$  kg.

C)  $3.000 \times 10^{-4}$  mg.

D)  $3.000 \times 10^5$  ng.

Answer: D

Diff: 2 Var: 5 Page Ref: 2.6

LO: 2.3

Global: G4

35) Convert 5  $\mu$ m to meters.

A)  $5 \times 10^{-9}$  m

B)  $5 \times 10^{-6}$  m

C)  $5 \times 10^{-3}$  m

D)  $5 \times 10^6$  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)  $1.15 \times 10^{-9}$  cm

B)  $1.15 \times 10^{-8}$  cm

C)  $1.15 \times 10^{12}$  cm

D)  $1.15 \times 10^{16}$  cm

Answer: B

Diff: 2 Var: 5 Page Ref: 2.6

LO: 2.3

Global: G4

37) The diameter of an atom is approximately  $1 \times 10^{-10}$  m. What is the diameter in picometers?

A)  $1 \times 10^{-25}$  pm

B)  $1 \times 10^{-22}$  pm

C)  $1 \times 10^2$  pm

D)  $1 \times 10^5$  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)  $30 \text{ cm}^3$

B)  $30 \text{ dm}^3$

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  $10,000 \text{ cm}^3$  to  $\text{m}^3$ .

A)  $1 \times 10^{-2} \text{ m}^3$

B)  $1 \times 10^2 \text{ m}^3$

C)  $1 \times 10^6 \text{ m}^3$

D)  $1 \times 10^{10} \text{ m}^3$

Answer: A

Diff: 2 Var: 5 Page Ref: 2.6

LO: 2.3

Global: G4

40) Convert  $15 \text{ m}^3$  to liters.

A)  $1.5 \times 10^{-2} \text{ L}$

B) 1.5 L

C)  $1.5 \times 10^2 \text{ L}$

D)  $1.5 \times 10^4 \text{ L}$

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  $8.80 \times 10^{-10}$  m?

- A)  $8.80 \times 10^{-3}$  nm
- B)  $8.80 \times 10^{-19}$  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)  $6.43 \times 10^{-4}$  mg
- B)  $6.43 \times 10^7$  mg
- C)  $6.43 \times 10^{-3}$  mg
- D)  $6.43 \times 10^6$  mg
- E)  $6.43 \times 10^8$  mg

Answer: E

Diff: 2 Var: 5 Page Ref: 2.6

LO: 2.3

Global: G4

43) How many kL does a  $9.45 \times 10^8$  cL sample contain?

- A)  $9.45 \times 10^3$  kL
- B)  $9.45 \times 10^{13}$  kL
- C)  $9.45 \times 10^4$  kL
- D)  $9.45 \times 10^{12}$  kL
- E)  $9.45 \times 10^2$  kL

Answer: A

Diff: 2 Var: 6 Page Ref: 2.6

LO: 2.3

Global: G4

44) How many  $\text{cm}^3$  are contained in  $2.67 \times 10^4$   $\text{mm}^3$ ?

- A)  $2.67 \times 10^4$   $\text{cm}^3$
- B)  $2.67 \times 10^1$   $\text{cm}^3$
- C)  $2.67 \times 10^{-10}$   $\text{cm}^3$
- D)  $2.67 \times 10^{20}$   $\text{cm}^3$
- E)  $2.67 \times 10^6$   $\text{cm}^3$

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)  $5.67 \times 10^{-3}$  mL

B)  $5.67 \times 10^1$  mL

C)  $5.67 \times 10^3$  mL

D)  $5.67 \times 10^{-1}$  mL

E)  $5.67 \times 10^2$  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)  $1.2 \times 10^2$  kg Ca

D)  $5.7 \times 10^2$  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  $2.5 \times 10^2$  nm thick, how many square meters will the oil slick cover?

A)  $3.8 \times 10^{-3}$  m<sup>2</sup>

B)  $3.8 \times 10^6$  m<sup>2</sup>

C)  $3.8 \times 10^7$  m<sup>2</sup>

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)  $2.1 \times 10^2$

C) 208

D)  $2 \times 10^2$

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)  $1.26 \times 10^{-4}$

B) 0.126

C) 114

D)  $7.93 \times 10^3$

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<sup>®</sup>, 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)  $3.0 \times 10^5$

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 =  $10^3 \text{ cm}^3$

- A) 3.32
- B) 0.138
- C)  $3.71 \times 10^4$
- 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 =  $10^3 \text{ cm}^3$

- A)  $2.99 \times 10^4$
- B) 111
- C) 32.2
- D)  $3.22 \times 10^7$
- E)  $9.45 \times 10^5$

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  $\text{ft}^2$ ?

(3 ft = 1 yd)

- A)  $83.4 \text{ ft}^2$
- B)  $9.27 \text{ ft}^2$
- C)  $166.8 \text{ ft}^2$
- D)  $250 \text{ ft}^2$
- E)  $70.6 \text{ ft}^2$

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)  $5.90 \times 10^{25}$  Zn atoms

B)  $7.09 \times 10^{21}$  Zn atoms

C)  $8.49 \times 10^{24}$  Zn atoms

D)  $4.27 \times 10^{22}$  Zn atoms

E)  $4.18 \times 10^{24}$  Zn atoms

Answer: C

Diff: 3 Var: 5 Page Ref: 2.8

LO: 2.6

Global: G4

65) Calculate the mass (in g) of  $2.0 \times 10^{24}$  atoms of Hg.

A)  $3.9 \times 10^2$  g

B)  $2.4 \times 10^2$  g

C)  $3.2 \times 10^2$  g

D)  $1.5 \times 10^2$  g

E)  $6.5 \times 10^2$  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)  $1.23 \times 10^{24}$  magnesium atoms

B)  $2.26 \times 10^{24}$  magnesium atoms

C)  $1.61 \times 10^{23}$  magnesium atoms

D)  $5.48 \times 10^{25}$  magnesium atoms

E)  $6.50 \times 10^{25}$  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  $2.16 \times 10^{24}$  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  $\text{SiO}_2$ ?

- A)  $4.52 \times 10^{24}$  atoms
- B)  $1.52 \times 10^{24}$  atoms
- C)  $5.02 \times 10^{23}$  atoms
- D)  $3.01 \times 10^{24}$  atoms
- E)  $7.53 \times 10^{23}$  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  $\text{SiO}_2$ ?

- A)  $4.52 \times 10^{24}$  atoms
- B)  $1.51 \times 10^{24}$  atoms
- C)  $5.02 \times 10^{23}$  atoms
- D)  $3.01 \times 10^{24}$  atoms
- E)  $7.53 \times 10^{23}$  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<sub>2</sub>?

A)  $4.52 \times 10^{24}$  atoms

B)  $1.51 \times 10^{24}$  atoms

C)  $5.02 \times 10^{23}$  atoms

D)  $3.01 \times 10^{24}$  atoms

E)  $7.53 \times 10^{23}$  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<sub>2</sub>?

A)  $4.52 \times 10^{24}$  atoms

B)  $1.51 \times 10^{24}$  atoms

C)  $5.02 \times 10^{23}$  atoms

D)  $3.01 \times 10^{24}$  atoms

E)  $7.53 \times 10^{23}$  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  $6.022 \times 10^{23}$  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  $100^{\circ}\text{C}$ ? (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  
 $6.3 \times 3.25 = \underline{\hspace{2cm}}$

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  
 $(1712 - 1615) \times (8.66 \times 7.66) = \underline{\hspace{2cm}}$

Answer: 6400

Diff: 4 Var: 10 Page Ref: 2.2

LO: 2.1

Global: G4