

**General Chemistry, 10e Cdn (Petrucci)**  
**Chapter 2 Atoms and the Atomic Theory**

1) Atoms retain their identity during a chemical reaction.

Answer: TRUE

Diff: 1 Type: TF

Reference: Section 2-1

2) All matter is composed of atoms.

Answer: TRUE

Diff: 1 Type: TF

Reference: Section 2-1

3) Atoms combine in small, whole-numbered ratios.

Answer: TRUE

Diff: 1 Type: TF

Reference: Section 2-1

4) All atoms of a given element are identical.

Answer: FALSE

Diff: 1 Type: TF

Reference: Section 2-1

5) Different ratios of atoms produce different compounds.

Answer: TRUE

Diff: 1 Type: TF

Reference: Section 2-1

6) J. J. Thomson suggested the "plum pudding" model of the atom.

Answer: TRUE

Diff: 2 Type: TF

Reference: Section 2-2

7) Robert Millikan determined the charge on an electron.

Answer: TRUE

Diff: 2 Type: TF

Reference: Section 2-2

8) The number of protons and neutrons in the nucleus of a given atom is called the atomic number.

Answer: FALSE

Diff: 1 Type: TF

Reference: Section 2-3

9) Isotopes have different atomic number ( $Z$ ) but the same mass number ( $A$ ).

Answer: FALSE

Diff: 2 Type: TF

Reference: Section 2-4

10) The vertical columns in the periodic table of the elements are called groups.

Answer: TRUE

Diff: 2 Type: TF

Reference: Section 2-6

11) A 25 g sample of sugar is found to contain 51.4% oxygen by mass. Another 250 g sample of the same sugar is also 51.4% oxygen by mass. This is consistent with the:

A) law of conservation of mass

B) law of constant composition

C) law of multiple proportions

D) first assumption of Dalton's atomic theory

E) second assumption of Dalton's theory

Answer: B

Diff: 1 Type: MC

Reference: Section 2-1

12) When a chemical reaction is carried out in a sealed container, the substances may change in color, temperature, or state, but no change in mass is detected. This is evidence of the:

A) law of conservation of mass

B) law of constant composition

C) law of definite proportions

D) existence of electrons

E) existence of protons

Answer: A

Diff: 1 Type: MC

Reference: Section 2-1

13) When decomposed chemically, 73.0 grams of a sample of HCl produce 71.0 g of Cl<sub>2</sub> and 2.0 g of H<sub>2</sub>, while 34.0 g of a sample of H<sub>2</sub>S produce 32.0 g of S and 2.0 g of H<sub>2</sub>. This is an example of the Law:

A) of Conservation of Mass

B) of Multiple Proportions

C) of Definite Proportions

D)  $E = mc^2$

E) of Simple Whole Numbers

Answer: A

Diff: 1 Type: MC

Reference: Section 2-1

14) Choose the INCORRECT statement from those given below.

A) Atoms retain their identity during a chemical reaction.

B) All matter is composed of atoms.

C) Atoms combine in small, whole-numbered ratios.

D) All atoms of a given element are identical.

E) Different ratios of atoms produce different compounds.

Answer: D

Diff: 1 Type: MC

Reference: Section 2-1

15) A 0.920-gram sample of magnesium is allowed to burn in 0.321 g of oxygen gas. The sole product is magnesium oxide. After the reaction, no oxygen remains and 0.809 g of magnesium oxide has been formed. What mass of magnesium is left unreacted?

- A) 0.210 g
- B) 0.432 g
- C) 1.408 g
- D) 0.111 g
- E) 0.488 g

Answer: B

Diff: 2 Type: MC

Reference: Section 2-1

16) Dalton's atomic theory is based on several assumptions, which are listed below. Which of these assumptions is strictly correct?

- I) All atoms of the same element are identical.
  - II) Atoms are indivisible and unchangeable.
  - III) Chemical changes are the result of the combination, separation, and rearrangement of atoms.
- A) I, II, and III are correct.
  - B) I and III are correct.
  - C) II and III are correct.
  - D) I and II are correct.
  - E) III is correct.

Answer: E

Diff: 3 Type: MC

Reference: Section 2-1

17) Choose the INCORRECT statement.

- A) The Law of Constant Composition is the Law of Definite Proportions.
- B) Objects of like charge repel each other.
- C) Electrons were once known as cathode rays.
- D) Alpha particles are the same mass as a helium nucleus.
- E) Gamma rays are the same as electrons.

