Chapter01: Chemistry & Measurements

Question Bank

1) Which of the following represents a valid *hypothesis*?

a) Neon does not react with oxygen.

b) Sodium metal reacts violently with water.

c) Lead is soft and malleable.

d) Oxygen is a gas at room temperature.

e) Metals tend to lose electrons

2) Choose the pure substance from the list below.

a) sea water

b) sugar

c) air

d) lemonade

e) milk

3) Choose the heterogeneous mixture from the list below.

a) Gatorade (power drink)

b) chlorine gas

c) black coffee

d) chicken noodle soup

e) carbon (graphite)

4) Which of the following are examples of extensive properties?

a) mass

b) color

c) density

d) temperature

e) taste

5) An example of an element is:

a) Helium, He
b) Glucose, $C_6H_{12}O_6$
c) Table salt, NaCl
d) An oxide of iron, Fe_3O_4
e) Limestone, $CaCO_3$

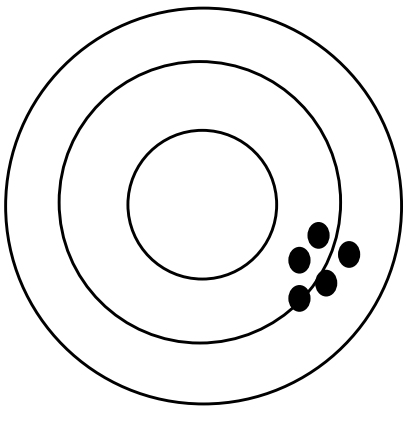
6) Which of the following is considered as a chemical change?

a) Combustion reaction
b) Sublimation of iodine
c) Melting of ice
d) Deposition of gases
e) Freezing of water

7) Describe the following set of experiments in terms of precision and accuracy:

Select one:

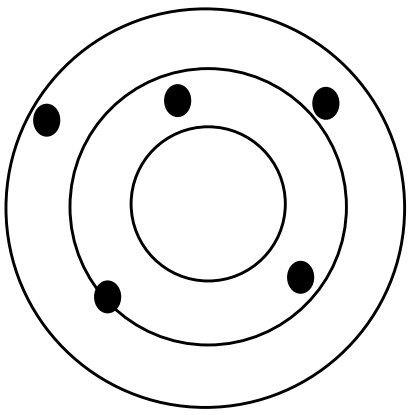
a) None of the statements is correct
b) The experiment is precise but not accurate
c) The experiment is neither accurate nor precise



8) Describe the following set of experiments in terms of precision and accuracy

Select one:

a) The experiment is neither accurate nor precise
b) The experiment is accurate but not precise
c) None of the statements is correct
d) The experiment is both accurate and precise
e) The experiment is precise but not accurate



9) What is the result of this mathematical operation?

$$\frac{4.268 \times 0.82057 \times 373.05}{\left(\frac{744}{76.0}\right) \times 2.688}$$

Select one:

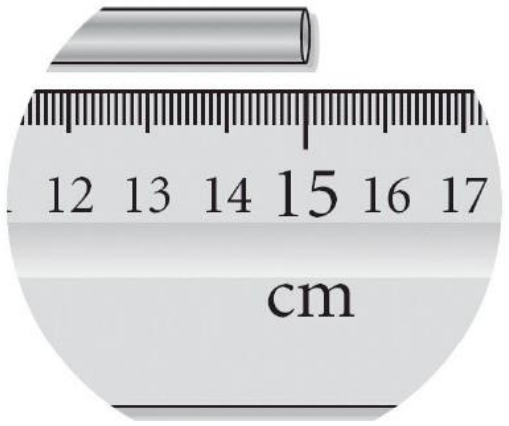
a) 49.7
b) 50.0
c) 49.6
d) 49.65

10) What is the result of this mathematical operation?

78.8680 / (23.5 + 10.0)

a) 24
b) 354
c) 2.36
d) 2.35
e) 6.89

11) 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

12) Round the following number to four significant figures and express the result in standard exponential notation: 229.613

a) 0.2296×10^{4}

b) 229.6

c) 2.296×10^{-2}

d) 2.296×10^{2}

e) 22.96×10^{-1}

13) How many significant figures are there in the answer to the following problem? (9.992 × 3.200) + 0.610 =?

a) one

b) two

c) three

d) four

14) Without using a calculator, solve the following problem:

$$\frac{[(1 \times 10^{4}) \times (1 \times 10^{3})]^{2}}{(1 \times 10^{-9})}$$

a) 1×10^{-4}

b) 1×10^{5}

c) 1×10^{23}

d) 1×10^{32}

15) The SI base units of time and amount of substance, respectively, are:

a) second and mole
b) second and kilogram
c) hour and mole
d) hour and milligram
e) minute and mole

16) The Sl base units of temperature and mass, respectively, are:

a) Fahrenheit and gram
b) Kelvin and gram
c) Fahrenheit and kilogram
d) Kelvin and kilogram
e) Celsius and milligram

17) How many square meters are in a rectangular piece of plastic which measures 32.0 feet by 15.0 feet? (1 m = 39.37 in), (1 ft = 12 in)

Select one:

a) 44.6 m^2
b) 20.8 m^2
c) 37.0 m^2
d) 66.9 m^2
e) 60.7 m^2

18) The speed of an object is 493 mi/hr. Calculate its speed in km/s?
(1 mi = 1.609 km, hr = 3600 s)

a) 3.06×10^2
b) 0.220
c) 0.137
d) 2.86×10^6
e) 1.10×10^6

19) What is the length of 1.85 km in units of µm with the correct number of significant figures?

Select one:

a) 1.85×10^{-9}
b) 1.85×10^{9}
c) 2×10^{-5}
d) 1.85×10^{6}
e) 2×10^{-6}

20) Which of the following is a derived unit?

a) kg
b) g/mol
c) mol
d) kelvin

21) Convert 35°C into Fahrenheit.

22) Convert 65.0 km/hour into mile/min? (1 mile = 1.6 km)

a) 1.73 mile/min
b) 6240 mile/min
c) 0.677 mile/min
d) 2438 mile/min

23) The SI base units of amount of substance and current, respectively, are:

Select one:

a) Mole and milliampere
b) Kilogram and kiloampere
c) Mole and ampere
d) Mole and kilowatt
e) Kilogram and ampere

24) A person with a fever has a temperature of 102.5 °F. What is this temperature in degrees Celsius?

25) A cooling mixture of dry ice and isopropyl alcohol has a temperature of -78°C. What is this temperature in kelvins?

26) Convert:

a) 68°F to degrees Celsius
b) 223°F to degrees Celsius
c) 26°C to degrees Fahrenheit
d) 281°C to degrees Fahrenheit

27) Convert 80 km/hr ➔ m/s.

28) The speed of a car is 48.0 m/h. calculate its speed in km/s.

a) 1.33×10^{-4}
b) 1.33×10^{-5}
c) 1.33×10^{-6}
d) 1.7×10^{5}
e) 1.7×10^{4}

29) A car moving at a speed of 32.0 km/h. What is its speed in m/s?

a) 8.89
b) 6.56
c) 7.22
d) 4.39
e) 5.83

30) An electron is moving at a speed of 6.5 x 10^3 cm/h, what is its speed in km/s?

a) 1.8 x 10^{-2}
b) 1.8 x 10^{-5}
c) 10.8
d) 1.08 x 10^{-3}
e) 1.8 x 10^{-4}

31) Which of the following statements is correct regarding some selected scientific SI-prefixes?

a. A milli is a 1000-fold greater than a Pico

b. A milli is a 100-fold less than a micro

c. A deci is a 10-fold less than a milli

d. A deci is a 10-fold less than a centi

e. A nano is 1000-fold greater than a Pico

32) Which of the following is the smallest volume? (m^3 = 10^3 L) (L = 10^3 cm^3)

a. 59 m^3

b. 1.0 x 10^8 nL

c. 44 cm^3

d. 5.5 x 10^3 mL

e. 1.0 dL

33) All the following are SI base units of measurement, EXCEPT

a) meter

b) gram

c) second

d) kelvin

e) mole

34) Determine the volume of an object that has a mass of 455.6 g and a density of 19.3 g/mL.

a) 87.9 mL

b) 42 .4 mL

c) 18.5 mL

d) 23.6 mL

e) 31.2 mL

35) A barn is an atomic unit of area equal to 10^{-28} m^2. What is the surface area of the Earth expressed in units of barn? Assume the Earth is a sphere with a radius of km (6.371 km) . (The surface area of a sphere is $4\pi r^2$)

a. 5.10×10^{42} barn

b. 5.10×10^{-14} barn

c. 5.10×10^{30} barn

d. 5.10×10^{36} barn

e. 5.10×10^{-20} barn

36) A barleycorn is an English unit of length equal to 1/3 of an inch. What is the height of the Empire State Building (449 m) expressed in barleycorn? (1 meter = 39.37 inch)

a. 4×10^4 barleycorn

b. 5×10^4 barleycorn

c. 3×10^5 barleycorn

d. 6×10^{-1} barleycorn

e. 6×10^3 barleycorn

37) A thin sheet of iridium metal that is 3.12 cm by 5.21 cm has a mass of 87.2 g and a thickness of 2.360 mm, What is the density of iridium?

a) 0.441 g/cm3

b) 0.044 g/cm3

c) 2.260 g/cm3

d) 22.600 g/cm3

e) 3.36 x 103 g/cm3

38) Which of the following is the shortest length?

a. 40 dm

b. 400 mm

c. 0.5 m

d. 5×10^7 pm

e. 55 cm

39) Which of the following is considered as a physical change?

a. Burning of magnesium to produce magnesium oxide

b. Combustion of propane

c. Dissolving sodium bromide in water

d. Decomposition of mercury oxide to form mercury and oxygen

e. Oxidation of mercury to form mercury oxide

40) The answer of the expression rounded to the proper number of significant figures is: (0.005686X12.80184)/ 0.00018

a. 4.0×10^2

b. 404.39

c. 404395901

d. 404.4

e. 404.400

41) Which of the following changes is considered a physical change?

a. Potassium reacts with water

b. Rusting of iron

c. Dissolving sugar in water

d. Burning of wood.

e. Burning of sulfur.

42) Assuming all of the numbers are measured quantities, perform the following arithmetic: setup and report the answer to the correct number of significant figures (9.10 - 8.60) x (265.9154 x 0.002300)

a.0.31

b. 0.30580

c. 0.3

d. 0.306

e. 0.3058

43) Solid is defined as

a. the form of matter characterized by rigidity, and is relatively incompressible and has fixed shape and volume.

b. a material that can be separated by physical means into two or more substances

c. a substance composed of two or more elements chemically combined

d. the form of matter that in costly compressible and will fit into a container of almost any size and shape.

e. the form of matter that is relatively incompressible and has a fixed volume but no fixed shape.

44) The density of a matter is 2.70×10^{4} g/cm^3, what is its density in kg/m^3?

a) 2.70×10^{3} kg/m^3

b) 2.70×10^{4} kg/m^3

c) 2.70×10^{5} kg/m^3

d) 2.70×10^{6} kg/m^3

e) 2.70×10^{7} kg/m^3

45) Acceleration of an object in a force field is 0.098 m/s^2. Express this value in millimeters/$millisecond^2$.

a) 9.8×10^{-3}

b) 9.8×10^{6}

c) 9.8×10^{3}

d) 9.8×10^{-5}

e) 9.8×10^{-9}

46) If matter is uniform throughout and cannot be separated into other substances by physical processes, but can be decomposed into other substances by chemical processes, it is called a (an):

A) heterogeneous mixture

B) element

C) homogeneous mixture

D) Compound

E) Mixture of elements

47) Give the correct number of significant figures for the following mathematical operation

(2.50-0.100)/1.10

A) 2.2

B) 2

C)2.18

D)2.182

E)2.1818

48) Convert 1000. ft/hr to m/s? (1 ft=0.3048 m, 1 hr-3600 s).

A) 0.007060

B) 0.02450

C) 0.08467

D) 0.00106

E) 0.01270

49) A uniform matter that is a combination of two or more substances is considered to be:

A) heterogeneous mixture

B) element

C) mixture of elements

D) compound

E) homogeneous mixture

50) A board that is 9.80 inches long and 7.21 inches wide (1 inch = 2.54 cm) then the area of the board in cm^2 :

A) 456 cm^2

B) 409 cm^2

C) 296 cm^2

D) 329 cm^2

E) 119 cm^2

51) A 1.728 in^3 of a substance has a mass of 36 grams. What is the density of the substance in g/cm^3? (1 inch = 2.54 cm)

a. 21

b. 5.6

c. 30

d. 14

e. 1.3

52)The density of a liquid is 2.65 g/cm^3. Calculate the mass of 0.25 m^3 of this liquid

(in kg).

a. $7.1x10^2$

b. $9.5x10^2$

c. $5.0x10^2$

d. $6.6x10^2$

e. $8.2x\ 10^2$

53) What is the volume of a 2.50 g block of metal whose density is 6.72 g/cm^3?

a. 16.8 cm^3

b. 2.69 cm^3

c. 0.0595 cm^3

d. 0.372 cm^3

e. 1.60 cm^3

54) A car is moving with a velocity of 65 km/hr. How many miles would it travel in 35 sec. (1 mile = 1.61 km)

a. 0.39

b. 1.1

c. 2.5

d. 0.18

e. 0.56

Answers:

1. (e)	2. (b)	3. (d)	4. (a)	5. (a)
6. (a)	7. (b)	8. (a)	9. (c)	10. (d)
11. (d)	12. (d)	13. (d)	14. (c)	15. (a)
16. (d)	17. (a)	18. (b)	19.(b)	20.(b)
21.(95°F)	22.(c)	23.(c)	24.(39.2°C)	25.(195.15 K)
26. a) 20°C	b) 106.1°C	c) 78.8°F	d) 537.8°F	27.(22.22 m/s)
28. (b)	29. (a)	30.(b)	31.(e)	32.(c)
33.(b)	34.(d)	35.(d)	36.(b)	37.(d)
38.(d)	39.(c)	40.(a)	41.(c)	42.(a)
43.(a)	44.(e)	45.(d)	46.(d)	47.(c)
48.(c)	49.(e)	50.(a)	51.(e)	52.(d)
		53.(d)	54.(a)	

ملاحظة: الحل بالتفصيل في الصفحات التالية، كل سؤال حسب رقمه بالترتيب.

Detailed solutions :

Q_1: ال hypothesis هي تفسير مقترح لظاهرة ما ويكون جاي من ملاحظات كيميائية مبنيّة على الأدلة والتي بنخبره عليها هالتعريف هي :

ⓔ Metals tend to lose electrons.

Q_2: Pure substance : elements or compound → ⓑ sugar.

a, c, d and e are mixtures.