Answer: E

Diff: 1 Type: MC

Reference: Section 2-2

18) Which of the following statements is FALSE?

- A) Michael Faraday discovered cathode rays.
- B) J. J. Thomson suggested the "plum pudding" model of the atom.
- C) Robert Millikan determined the charge on an electron.
- D) J. J. Thomson determined the charge-to-mass ratio for electrons.
- E) Michael Faraday determined that cathode rays were the fundamental negatively charged particles and called them electrons.

Answer: E

Diff: 2 Type: MC

Reference: Section 2-2

19) Which of the following would be unaffected by an electric field?

- A) alpha particles
- B) beta particles
- C) gamma rays
- D) protons
- E) electrons

Answer: C

Diff: 2 Type: MC

Reference: Section 2-2

20) Choose the correct statement.

- A) Neutrons have no charge and no mass.
- B) An electron has 1/1837 the mass of a proton.
- C) The atomic number is the total number of protons and neutrons in the nucleus.
- D) The charge of a proton is 1837 times the charge of an electron.
- E) Electrons and protons have about the same mass.

Answer: B

Diff: 1 Type: MC

Reference: Section 2-3

21) Which of the following is a correct feature of the nuclear atom proposed by Rutherford?

- A) All atoms of an element have the same mass.
- B) The atom is mostly empty space.
- C) The number of neutrons and electrons in the atom are equal.
- D) The majority of alpha particles to strike the foil "bounced back."
- E) It is like the "plum pudding" model.

Answer: B

Diff: 1 Type: MC

Reference: Section 2-3

22) Beta particles:

- A) have a mass of 4 and a charge of +2
- B) are like X-rays
- C) are repelled by a positively charged plate
- D) are electrons
- E) have the same mass as a neutron

Answer: D

Diff: 1 Type: MC

Reference: Section 2-3

23) Ernest Rutherford is credited with:

- I) the nuclear model of the atom
- II) the identification of alpha and beta particles
- III) the discovery of protons
- IV) the prediction of a third, neutral, subatomic particle

- A) I and II
- B) I and III
- C) I, II, III
- D) II, III, IV
- E) I, II, III, IV

Answer: E

Diff: 2 Type: MC

Reference: Section 2-3

24) Choose the INCORRECT statement.

- A) Gamma rays are bent by magnetic fields as a ray of positive charges.
- B) Protons and neutrons are found in the nucleus.
- C) Protons and neutrons are close to the same mass.
- D) The atomic number is the proton number.
- E) The mass number is the number of protons plus neutrons.

Answer: A

Diff: 1 Type: MC

Reference: Section 2-4

25) What is the mass number of the most abundant form of oxygen atom?

- A) 15.9994
- B) 8
- C) 16
- D) 24
- E) 32

Answer: C

Diff: 1 Type: MC

Reference: Section 2-4

26) Which of these atoms has the greatest number of neutrons in its nucleus?

- A)  ${}_{25}^{56}\text{Mn}$
- B)  ${}_{27}^{57}\text{Co}$
- C)  ${}_{27}^{55}\text{Fe}$
- D)  ${}_{28}^{56}\text{Ni}$
- E)  ${}_{14}^{28}\text{Si}$

Answer: A

Diff: 1 Type: MC

Reference: Section 2-4

27) Choose the information a mass spectrometer is unable to provide.

- A) the relative abundance of two isotopes of potassium
- B) the number of protons in potassium
- C) the atomic mass of a single isotope of potassium
- D) the mass of a proton
- E) the number of stable isotopes of potassium

Answer: B

Diff: 1 Type: MC

Reference: Section 2-4

28) A species that differs in charge from another atom of the same element:

- I) is called an isotope
- II) has more or less neutrons
- III) has lost or gained electrons
- IV) is called an ion
- V) has the same number of protons

A) I and II

B) I and III

C) II and IV

D) III and IV

E) III, IV, V

Answer: E

Diff: 3 Type: MC

Reference: Section 2-4

29) Which of the following statements is true concerning the masses of individual Cl atoms?

- A) All atoms have a mass of 35.45 u.
- B) Most of the atoms have a mass of 35.45 u.
- C) Some of the atoms have a mass of 35.45 u.
- D) None of the atoms have a mass of 35.45 u.
- E) All atoms have a mass of 17 u.

Answer: D

Diff: 2 Type: MC

Reference: Section 2-5

30) A hypothetical element, E, has two stable isotopes:

$E-46 = 46.046 \text{ u } 64.08\%$        $E-51 = 50.826 \text{ u } 35.92\%$

What is the average atom weight of the element?

A) 47.76 u

B) 48.44 u

C) 49.11 u

D) 48.50 u

E) 47.44 u

Answer: A

Diff: 1 Type: MC

Reference: Section 2-5

31) A hypothetical element, E, has two stable isotopes.

E-38 = 38.012 u 75.68%

E-46 = 45.981 u 24.32%

The element's atomic mass would be closest to which of the elements?

A) K

B) Ar

C) Ca

D) Sc

E) Cl

Answer: B

Diff: 2 Type: MC

Reference: Section 2-5

32) The atomic weight of chlorine is very close to 35.5. This means that:

A) chlorine occurs with a variable number of protons

B) a variable number of electrons gives the fractional weight

C) on the average, an atom of chlorine weighs almost 3 times as much as carbon

D) the actual weight of a chlorine atom is not known very precisely

E) chlorine atoms contain half of a proton

Answer: C

Diff: 2 Type: MC

Reference: Section 2-5

33) An element has 5 stable isotopes. The mass and percentage of each are:

69.9243 20.52%

71.9217 27.43%

72.9234 7.76%

73.9219 36.54%

75.9214 7.76%

The element is which of the following?

A) As

B) Se

C) Ge

D) Ga

E) Zn

Answer: C

Diff: 3 Type: MC

Reference: Section 2-5

34) An element has 5 stable isotopes. The mass and percentage of each are:

89.9043	51.46%
90.9053	11.23%
91.9046	17.11%
93.9061	17.40%
95.9082	2.80%

The element is which of the following?

- A) Nb
- B) Y
- C) Sr
- D) Zr
- E) Rb

Answer: D

Diff: 3 Type: MC

Reference: Section 2-5

35) Which statement below is true?

- A) Metals gain electrons to have a positive charge.
- B) Metals gain electrons to have a negative charge.
- C) Metals lose electrons to have a positive charge.
- D) Nonmetals lose electrons.
- E) Transition metals can gain 2 or more electrons to become metal ions.

Answer: C

Diff: 1 Type: MC

Reference: Section 2-6

36) Groups, or families, on the periodic table are:

- A) vertical columns of elements with similar properties
- B) horizontal rows of elements with increasing atomic numbers
- C) named for the first elements in the series; such as "actinides"
- D) extremely reactive with each other
- E) elements that all occur naturally in the same state

Answer: A

Diff: 1 Type: MC

Reference: Section 2-6

37) Which of the following is a metalloid?

- A) mercury
- B) selenium
- C) bismuth
- D) radium
- E) calcium

Answer: B

Diff: 2 Type: MC

Reference: Section 2-6



38) What is the mass in grams of 1 atom of sulfur (atomic mass = 32.066)?

- A)  $1.661 \times 10^{-24}$  g
- B)  $1.931 \times 10^{-25}$  g
- C)  $5.325 \times 10^{-23}$  g
- D)  $5.179 \times 10^{-26}$  g
- E)  $5.989 \times 10^{-23}$  g

Answer: C

Diff: 2 Type: MC

Reference: Section 2-7

39) 31.0 grams of the element phosphorus contain:

- A)  $6.02 \times 10^{23}$  P<sub>4</sub> molecules
- B)  $31.0 \times (6.02 \times 10^{23})$  P atoms
- C)  $6.02 \times 10^{23}$  P atoms
- D) 31.0 P atoms
- E) 31.0 moles of P

Answer: C

Diff: 1 Type: MC

Reference: Section 2-8

40) How many arsenic atoms are in 5.21 g of arsenic?

- A) 0.0695 atoms
- B)  $9.51 \times 10^{22}$  atoms
- C)  $3.14 \times 10^{24}$  atoms
- D)  $2.10 \times 10^{22}$  atoms
- E)  $4.19 \times 10^{22}$  atoms

Answer: E

Diff: 1 Type: MC

Reference: Section 2-8

41) A cubic centimeter of lead weighs 11.35 g. How many atoms are in the block?

- A)  $6.8 \times 10^{24}$  atoms
- B)  $2.4 \times 10^{23}$  atoms
- C)  $3.3 \times 10^{22}$  atoms
- D)  $5.3 \times 10^{22}$  atoms
- E)  $1.1 \times 10^{25}$  atoms

Answer: C

Diff: 1 Type: MC

Reference: Section 2-8

42) How many moles are represented by  $2.5 \times 10^{15}$  Na atoms?