Q_3: Heterogeneous mixture: a mixture that consists of substances which remain physically separate → ⓓ chicken noodle soap.

Q_4: Extensive properties: properties that depends on the quantity of the matter → ⓐ Mass.

Q_5 : Helium , He.

Q_6: Chemical change: one or more kinds of matter transformed into a new kind of matter (s) → ⓐ Combustion reaction

كلمة reaction بتدل على وجود تغيّر بطبيعة المواد وتحوّلهم لنواتج مختلفة .

Q_7: precise : النتائج قريبة من بعضها accurate : النتائج قريبة من نقطة الأصل

→ ⓑ The experiment is precise but not accurate.

Q8: (a) The experiment is neither accurate nor precise.

لانه لا النتائج قريبة من نقطة الاصل ولا حتى قريبين من بعض .

Q9: طالما كل العمليات الموجودة بالـ operation هي ضرب وقسمة بنحطها زي ما هي على الآلة الحاسبة بعدها بنشوف كم لازم يكون عدد الـ s.f. و بنقرّب آخر اشي.

$$\frac{4.268 \times 0.82057 \times 373.05}{\left(\frac{744}{76.0}\right) \times 2.688}$$

4 s.f. 5 s.f. 5 s.f. — 3 s.f. — 4 s.f.

→ الاجابة لازم يكون فيها بس 3 s.f.

5 أقل من ↩

= 49.6(4)9... → (49.6)

Q10: $\frac{78.8680}{(23.5 + 10.5)}$

هون الوضع اختلف لانه عنا بالأقواس جمع وبعدها بدنا نقسم

→ بنبدأ بناخ الأقواس وبنراعي انه يكون فيه بس 1 decimal

بعد بنشوف عدد الـ s.f. بالبسط والمقام.

$$\rightarrow \frac{78.8680}{33.5}$$

6 s.f. — 3 s.f.

→ الاجابة لازم يكون فيها بس 3 s.f.

= 2.35(4)2... → (2.35)

Q11: طالما بدنا نقرأ الرقم من المسطرة لطول اشي معيّن لازم نراعي تقسيمات المسطرة لحتى نشوف الخانة اللي فيها شك شو ممكن نحط مكانها كرقم uncertain (رقم أنا مش متأكد من قيمته)

← لحتى نكون دقيقين قدر الإمكان بنمشي على مبدأ الـ sig. fig. لانه بشمل كل الـ certain digits بالإضافة للرقم الأخير او الخانة الأخيرة اللي مشكوك بأمرها.

→ 

15 16

→ (15.00) → أول صفر لانه التقسيمة

الصفر الثاني لانه 0.1 - 1

0.01 - 0.99 جاية بيله uncertain digit الـ

Q_{12}: (4 s.f.) in standard exponential notation (scientific notation)

→ 1 s.f. ⊙ 3 s.f. → $229.613 = 2.296 \times 10^{2}$

dot

Q_{13}: $(9.992 \times 3.200) + 0.610$

4 s.f.

$31.9744 + 0.610 \xrightarrow{\text{2dec.}} 32.5844 = \boxed{32.58}$ 2 decimals, 4 s.f. → (d)

2 decimals 3 decimals

Q_{14}: calculator تستخدم لوجد ما يلي → $\dfrac{((1\times10^{4}) \times (1\times10^{3}))^{2}}{1\times10^{-9}} = \dfrac{(1\times10^{7})^{2}}{1\times10^{-9}} = 1\times10^{14}\times10^{9} = 1$

$= 1 \times 10^{23}$

Q_{15}: (a) second and mole.

Q_{16}: (d) Kelvin and Kilogram → gram مش انتبهوا.

Q_{17}: $32.0\,\text{ft} \times 15.0\,\text{ft} \times \dfrac{(12\,\text{in})^{2}}{\text{ft}^{2}} \times \dfrac{1\,m^{2}}{(39.37\,\text{in})^{2}} = \boxed{44.6\,m^{2}}$

Q_{18}: $493 \dfrac{\text{mi}}{\text{hr}} \times \dfrac{1.609\,\text{Km}}{1\,\text{mi}} \times \dfrac{1\,\text{hr}}{3600\,\text{s}} = \boxed{0.220}$

Q_{19}: $1.85\,\text{Km} \times \dfrac{10^{3}\,m}{1\,\text{Km}} \times \dfrac{1\,\mu m}{10^{-6}\,m} = \boxed{1.85 \times 10^{9}\,\mu m}$

Q_{20}: derived unit : a unit that results from a mathematical combination of SI units → (b) g/mol.

Q_{21}: $35^\circ C \times \frac{9}{5} + 32 = 95^\circ F$.

Q_{22}: $65 \frac{\cancel{Km}}{\cancel{hr}} \times \frac{1 mile}{1.6 \cancel{Km}} \times \frac{1 \cancel{hr}}{60 min} = 0.677 \frac{mile}{min}$.

Q_{23}: (c) Mole and ampere.

Q_{24}: $\frac{5}{9}(102.5 - 32) = 39.2^\circ C$.

Q_{25}: $-78 + 273.15 = 195.15 K$.

Q_{26}: a) $\frac{5}{9}(68 - 32) = 20^\circ C$.

b) $\frac{5}{9}(223 - 32) = 106.1^\circ C$.

c) $26 \times \frac{9}{5} + 32 = 78.8^\circ F$.

d) $281 \times \frac{9}{5} + 32 = 537.8^\circ F$.

Q_{27}: $80 \frac{\cancel{Km}}{\cancel{hr}} \times \frac{10^3 m}{1 \cancel{Km}} \times \frac{1 \cancel{hr}}{3600 s} = 22.2 \frac{m}{s}$

Q_{28}: $48 \frac{m}{h} \times \frac{1Km}{10^3 m} \times \frac{1h}{3600s} = 1.33 \times 10^{-5} \frac{Km}{s}$

Q_{29}: $32 \frac{Km}{h} \times \frac{10^3 m}{1Km} \times \frac{1h}{3600s} = 8.89 \frac{m}{s}$

Q_{30}: $6.5 \times 10^3 \frac{cm}{hr} \times \frac{10^{-2} m}{1 s} \times \frac{1Km}{10^3 m} \times \frac{1hr}{3600s} = 1.8 \times 10^{-5} \frac{Km}{s}$.

Q_{31}: a. A milli is a 10^9 1000-fold greater than pico.

b. A milli is a 10^3 100-fold greater less than micro

c. A deci is a 100 10-fold greater less than a milli

d. A deci is a 10-fold greater less than a centi.

(e.) A nano is 1000-fold greater than a pico. ✓

Q_{32}: a. $59\ m^3 \times \frac{10^3 l}{1 m^3} = 59 \times 10^3 l$

b. $1 \times 10^8\ nl \times \frac{10^{-9}\ l}{1 nl} = 1 \times 10^{-1} l$.

c. $44\ cm^3 \times \frac{1L}{10^3 cm} = 44 \times 10^{-3} l$.

d. $5.5 \times 10^3\ ml \times \frac{1l}{10^3 ml} = 5.5\ l$.

e. $1\ dl \times \frac{0.1 l}{1 dl} = 0.1 l$

لحتى نقدر نحدد the smallest volume
لازم نوحّد الـ units

Q_{33}: gram

Q_{34}: $19.3 \frac{g}{ml} = \frac{455.6\ g}{V} \Rightarrow V = 23.6\ ml$.