- A)  $3.8 \times 10^{-10}$  mol
- B)  $1.8 \times 10^{-10}$  mol
- C)  $1.5 \times 10^{39}$  mol
- D)  $4.2 \times 10^{-9}$  mol
- E)  $1.1 \times 10^{14}$  mol

Answer: D

Diff: 1 Type: MC

Reference: Section 2-8

43) The natural abundance of calcium in the earth's crust is 3.4% by mass. How many calcium atoms are present in a 1.50 g sample of the earth's crust?

- A)  $6.6 \times 10^{23}$  atoms
- B)  $3.1 \times 10^{22}$  atoms
- C)  $7.7 \times 10^{20}$  atoms
- D)  $7.7 \times 10^{22}$  atoms
- E)  $5.1 \times 10^{20}$  atoms

Answer: C

Diff: 2 Type: MC

Reference: Section 2-8

44) 57.7 g Ni contains how many atoms?

- A)  $6.13 \times 10^{23}$  atoms
- B)  $3.47 \times 10^{23}$  atoms
- C)  $5.92 \times 10^{23}$  atoms
- D)  $1.24 \times 10^{24}$  atoms
- E) 0.983 atoms

Answer: C

Diff: 2 Type: MC

Reference: Section 2-8

45) How many atoms of silicon are contained in  $8.50 \times 10^{-5}$  grams?

- A)  $1.44 \times 10^{23}$  atoms
- B)  $1.82 \times 10^{18}$  atoms
- C)  $5.02 \times 10^{30}$  atoms
- D)  $5.02 \times 10^{18}$  atoms
- E)  $1.82 \times 10^{20}$  atoms

Answer: B

Diff: 2 Type: MC

Reference: Section 2-8

46) If the density of lead is  $11.34 \text{ g/cm}^3$ , how many atoms are in a piece of lead that is 2.00 cm wide, 1.00 m long, and 2.00 mm thick?

- A)  $1.32 \times 10^{24}$  atoms
- B)  $1.16 \times 10^{23}$  atoms
- C)  $1.32 \times 10^{23}$  atoms
- D)  $1.16 \times 10^{22}$  atoms
- E)  $6.60 \times 10^{23}$  atoms

Answer: A

Diff: 3 Type: MC

Reference: Section 2-8

47) How many atoms of rubidium-85 are in 87.2 g of rubidium? Rubidium-85 is 72.2 % abundant.

- A)  $5.16 \times 10^{46}$  atoms
- B)  $4.44 \times 10^{23}$  atoms
- C)  $8.51 \times 10^{23}$  atoms
- D)  $6.14 \times 10^{22}$  atoms
- E)  $1.02 \times 10^{24}$  atoms

Answer: B

Diff: 3 Type: MC

Reference: Section 2-8

48) How many atoms of hydrogen are present in 1.5 lb of hydrogen peroxide, which is 5.93% hydrogen? (1 lb = 454 grams)

- A)  $2.4 \times 10^{25}$  atoms
- B)  $1.21 \times 10^{25}$  atoms
- C)  $1.2 \times 10^{25}$  atoms
- D)  $2.41 \times 10^{25}$  atoms
- E)  $1.2 \times 10^{20}$  atoms

Answer: A

Diff: 3 Type: MC

Reference: Section 2-8

49) How many atoms of sulfur are in 280 g of a 50% by mass  $\text{H}_2\text{SO}_4$  solution?

- A)  $8.6 \times 10^{25}$  atoms
- B)  $8.6 \times 10^{23}$  atoms
- C)  $8.0 \times 10^{25}$  atoms
- D)  $8.0 \times 10^{23}$  atoms
- E)  $2.8 \times 10^{29}$  atoms

Answer: B

Diff: 3 Type: MC

Reference: Section 2-8

50) How many Cu atoms are present in a 75.0 cm length of 20-gauge copper wire? A 20-gauge wire has a diameter of 0.03196 in. Copper's density is 8.92 g/cm<sup>3</sup>.

A)  $1.31 \times 10^{21}$

B)  $3.28 \times 10^{22}$

C)  $8.08 \times 10^{21}$

D)  $1.04 \times 10^{22}$

E)  $2.08 \times 10^{22}$

Answer: B

Diff: 3 Type: MC

Reference: Section 2-8

51) How many atoms of lead are required to cover a 33.0 cm by 45.0 cm area with a sheet of lead that is 0.140 mm thick? The density of lead is 11.35 g/cm<sup>3</sup>.