Q_{35}: $1\ barn = 10^{-28}\ m^2$

$$r = 6.371\ Km \times \frac{10^3\ m}{1\ Km} = 6.371 \times 10^3\ m$$

$$\rightarrow \text{surface area} = 4\pi (6.371 \times 10^3)^2\ m^2 \times \frac{1\ barn}{10^{-28}\ m^2} = 5.10 \times 10^{36}\ barn.$$

Q_{36}: $barleycon = \frac{1}{3}\ inch$.

$1\ m = 39.37\ inch$

$$\Rightarrow 449\ \cancel{m} \times \frac{39.37\ \cancel{inch}}{1\ \cancel{m}} \times \frac{1\ barleycon}{\frac{1}{3}\ \cancel{inch}}$$

$= 449 \times 39.37 \times 3 = 53031\ barleycon = 5 \times 10^4$

Q_{37}: $V = 3.12\ cm \times 5.21\ cm \times 2.36\ \cancel{cm} \times \frac{1\ cm}{10\ \cancel{cm}} = 3.84\ cm^3$

$\rightarrow d = \frac{m}{V} = \frac{87.2\ g}{3.84\ cm^3} = 22.7\ g/cm^3$ الاجابة اختلفت بسبب التقريب

فمش مشكلة المهم المبدأ صح والرقم قريب جدًا.

Q_{38}: a) $40\ dm \times \frac{10^{-1}\ m}{1\ dm} = 4\ m$

لحتى نحدّد الحلول الأوحد
لازم نوحّد الـ units
لحتى نسهل علينا الطّرق والاختيار.

b) $400\ mm \times \frac{10^{-3}\ m}{1\ mm} = 0.4\ m$

c) $0.5\ m$

d) $5 \times 10^{7}\ pm \times \frac{10^{-12}\ m}{1\ pm} = 5 \times 10^{-5}\ m$

e) $56\ cm \times \frac{10^{-2}\ m}{1\ cm} = 0.55\ m$

Q_{39}: © dissolving sodium bromide in water.
. physical change عملية الإذابة بإعتبار

Q_{40}: $\frac{0.005686 \times 12.80184}{0.00018}$ (4 s.f. × 7 s.f. / 2 s.f.) → الإجابة لازم يكون 2 s.f. فيهابس

→ 4.0×10^{2}

Q_{41}: © dissolving sugar in water — نفس فكرة سؤال 39

Q_{42}: $\frac{(9.10 - 8.60) \rightarrow 2\ \text{decimals}}{(265.9154 \times 0.002300)} = \frac{0.50}{265.9154 \times 0.002300}$ (2 s.f. / 7 s.f. × 4 s.f.) → الإجابة لازم يكون 2 s.f. فيهابس

→ 0.31

Q_{44}: $2.7\times10^{4}\ \frac{g}{cm^3}\times\frac{1\,Kg}{10^3\,g}\times\frac{1\,cm^3}{(10^{-2})^3\,m^3}=2.7\times10^{7}\ Kg/m^3$

Q_{45}: $0.098\ \frac{m}{s^2}\times\frac{1\,mm}{10^{-3}\,m}\times\frac{(10^{-3})^2\,s^2}{1\,ms^2}=9.8\times10^{-5}\ mm/ms^2$

سؤال: 43, 46, 49 بعتمد على حفظكم
وفهمكم للتعريفات

Q_{47}: $\frac{(2.50-0.100)}{1.10}=\frac{2.40}{1.10}=2.18$

(2.50 - 0.100: 2 dec. 3 dec. — 2.40: 3 s.f. — 1.10: 3 s.f.)

Q_{48}: $1000\ \frac{ft}{hr}\times\frac{0.3048\,m}{1\,ft}\times\frac{1\,hr}{3600\,s}=0.08467\ m/s$

Q_{50}: $9.8\ inch\times7.21\ inch\times\frac{(2.54)^2\,cm^2}{1\,inch^2}=456\ cm^2$

Q_{51}: $\frac{36\ g}{1.728\,in^3}\times\frac{1\,in^3}{(2.54)^3\,cm^3}=1.3\ g/cm^3$

Q_{52}:

$$2.65\ \frac{g}{cm^3}=\frac{m}{0.25\,m^3}\Rightarrow m=2.65\ \frac{g}{cm^3}\times0.25\,m^3\times\frac{1\,cm^3}{(10^{-2})^3\,m^3}\times\frac{1\,Kg}{10^3\,g}$$

$$=662.5\ Kg=6.6\times10^{2}\ Kg$$

Q_{53}: $6.72\ \frac{g}{cm^3} = \frac{2.50\ g}{V}$

$\rightarrow V = \frac{2.5}{6.72} = 0.372\ cm^3$

Q_{54}: $velocity = \frac{distance}{time} \rightarrow 65\ \frac{Km}{hr} = \frac{distance}{35\ s}$

$\rightarrow distance\ (mile) = 65\ \frac{Km}{hr} \times 35\ s \times \frac{1\ hr}{3600\ s} \times \frac{1\ mile}{1.61\ Km}$

$= 0.393\ mile$

CHAPTER 1

1. What is the length of 1.85 kilometre in units of micrometre with the correct number of significant figures?

A) $1.85 * 10^{-9}$

B) $1.85 * 10^{9}$

C) $2 * 10^{-5}$

D) $1.85 * 10^{6}$

E) $2 * 10^{-6}$

2. The SI units for length and amount of substance respectively are:

A) meter and gram

B) kilo meter and mole

C) kg and mole

D) meter and mole

3. Which of the following consist of one type of atom only:

A) elements

B) compounds

C) mixtures

D) solids

E) none of the above

4. Convert 40 (ng/cm^3) to (pg/dm^3):

A) $4 * 10^7$

B) $4 * 10^8$

C) $4 * 10^9$

D) $4 * 10^4$

5. The density in (g/ml) of a metal piece that has a volume of 1.68 cm^3 and amass of a 52.8 g is:

A) 10

B) 21

C) 31.4

D) 0.1212

6. How many significant figures are there in 0.3070?

A) 6

B) 5

C) 4

D) 3

7. Which of the following is an intensive property?

A) length

B) area

C) density

D) energy

8. How many significant figures does the result of the following operation contain?

(8.52010 * 7.9)

A) 2

B) 3

C) 4

D) 5

E) 6

9. The result of (3.8621 * 1.5630) – 5.98 is properly written as:

A) 0.06

B) 0.05646

C) 0.056462

D) 0.0565

E) 0.056

10. The agreement of a particular value of measurement with the true value is called:

A) significance

B) certainty

C) precision

D) error

E) accuracy

11. Which of the following represents a chemical change:

A) melting of solid H_2O

B) separation of H_2O molecule into its atoms

C) Evaporation of liquid H_2O

D) Mixing H_2O with oil

E) condensation of H_2O vapor

12. Which of the following is an extensive property?

A) mass

B) temperature

C) boiling point

D) density

13. Convert 77°F to Kelvin scale.

A) 245 K

B) 452 K

C) 298 K

D) 195 K

14. Which of these is an example of a physical change?

A) corrosiveness of acid

B) apples when exposed to air, turn brown

C) lead becomes a liquid when heated to 601°C

D) burning of wood

15. Round the following number (0.0084977) into 4 digits with writing the answer in scientific notation.

A) $8.4977 * 10^{-3}$

B) $8.4977 * 10^{3}$

C) $8.498 * 10^{-3}$

D) $8.497 * 10^{3}$

E) $8.5 * 10^{3}$

16. Perform the following mathematical operation and express the result in the appropriate number of significant figures:

$$((2.085 * 4.1) - 1.13) = ?$$

A) 7.4185

B) 7.419

C) 7.42

D) 7.4

E) 7.0

17. The SI temperature unit is:

A) ^{o}C

B) ^{o}F

C) K

D) both A & B

E) both A & C

18. Accuracy is defined as:

A) a measure of how often an experimental value can be repeated.