A)  $6.86 \times 10^{23}$

B)  $2.29 \times 10^{26}$

C)  $2.29 \times 10^{25}$

D)  $6.86 \times 10^{22}$

E)  $1.42 \times 10^{26}$

Answer: A

Diff: 3 Type: MC

Reference: Section 2-8

52) A 3.214 g sample of magnesium reacts with 8.416 g of bromine. The only product is magnesium bromide. If 1.934 g of magnesium is left unreacted, how much magnesium bromide is formed?

A) 1.280 g

B) 5.202 g

C) 9.696 g

D) 7.136 g

E) 3.268 g

Answer: C

Diff: 2 Type: BI

Reference: Section 2-1

53) What mass of magnesium is necessary to make 10.5 g of magnesium bromide if 1.04 g of magnesium makes 7.88 g of magnesium bromide?

A) 1.39 g

B) 79.9 g

C) 1.58 g

D) 3.66 g

E) 7.89 g

Answer: A

Diff: 2 Type: BI

Reference: Section 2-1

54) A sample of pure carbon weighing 1.48 g was burned in an excess of air. The mass of carbon dioxide, the sole product, was 5.42 g. In a second experiment, 11.62 g of carbon dioxide was obtained. What mass of carbon was burned in the second experiment?

- A) 42.6 g
- B) 3.17 g
- C) 3.54 g
- D) 0.866 g
- E) 11.6 g

Answer: B

Diff: 2 Type: BI

Reference: Section 2-1

55) A 1.4 g sample of calcium is reacted with 3.2 g of oxygen. The only product after the reaction is 1.96 g of CaO. How many grams of oxygen remains unreacted?

- A) 0.56 g
- B) 0.224 g
- C) 2.64 g
- D) 0.264 g
- E) 0.203 g

Answer: C

Diff: 2 Type: BI

Reference: Section 2-1

56) A certain mass of nickel reacts with sulphur to produce 2.83 g of NiS. The same mass of nickel reacts completely with 0.5 g of oxygen to produce 2.33 g of NiO. How many grams of sulfur reacted in the first reaction?

- A) 0.5 g
- B) 1 g
- C) 1.5 g
- D)  $10^{-1}$  g
- E) 1.25 g

Answer: B

Diff: 2 Type: BI

Reference: Section 2-1

57) Write the symbol for the radioactive isotope phosphorus-32.

- A)  ${}_{15}^{32}\text{P}$
- B)  ${}_{32}^{15}\text{Ge}$
- C)  ${}_{15}^{15}\text{P}$
- D)  ${}_{15}^{17}\text{P}$
- E)  ${}_{32}^{32}\text{Ge}$

Answer: A

Diff: 1 Type: BI

Reference: Section 2-4

58) The total number of neutrons in an  $^{192}\text{Ir}^{2+}$  cation is \_\_\_\_\_.

- A) 115
- B) 77
- C) 192
- D) 75
- E) 269

Answer: A

Diff: 1 Type: BI

Reference: Section 2-4

59) With mass spectral data the ratio of the mass of  $^{14}\text{N}/^{12}\text{C}$  was found to be 1.167. What is the mass of the  $^{14}\text{N}$  atom?

- A) 14.017 u
- B) 10.292 u
- C) 14.004 u
- D) 17.000 u
- E) 14.007 u

Answer: C

Diff: 1 Type: BI

Reference: Section 2-4

60) Which is the proper chemical symbol for tungsten?

- A) Te
- B) Ti
- C) Tm
- D) W
- E) Tc

Answer: D

Diff: 1 Type: BI

Reference: Section 2-4

61) The total numbers of neutrons, protons, and electrons in  $^{31}\text{P}^{3-}$  are:

- A) 15 neutrons, 31 protons, 15 electrons
- B) 16 neutrons, 15 protons, 18 electrons
- C) 31 neutrons, 15 protons, 18 electrons
- D) 15 neutrons, 16 protons, 12 electrons
- E) 16 neutrons, 16 protons, 18 electrons

Answer: B

Diff: 1 Type: BI

Reference: Section 2-4

62) The total numbers of neutrons, protons, and electrons in  $^{35}\text{Cl}^-$  are \_\_\_\_\_.

- A) 17 neutrons, 35 protons, 36 electrons
- B) 35 neutrons, 17 protons, 18 electrons
- C) 18 neutrons, 17 protons, 16 electrons
- D) 18 neutrons, 17 protons, 18 electrons
- E) 17 neutrons, 17 protons, 17 electrons

Answer: D

Diff: 1 Type: BI

Reference: Section 2-4

63) The total numbers of neutrons, protons, and electrons in  $^{138}\text{Ba}^{2+}$  are \_\_\_\_\_.

- A) 138 neutrons, 56 protons, 54 electrons
- B) 82 neutrons, 56 protons, 54 electrons
- C) 56 neutrons, 82 protons, 80 electrons
- D) 82 neutrons, 56 protons, 58 electrons
- E) 82 neutrons, 82 protons, 82 electrons

Answer: B

Diff: 1 Type: BI

Reference: Section 2-4

64) A cation has 13 neutrons and 10 electrons. If it has a charge of +1, what is its correct symbol?

- A)  $^{13}_{11}\text{Na}^+$
- B)  $^{24}_{11}\text{Na}^+$
- C)  $^{26}_{13}\text{Al}^+$
- D)  $^{23}_{10}\text{Ne}^+$
- E)  $^{13}_{10}\text{Na}^+$

Answer: B

Diff: 1 Type: BI

Reference: Section 2-4

65) A cation has 28 neutrons and 21 electrons. If it has a +3 charge, what is its correct symbol?

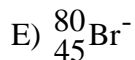
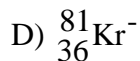
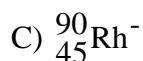
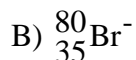
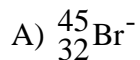
- A)  $^{24}_{28}\text{Ni}^{3+}$
- B)  $^{28}_{21}\text{Sc}^{3+}$
- C)  $^{28}_{24}\text{Cr}^{3+}$
- D)  $^{52}_{24}\text{Cr}^{3+}$
- E)  $^{49}_{21}\text{Sc}^{3+}$

Answer: D

Diff: 1 Type: BI

Reference: Section 2-4

66) An anion has 45 neutrons and 36 electrons. If it has a -1 charge, what is its correct symbol?



Answer: B

Diff: 1 Type: BI

Reference: Section 2-4

67) How many protons, neutrons, and electrons are in  ${}_{12}^{24}\text{Mg}^{2+}$  ?

A) 12 protons, 10 electrons, 12 neutrons

B) 12 protons, 12 electrons, 12 neutrons

C) 12 protons, 12 electrons, 24 neutrons

D) 24 protons, 10 electrons, 12 neutrons

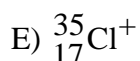
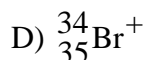
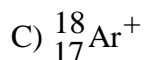
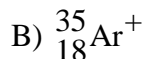
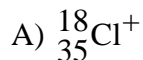
E) 10 protons, 12 electrons, 24 neutrons

Answer: A

Diff: 1 Type: BI

Reference: Section 2-4

68) Write the appropriate symbol for the species containing 18 neutrons, 17 protons, and 16 electrons.



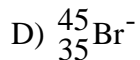
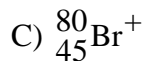
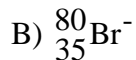
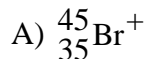
Answer: E

Diff: 1 Type: BI

Reference: Section 2-4



69) What is the proper  $\frac{A}{Z}E$  notation for an ion having 35 protons, 36 electrons and 45 neutrons?



Answer: B

Diff: 2 Type: BI

Reference: Section 2-4

70) Write the symbol for the most common ion formed by sulfur.

A) S<sup>-1</sup>

B) S<sup>-2</sup>

C) S<sup>+1</sup>

D) S<sup>+2</sup>

E) requires experimental data

Answer: B

Diff: 2 Type: BI

Reference: Section 2-4

71) An isotope with mass number 81 has eleven more neutrons than protons. This is an isotope of what element?

A) Tl

B) Yb

C) Zr

D) Br

E) Nb

Answer: D

Diff: 2 Type: BI

Reference: Section 2-4

72) The following ratios of masses were obtained with a mass spectrometer:

$${}_{17}^{35}\text{Cl}/{}_{9}^{19}\text{F} = 1.8406, \quad {}_{9}^{19}\text{F}/{}_{6}^{12}\text{C} = 1.5832$$

What is the mass of a  ${}_{17}^{35}\text{Cl}$  atom in atomic mass units?

A) 35.45 u

B) 36.36 u

C) 13.95 u

D) 35.00 u

E) 34.97 u

Answer: E

Diff: 2 Type: BI

Reference: Section 2-4

73) Copper occurs in an isotopic mixture of 69.09%  $^{63}\text{Cu}$  (mass = 62.93 u per atom) and 30.91%  $^{65}\text{Cu}$  (mass = 64.93 u per atom). What is the average atomic mass of copper?