B) the closeness of a measured value to the true value.

C) the number of significant figures used in a measurement.

D) none of the above.

19. Which of the following equalities is wrong?

A) 1.35 micrometres = 1.35 * 10^{3} millimetres

B) 7.43 * 10^{-2} nanometre = 7.43 * 10^{-8} millilitres

C) 3.5 kilograms = 3.5 * 10^{6} milligrams

D) 1.89 * 10^{4} decilitter = 1.89 * 10^{3} litter

20. The speed of a car is 32.0 miles/hour. What is its speed in m/s?

(given 1 mile = 1609 m)

A) 14.3

B) 16.1

C) 18.8

D) 20.6

***Principles of Chemistry: A Molecular Approach 2e* (Tro)**
Chapter 1 Matter, Measurement, and Problem Solving

1) Molecules can be described as
A) a mixture of two or more pure substances.
B) a mixture of two or more elements that has a specific ratio between components.
C) two or more atoms chemically joined together.
D) a heterogeneous mixture
E) a homogeneous mixture
Answer: C
Diff: 1 Page Ref: 1.1

2) Give the composition of water.
A) two hydrogen atoms and two oxygen atoms.
B) one hydrogen atom and one oxygen atom.
C) two hydrogen atoms and one oxygen atom.
D) one hydrogen atom and two oxygen atoms.
Answer: C
Diff: 1 Page Ref: 1.1

3) Dalton's Atomic Theory states
A) that all elements have several isotopes.
B) that matter is composed of small indestructible particles.
C) that the properties of matter are determined by the properties of atoms.
D) that energy is neither created nor destroyed during a chemical reaction.
E) that an atom is predominantly empty space.
Answer: B
Diff: 1 Page Ref: 1.2

4) The statement, "In a chemical reaction, matter is neither created nor destroyed" is called
A) The Law of Conservation of Mass
B) Dalton's Atomic Theory
C) The Scientific Method
D) The Law of Multiple Proportions
E) The Law of Definite Proportions
Answer: A
Diff: 1 Page Ref: 1.2

5) Which of the following represents a *hypothesis*?
A) Sodium reacts with water to form sodium hydroxide and hydrogen gas.
B) Nitrogen gas is a fairly inert substance.
C) Nickel has a silvery sheen.
D) When a substance combusts, it combines with air.
E) When wood burns, heat is given off.
Answer: D
Diff: 1 Page Ref: 1.2

6) Which of the following represent a valid *hypothesis*?
A) Neon does not react with oxygen.
B) Sodium metal reacts violently with water.
C) Lead is soft and malleable.
D) Oxygen is a gas at room temperature.
E) Metals tend to lose electrons.
Answer: E
Diff: 1 Page Ref: 1.2

7) The Scientific Method
A) is just a theory.
B) is a strict set of rules and procedures that lead to inarguable fact.
C) isn't used much in modern chemistry.
D) is based on continued observation and experiment.
E) is a framework for proving an argument you know to be true.
Answer: D
Diff: 1 Page Ref: 1.2

8) Which of the following statements is TRUE?
A) A scientific law is fact.
B) Once a theory is constructed, it is considered fact.
C) A hypothesis is speculation that is difficult to test.
D) An observation explains why nature does something.
E) A scientific law summarizes a series of related observations.
Answer: E
Diff: 1 Page Ref: 1.2

9) Identify a liquid.
A) Definite volume and definite shape.
B) Definite volume and no definite shape.
C) Definite shape and no definite volume.
D) No definite shape and no definite volume.
Answer: B
Diff: 1 Page Ref: 1.3

10) Identify dry ice as a solid, liquid, or gas.
A) solid
B) liquid
C) gas
D) both solid and liquid
Answer: A
Diff: 1 Page Ref: 1.3

11) Choose the pure substance from the list below.
A) sea water
B) sugar
C) air
D) lemonade
E) milk
Answer: B
Diff: 1 Page Ref: 1.3

12) Choose the pure substance from the list below.
A) tea
B) a casserole
C) carbon monoxide
D) sugar water
E) pomegranate juice
Answer: C
Diff: 1 Page Ref: 1.3

13) Choose the heterogeneous mixture from the list below.
A) Gatorade
B) chlorine gas
C) black coffee
D) chicken noodle soup
E) carbon (graphite)
Answer: D
Diff: 1 Page Ref: 1.3

14) Choose the homogeneous mixture from the list below.
A) Kool-aid
B) mud
C) ice water
D) salad dressing
E) salsa
Answer: A
Diff: 1 Page Ref: 1.3

15) Which of the following statements about crystalline and amorphous solids is TRUE?
A) A crystalline solid is composed of atoms or molecules arranged with long-range repeating order.
B) An example of a crystalline solid is glass.
C) An example of an amorphous solid is table salt (NaCl).
D) An amorphous solid is composed of atoms or molecules with a majority of its volume empty.
E) All of the above statements are TRUE.
Answer: A
Diff: 1 Page Ref: 1.3

16) Which of the following statements about the phases of matter is TRUE?
A) In both solids and liquids, the atoms or molecules pack closely to one another.
B) Solids are highly compressible.
C) Gaseous substances have long-range repeating order.
D) There is only one type of geometric arrangement that the atoms or molecules in any solid can adopt.
E) Liquids have a large portion of empty volume between molecules.
Answer: A
Diff: 1 Page Ref: 1.3

17) A substance that can't be chemically broken down into simpler substances is considered to be
A) a homogeneous mixture.
B) an element.
C) a heterogeneous mixture.
D) a compound.
E) an electron.
Answer: B
Diff: 1 Page Ref: 1.3

18) A substance composed of 2 or more elements in a fixed, definite proportion is considered
A) a homogeneous mixture.
B) a heterogeneous mixture.
C) a compound.
D) a solution.
E) an alloy.
Answer: C
Diff: 1 Page Ref: 1.3

19) Two or more substances in variable proportions, where the composition is constant throughout are considered
A) a compound.
B) an element.
C) a heterogeneous mixture.
D) a homogeneous mixture.
E) a crystalline solid.
Answer: D
Diff: 1 Page Ref: 1.3

20) Two or more substances in variable proportions, where the composition is variable throughout are considered
A) a solution.
B) a homogeneous mixture.
C) a compound.
D) an amorphous solid..
E) a heterogeneous mixture.
Answer: E
Diff: 1 Page Ref: 1.3

21) Choose the homogeneous mixture from the list below.
A) cola
B) air
C) concrete
D) trail mix
E) blood
Answer: B
Diff: 2 Page Ref: 1.3

22) Which of the following are examples of physical change?
A) sugar is dissolved in water.
B) coffee is brewed.
C) dry ice sublimes.
D) ice (solid water) melts.
E) All of these are examples of physical change.
Answer: E
Diff: 1 Page Ref: 1.4

23) Which of the following are examples of physical change?
A) dew forms on a blade of grass
B) a halloween light stick glows after shaking
C) an egg solidifies during cooking
D) a hydrogen balloon explodes when contacted with a flame
E) None of the above are physical changes.
Answer: A
Diff: 1 Page Ref: 1.4

24) Which of the following are examples of a chemical change?
A) Copper building materials develop a green patina over time.
B) a match burns
C) ethanol evaporates
D) Both A and B are examples of chemical change.
E) All of the above are examples of chemical change.
Answer: D
Diff: 1 Page Ref: 1.4

25) Which of the following are examples of a chemical change?
A) coffee brewing
B) water boiling
C) nails rusting
D) salt dissolves in water
E) None of the above are chemical changes.
Answer: C
Diff: 1 Page Ref: 1.4

26) A physical change
A) occurs when iron rusts.
B) occurs when sugar is heated into caramel.
C) occurs when glucose is converted into energy within your cells.
D) occurs when water is evaporated.
E) occurs when propane is burned for heat.
Answer: D
Diff: 1 Page Ref: 1.4

27) A chemical change
A) occurs when methane gas is burned.
B) occurs when paper is shredded.
C) occurs when water is vaporized.
D) occurs when salt is dissolved in water.
E) occurs when Kool-aid is stirred into water.
Answer: A
Diff: 1 Page Ref: 1.4

28) Which of the following represents a physical property?
A) Sodium metal is extremely reactive with chlorine gas.
B) Mercury is a silver liquid at room temperature.
C) the tendency of aluminum to "rust"
D) the flammability of butane fuel
E) the unreactive nature of argon gas
Answer: B
Diff: 1 Page Ref: 1.4

29) Which of the following represents a chemical property of hydrogen gas?
A) It is gaseous at room temperature.
B) It is less dense than air.
C) It reacts explosively with oxygen.
D) It is colorless.
E) It is tasteless.
Answer: C
Diff: 1 Page Ref: 1.4

30) Which of the following statements about energy is FALSE?
A) Energy can be converted from one type to another.
B) The total energy of a system remains constant.
C) Potential energy is the energy associated with its position or composition.
D) Kinetic energy is the capacity to do work.
E) Systems tend to change in order to lower their potential energy.
Answer: C
Diff: 1 Page Ref: 1.5

31) Define thermal energy.
A) Energy associated with the temperature of an object.
B) Energy associated with the motion of an object.
C) Energy associated with the force of an object.
D) Energy associated with the gravity of an object.
E) Energy associated with the position of an object.
Answer: A
Diff: 1 Page Ref: 1.5

32) All of the following are SI base units of measurement, EXCEPT
A) meter
B) gram
C) second
D) kelvin
E) mole
Answer: B
Diff: 1 Page Ref: 1.6

33) Which of the following are examples of intensive properties?
A) density
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 Page Ref: 1.6

34) Which of the following are examples of extensive properties?
A) mass
B) color
C) density
D) temperature
E) taste
Answer: A
Diff: 1 Page Ref: 1.6

35) If the temperature is 178°F, what is the temperature in degrees celsius?
A) 352°C
B) 451°C
C) 67°C
D) 81.1°C
E) 378°C
Answer: D
Diff: 2 Page Ref: 1.6

36) If a solution has a temperature of 355 K, what is its temperature in degrees celsius?
A) 165°C
B) 628°C
C) 179°C
D) 79°C
E) 82°C
Answer: E
Diff: 2 Page Ref: 1.6

37) The outside air temperature is 30°F, what is the temperature in Kelvin?
A) 303 K
B) 307 K
C) 274 K
D) 272 K
Answer: D
Diff: 3 Page Ref: 1.6

38) If the temperature is 25°C, what is the temperature in °F?
A) 45°F
B) 298.15°F
C) 77°F
D) -3.89°F
Answer: C
Diff: 3 Page Ref: 1.6

39) If the temperature is 25°C, what is the temperature in K?
A) 45 K
B) 298 K
C) 77 K
D) -3.89 K
Answer: B
Diff: 3 Page Ref: 1.6

40) 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 Page Ref: 1.6

41) 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 Page Ref: 1.6

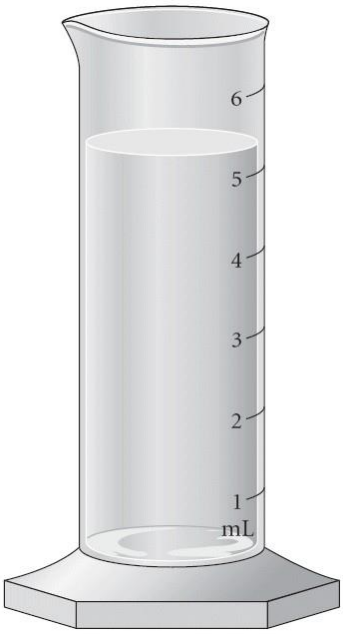
42) Determine the mass of an object that has a volume of 88.6 mL and a density of 9.77 g/mL.
A) 298 g
B) 1100 g
C) 907 g
D) 568 g
E) 866 g
Answer: E
Diff: 2 Page Ref: 1.6

43) A student performs an experiment to determine the density of a sugar solution. She obtains the following results: 4.11 g/mL, 4.81 g/mL, 4.95 g/mL, 3.75 g/mL. If the actual value for the density of the sugar solution is 4.75 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 Page Ref: 1.7

44) A student performs an experiment to determine the density of a sugar solution. She obtains the following results: 4.71 g/mL, 4.73 g/mL, 4.67 g/mL, 4.69 g/mL. If the actual value for the density of the sugar solution is 4.40 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 Page Ref: 1.7

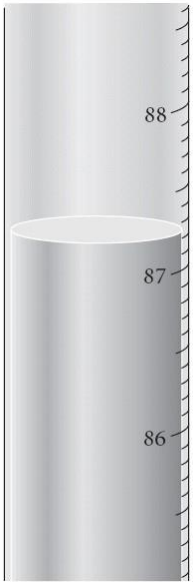
45) Systematic error is defined as
A) error that tends to be too high or too low.
B) error that is too high and too low.
C) error that averages out with repeated trials.
D) error that is random.
Answer: A
Diff: 1 Page Ref: 1.7

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



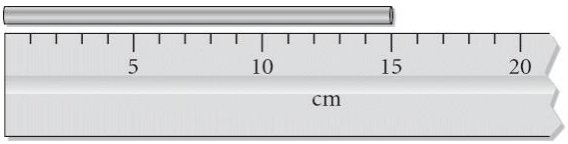
A) 5 mL
B) 5.3 mL
C) 5.32 mL
D) 5.320 mL
E) 5.3200 mL
Answer: B
Diff: 2 Page Ref: 1.7

47) 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 Page Ref: 1.7

48) 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 Page Ref: 1.7

49) 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 Page Ref: 1.7

50) How many significant figures are in 1009.630 mL?
A) 3
B) 4
C) 5
D) 6
E) 7
Answer: E
Diff: 2 Page Ref: 1.7

51) How many significant figures are in 3.408×10^4 m?
A) 3
B) 4
C) 5
D) 7
E) 8
Answer: B
Diff: 2 Page Ref: 1.7

52) How many significant figures are in the measurement, 463.090 m?
A) 2
B) 3
C) 4
D) 5
E) 6
Answer: E
Diff: 2 Page Ref: 1.7

53) How many significant figures are in the measurement, 0.0005890 g?
A) 4
B) 5
C) 6
D) 7
E) 8
Answer: A
Diff: 2 Page Ref: 1.7

54) 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: B
Diff: 2 Page Ref: 1.7

55) 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 Page Ref: 1.7

56) 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: E
Diff: 3 Page Ref: 1.7