- A) 64.00 u
- B) 63.55 u
- C) 63.45 u
- D) 64.31 u
- E) 29.00 u

Answer: B

Diff: 2 Type: BI

Reference: Section 2-5

74) There are two stable isotopes of supposium (Su).

Su-191 = 190.9609 u (27.30%) Su-194 = 193.9633 u (72.70%)

Compute the atomic mass of supposium.

- A) 190.9 u
- B) 194.0 u
- C) 191.8 u
- D) 192.5 u
- E) 193.1 u

Answer: E

Diff: 1 Type: BI

Reference: Section 2-5

75) Which is the more abundant isotope, Cl-35 or Cl-37?

- A) The two isotopes are equal in abundance.
- B) Cl-37
- C) Cl-35
- D) A third unstable isotope is more abundant.
- E) Cl-17

Answer: C

Diff: 1 Type: BI

Reference: Section 2-5

76) A new element is discovered. It has two isotopes. The relative abundance of the isotopes and their masses are 18% isotope 1, mass 350.0 u and 82% isotope 2, mass 352.0 u. What is the atomic mass of the element?

- A) 351.6
- B) 351.0
- C) 350.4
- D) 352.0
- E) 350.0

Answer: A

Diff: 2 Type: BI

Reference: Section 2-5

77) Rubidium possesses two stable forms and has an average mass of 85.5.

$^{85}\text{Rb}$  has a mass of 84.9 and a percent abundance of 72.2%. What is the mass of the other form of Rb?

- A) 86.1 u
- B) 85.7 u
- C) 88.3 u
- D) 87.1 u
- E) 89.4 u

Answer: D

Diff: 2 Type: BI

Reference: Section 2-5

78) The three naturally occurring isotopes of magnesium are  $^{24}\text{Mg}$  (23.985042 u, 78.99%),  $^{25}\text{Mg}$  (24.985837, 10.00%), and  $^{26}\text{Mg}$ . What is the atomic mass of  $^{26}\text{Mg}$ ?

- A) 25.98 u
- B) 48.67 u
- C) 23.94 u
- D) 26.43 u
- E) 24.31 u

Answer: A

Diff: 2 Type: BI

Reference: Section 2-5

79) The average atomic mass of B is 10.80 u. Boron has only two stable forms  $^{10}_5\text{B}$  (10.00 u) and  $^{11}_5\text{B}$  (11.00 u). What is the natural percent abundance of  $^{11}_5\text{B}$  ?

- A) 80%
- B) 20%
- C) 1.0%
- D) 3.8%
- E) 75%

Answer: A

Diff: 2 Type: BI

Reference: Section 2-5

80) Silver possesses two stable isotopes:  $^{107}\text{Ag}$  (106.90 u) and  $^{109}\text{Ag}$  (108.90 u). If the average atomic mass of Ag is 107.87 u, what is the percent abundance of  $^{107}\text{Ag}$ ?

- A) 48.5%
- B) 50.0%
- C) 51.5%
- D) 46.3%
- E) 53.8%

Answer: C

Diff: 2 Type: BI

Reference: Section 2-5

81) A certain element contains eleven atoms of mass 95.952 u for every four atoms of mass 98.949 u. Compute the average atomic weight of this element.

- A) 97.451 u
- B) 96.754 u
- C) 98.150 u
- D) 105.16 u
- E) 96.952 u

Answer: B

Diff: 3 Type: BI

Reference: Section 2-5

82) Calculate the percent abundance of the two isotopes of a fictional element, georgium, if it has an average atomic mass of 291.23 u.

Go-290 289.86 u

Go-292 292.07 u

- A) Go-290, 38% and Go-292, 62%
- B) Go-290, 62% and Go-292, 38%
- C) Go-290, 42% and Go-292, 58%
- D) Go-290, 58% and Go-292, 42%
- E) cannot be determined

Answer: A

Diff: 3 Type: BI

Reference: Section 2-5

83) Magnesium has 3 stable isotopes with masses of 23.98504, 24.98584, and 25.98259 respectively. Mg-25 is 10.13%. What are the percentages of the other two isotopes?

- A) 78.9% and 10.9%
- B) 50% and 50%
- C) 44.9% and 44.9%
- D) 83.6% and 16.4%
- E) 78.9% and 21.1%

Answer: A

Diff: 3 Type: BI

Reference: Section 2-5

84) Lead has 4 stable isotopes with masses of 203.973 (1.48%), 205.9745 (23.6%), 206.9759, and 207.9766 respectively. What are the percentages of the last two isotopes?