57) What wavelength of light would you report in units of nm, if the light had a wavelength of 7.60 x 10^{-10} m?
A) 7.60×10^{-3} nm
B) 7.60×10^{-19} nm
C) 1.32 nm
D) 0.760 nm
E) 760 nm
Answer: D
Diff: 2 Page Ref: 1.8

58) How many mg does a 433 kg sample contain?
A) 4.33×10^{-4} mg
B) 4.33×10^{7} mg
C) 4.33×10^{-3} mg
D) 4.33×10^{6} mg
E) 4.33×10^{8} mg
Answer: E
Diff: 2 Page Ref: 1.8

59) How many kL does a 1.25×10^{8} cL sample contain?
A) 1.25×10^{3} kL
B) 1.25×10^{13} kL
C) 1.25×10^{4} kL
D) 1.25×10^{12} kL
E) 1.25×10^{2} kL
Answer: A
Diff: 2 Page Ref: 1.8

60) How many cm^3 are contained in 3.77×10^{4} mm^3?
A) 3.77×10^{4} cm^3
B) 3.77×10^{1} cm^3
C) 3.77×10^{-10} cm^3
D) 3.77×10^{20} cm^3
E) 3.77×10^{6} cm^3
Answer: B
Diff: 2 Page Ref: 1.8

61) 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 Page Ref: 1.8

62) If a room requires 25.4 square yards of carpeting, what is the area of the floor in units of ft^2? (3 ft = 1 yd)
A) 76.2 ft^2
B) 8.47 ft^2
C) 282 ft^2
D) 229 ft^2
E) 68.6 ft^2
Answer: D
Diff: 3 Page Ref: 1.8

63) A person weighs 77.1 kg. What is their weight in pounds?
A) 154 pounds
B) 170 pounds
C) 35.0 pounds
D) 162 pounds
Answer: B
Diff: 3 Page Ref: 1.8

64) Convert 15.0 km to miles.
A) 24.1 miles
B) 9.32 miles
C) 591 miles
D) 33.1 miles
Answer: B
Diff: 3 Page Ref: 1.8

65) 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 Page Ref: 1.8

66) 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 dollars?
A) $16.79
B) $67.15
C) $4.44
D) $63.54
Answer: D
Diff: 5 Page Ref: 1.8

Match the following.

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

67) kilo
Diff: 1 Page Ref: 1.6

68) centi
Diff: 1 Page Ref: 1.6

69) milli
Diff: 1 Page Ref: 1.6

70) nano
Diff: 1 Page Ref: 1.6

71) micro
Diff: 1 Page Ref: 1.6

Answers: 67) F 68) B 69) A 70) D 71) C

72) Define matter.
Answer: Matter is anything that occupies space and has mass.
Diff: 1 Page Ref: 1.3

73) What is the difference between a physical property and a chemical property? Give an example of each.
Answer: A physical property is something that can be observed without changing the chemical identity of the substance, such as color or scent. A chemical property can only be observed while the chemical identity of a substance is changing, such as sodium metals tendency to react with water to form hydrogen gas and sodium hydroxide.
Diff: 1 Page Ref: 1.4LO: 1.4

74) Define the law of the conservation of energy.
Answer: Energy is neither created or destroyed.
Diff: 1 Page Ref: 1.5
75) A sample of liquid isopropyl alcohol is placed in a sealed container. Some of the volatile isopropyl alcohol vaporizes. Does the mass of the sealed container and its contents change during the vaporization? Explain.
Answer: No. The vaporized isopropyl alcohol is just in a different physical state. It still has mass and therefore the gas plus the remaining liquid and container have the same total mass after the vaporization of some of the isopropyl alcohol.
Diff: 1 Page Ref: 1.6

76) A flash drive contains 4 gigabytes. How many bytes does it contain?
Answer: 4,000,000,000 bytes, 4×10^9 bytes. or 4,292,967,296 byte if someone is computer literate
Diff: 1 Page Ref: 1.8

77) 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 Page Ref: 1.6

78) 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 Page Ref: 1.6

79) 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 Page Ref: 1.7

80) Define precision.
Answer: How close a series of measurements are to one another.
Diff: 1 Page Ref: 1.7

81) Crude oil is an example of
A) a compound.
B) an element.
C) a heterogeneous mixture.
D) a homogeneous mixture.
Answer: C
Diff: 2 Page Ref: 1.3

82) Gasoline is an example of
A) a compound.
B) an element.
C) a heterogeneous mixture.
D) a homogeneous mixture.
Answer: D
Diff: 2 Page Ref: 1.3

83) Gold is an example of
A) a compound.
B) an element.
C) a heterogeneous mixture.
D) a homogeneous mixture.
Answer: B
Diff: 2 Page Ref: 1.3

84) Water is an example of
A) a compound.
B) an element.
C) a heterogeneous mixture.
D) a homogeneous mixture.
Answer: A
Diff: 2 Page Ref: 1.3

85) Which of the following is the **smallest** volume?
A) 44 cm^3
B) 1.0 dL
C) 5.5×10^3 mL
D) 1.0×10^8 nL
Answer: A
Diff: 1 Page Ref: 1.8

86) What symbol is used to represent the factor 10^{-1}?
A) M
B) m
C) μ
D) d
Answer: D
Diff: 1 Page Ref: 1.6

87) The factor 1,000,000 corresponds to which prefix?
A) deka
B) deci
C) mega
D) milli
Answer: C
Diff: 1 Page Ref: 1.6

88) The factor 10^{-3} corresponds to which prefix?
A) deka
B) deci
C) milli
D) centi
Answer: C
Diff: 1 Page Ref: 1.6

89) What decimal power does the abbreviation f represent?
A) 1×10^{6}
B) 1×10^{3}
C) 1×10^{-1}
D) 1×10^{-15}
E) 1×10^{-12}
Answer: D
Diff: 1 Page Ref: 1.6

90) What decimal power does the abbreviation pico 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 Page Ref: 1.6

91) What is the volume (in cm^3) of a 43.6 g piece of metal with a density of 2.71 g/cm^3?
A) 16.1
B) 19.5
C) .425
D) 6.65
E) none of the above
Answer: A
Diff: 2 Page Ref: 1.6

92) A piece of metal ore weighs 8.25 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) 0.312 g/mL
B) 0.633 g/mL
C) 1.58 g/mL
D) 3.21 g/mL
Answer: C
Diff: 2 Page Ref: 1.6

93) A mass of mercury occupies 0.950 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) 0.0553 L
B) 0.0613 L
C) 16.3 L
D) 18.1 L
Answer: C
Diff: 2 Page Ref: 1.6

94) If the melting point of vanadium metal is 1910°C, what is its melting point in Kelvin?
A) 1029 K
B) 1637 K
C) 2183 K
D) 3470 K
Answer: C
Diff: 3 Page Ref: 1.6

95) Which of the following is the **lowest** temperature?
A) 42°C
B) 57°F
C) 318 K
D) All of these temperatures are all equal.
Answer: B
Diff: 3 Page Ref: 1.6

96) How many significant figures are in the measurement 5.34 g?
A) 1
B) 2
C) 4
D) 3
E) 5
Answer: D
Diff: 1 Page Ref: 1.7

97) The correct answer (reported to the proper number of significant figures) to the following is _____.

$11.5 \times 8.78 =$ _____

Answer: 101
Diff: 2 Page Ref: 1.7

98) Round the following number to four significant figures and express the result in standard exponential notation: 229.613
A) 0.2296×10^{3}
B) 229.6
C) 2.296×10^{-2}
D) 2.296×10^{2}
E) 22.96×10^{-1}
Answer: D
Diff: 2 Page Ref: 1.7

99) 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 Page Ref: 1.7

100) How many of the following numbers contain 3 significant figures?
0.408 9.040 0.0400 9.05×10^{24}
A) one
B) two
C) three
D) four
Answer: C
Diff: 2 Page Ref: 1.7

101) How many significant figures are there in the answer to the following problem?
$(9.992 \times 3.200) + 0.610 = ?$
A) one
B) two
C) three
D) four
Answer: C
Diff: 2 Page Ref: 1.7

102) How many significant figures are there in the answer for the following problem?
$56.4 + 0.8822 + 21 = ?$
A) one
B) two
C) three
D) four
Answer: B
Diff: 2 Page Ref: 1.7

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

$$\frac{[(143.7 - 121) \times 2.06]}{0.600}$$

A) one
B) two
C) three
D) four
Answer: B
Diff: 2 Page Ref: 1.7

104) An acetylene molecule contains 2 atoms of carbon. The number 2 represents how many significant figures?
A) one
B) two
C) three
D) infinite
Answer: D
Diff: 2 Page Ref: 1.7

105) Round off 00907506 to four significant figures.
A) 0091
B) 9076
C) 9100
D) 9.075×10^5
Answer: D
Diff: 2 Page Ref: 1.7

106) The width, length, and height of a large, custom-made shipping crate are 1.22 m, 3.22 m, and 0.83 m, respectively. The volume of the box using the correct number of significant figures is _____ m^3.
A) 3.26057
B) 3.3
C) 3.26
D) 3.261
E) 3.2606
Answer: B
Diff: 2 Page Ref: 1.7

107) The correct answer (reported to the proper number of significant figures) to the following is _____.

$(1815 - 1806) \times (9.11 \times 7.92) =$ _____

Answer: 600
Diff: 4 Page Ref: 1.7

108) Without using a calculator, solve the following problem:

$$\frac{[(1 \times 10^4) \times (1 \times 10^3)]^2}{(1 \times 10^{-9})}$$

A) 1×10^{-4}
B) 1×10^5
C) 1×10^{23}
D) 1×10^{32}
Answer: C
Diff: 1 Page Ref: 1.7

109) Without using a calculator, solve the following problem:

$$\frac{[(1 \times 10^{-8}) \times (1 \times 10^5)]^2}{(1 \times 10^6)}$$

A) 1×10^6
B) 1×10^0
C) 1×10^{-12}
D) 1×10^{-18}
Answer: C
Diff: 1 Page Ref: 1.7

110) Which of the following is the greatest mass?
A) 1000 μg
B) 1.000×10^{-4} kg
C) 1.000×10^{-4} cg
D) 1.000×10^{-8} Mg
Answer: B
Diff: 2 Page Ref: 1.8

111) The mass of a proton is 1.67×10^{-27} kg. What is the mass of a proton in picograms?
A) 1.67×10^{-18} pg
B) 1.67×10^{-15} pg
C) 1.67×10^{-12} pg
D) 1.67×10^{-9} pg
Answer: C
Diff: 2 Page Ref: 1.8

112) The mass of a single zinc atom is 1.086×10^{-22} g. This is the same mass as
A) 1.086×10^{-16} mg.
B) 1.086×10^{-25} kg.
C) 1.086×10^{-28} μg.
D) 1.086×10^{-31} ng.
Answer: B
Diff: 2 Page Ref: 1.8

113) A student weighed 30.00 μg of sulfur in the lab. This is the same mass as
A) 3.000×10^{-8} g.
B) 3.000×10^{-5} kg.
C) 3.000×10^{-5} mg.
D) 3.000×10^{4} ng.
Answer: D
Diff: 2 Page Ref: 1.8

114) Convert 4 μm to meters.
A) 4×10^{-9} m
B) 4×10^{-6} m
C) 4×10^{-3} m
D) 4×10^{6} m
Answer: B
Diff: 2 Page Ref: 1.8

115) The average distance between nitrogen and oxygen atoms is 115 pm in a compound called nitric oxide. What is this distance in millimeters?
A) 1.15×10^{-8} mm
B) 1.15×10^{-7} mm
C) 1.15×10^{13} mm
D) 1.15×10^{17} mm
Answer: B
Diff: 2 Page Ref: 1.8

116) The diameter of an atom is approximately 1×10^{-10} m. What is the diameter in millimeters?
A) 1×10^{-16} mm
B) 1×10^{-13} mm
C) 1×10^{-7} mm
D) 1×10^{-4} mm
Answer: C
Diff: 2 Page Ref: 1.8

117) Which of the following volumes is equal to 40 mL?
A) 40 cm^3
B) 40 dm^3
C) 0.40 L
D) 0.00040 kL
Answer: A
Diff: 2 Page Ref: 1.8

118) Convert 10 cm^3 to m^3.
A) 1×10^{-5} m^3
B) 1×10^{-1} m^3
C) 1×10^{3} m^3
D) 1×10^{7} m^3
Answer: A
Diff: 2 Page Ref: 1.8

119) Convert 35 m^3 to liters.
A) 3.5×10^{-2} L
B) 3.5 L
C) 3.5×10^{2} L
D) 3.5×10^{4} L
Answer: D
Diff: 2 Page Ref: 1.8

120) 38.325 lbs = _____ grams. (1 lb = 454 g)
Answer: 17400
Diff: 4 Page Ref: 1.8

121) 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 Page Ref: 1.8

122) A fishing boat accidentally spills 3.0 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) 1.9×10^{-3} m^2
B) 1.9×10^6 m^2
C) 1.9×10^7 m^2
D) none of these
Answer: B
Diff: 5 Page Ref: 1.8

123) 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 10. kilometers in Death Valley.
A) 2.9 L
B) 12 L
C) 30 L
D) 47 L
Answer: A
Diff: 5 Page Ref: 1.8

124) The estimated costs for remodelling the interior of an apartment are: three 1-gallon cans of paint at $13.22 each , two paint brushes at $9.53 each , and $135 for a helper. The total estimated cost with the appropriate significant figures is $_____.
A) 193.72
B) 1.9×10^2
C) 194
D) 2×10^2
E) 193.7
Answer: C
Diff: 5 Page Ref: 1.8

125) How many liters of wine can be held in a wine barrel whose capacity is 26.0 gal?
1 gal = 4 qt = 3.7854 L.
A) 1.46×10^{-4}
B) 0.146
C) 98.4
D) 6.87×10^{3}
E) 6.87
Answer: C
Diff: 5 Page Ref: 1.8

126) 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 115-lb person. 1 lb. = 453.59 g.
A) 24
B) 1,521
C) 1.5
D) 313
E) 3.1×10^{5}
Answer: D
Diff: 5 Page Ref: 1.8

127) 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 11.0 ft x 11.0 ft and has an 10.0 ft ceiling? 1 in. = 2.54 cm (exactly);
1 L = 10^{3} cm^{3}.
A) 3.66
B) 0.152
C) 4.08×10^{4}
D) 0.0962
E) 40.8
Answer: E
Diff: 5 Page Ref: 1.8

128) How many liters of air are in a room that measures 10.0 x 11.0 ft and has an 8.00 ft ceiling?
1 in. = 2.54 cm (exactly); 1 L = 10^{3} cm^{3}.
A) 2.49×10^{4}
B) 92.8
C) 26.8
D) 2.68×10^{7}
E) 8.84×10^{5}
Answer: A
Diff: 5 Page Ref: 1.8