- A) 77% and 23%
- B) 50% and 50%
- C) 37% and 38%
- D) 64% and 11%
- E) 24% and 50%

Answer: E

Diff: 3 Type: BI

Reference: Section 2-5

85) Iodine is a member of the family called \_\_\_\_\_.

- A) metals
- B) metalloids
- C) noble gasses
- D) halogens
- E) actinides

Answer: D

Diff: 1 Type: BI

Reference: Section 2-6

86) Sodium is a member of the family called \_\_\_\_\_.

- A) alkali metals
- B) earth alkali metals
- C) metalloids
- D) actinide metals
- E) transition metals

Answer: A

Diff: 2 Type: BI

Reference: Section 2-6

87) Main group elements are those in groups \_\_\_\_\_.

- A) 1 and 2
- B) 1, 2, and 13 to 18
- C) 13 to 18
- D) 1 and 18
- E) 3 to 12

Answer: B

Diff: 2 Type: BI

Reference: Section 2-6

88) What is the average mass in kilograms of one atom of arsenic?

- A) 74.922 kg
- B) 0.074922 kg
- C)  $5.48 \times 10^{-23}$  kg
- D)  $1.24 \times 10^{-25}$  kg
- E)  $1.24 \times 10^{-22}$  kg

Answer: D

Diff: 2 Type: BI

Reference: Section 2-7

89) What is the mass of a sample containing 1.2 moles of Ni?

- A) 49 g
- B) 59 g
- C) 34 g
- D) 61 g
- E) 70 g

Answer: E

Diff: 1 Type: BI

Reference: Section 2-8

90) How many moles of Fe is present in 1.2 grams of Fe?

- A)  $2.15 \times 10^{-2}$  mol
- B) 0.215 mol
- C)  $4.30 \times 10^{-2}$  mol
- D)  $2.15 \times 10^{-1}$  mol
- E) 0.430 mol

Answer: A

Diff: 2 Type: BI

Reference: Section 2-8

91) 24.9 g of Mn is equivalent to how many moles of Mn?

- A) 2.21 moles
- B) 0.453 moles
- C) 0.461 moles
- D) 0.996 moles
- E) 1.00 mole

Answer: B

Diff: 1 Type: BI

Reference: Section 2-8

92) How many moles of lead are present in a piece of lead with a volume of  $0.600 \text{ cm}^3$ ? The density of Pb is  $11.34 \text{ g/cm}^3$ .

- A) 6.80
- B) 0.0328
- C) 11.0
- D) 0.547
- E) 0.0912

Answer: B

Diff: 2 Type: BI

Reference: Section 2-8

93) What is the density ( $\text{g/cm}^3$ ) of tin if  $4.56 \times 10^{20}$  atoms make a cube 2.31 mm on each side?

A) 0.00729

B) 169

C) 3.28

D) 0.0142

E) 7.29

Answer: E

Diff: 3 Type: BI

Reference: Section 2-8

94) What is the isotopic atomic mass of an isotope if  $9.7023 \times 10^{22}$  atoms weighs 4.0256 g?

A) 0.64858

B) 24.305

C) 24.986

D) 13.728

E) 4.0256

Answer: C

Diff: 3 Type: BI

Reference: Section 2-8

95) What is the atomic weight of an element if 4.00 grams of it contain  $2.98 \times 10^{22}$  atoms?

A) 20.2 u

B) 80.8 u

C) 19.7 u

D) 8.08 u

E) 2.02 u

Answer: B

Diff: 3 Type: BI

Reference: Section 2-8

96) A solution contains 12.5% NaCl by mass. What mass of solution is required to obtain  $1.0 \times 10^{23}$  Na atoms?

A) 0.013 g

B) 30 g

C) 1.2 g

D) 95 g

E) 78 g

Answer: E

Diff: 3 Type: BI

Reference: Section 2-8

97) A lead cube that is 3.00 cm on each side contains  $8.91 \times 10^{23}$  atoms. What is the density of this cube in  $\text{g/cm}^3$ ?

- A) 34.1
- B) 11.4
- C) 0.0550
- D) 0.990
- E) 26.7

Answer: B

Diff: 3 Type: BI

Reference: Section 2-8

98) Lead-204 has a relative abundance of 1.48%. What size block of lead (in cubic centimeters) will contain  $8.34 \times 10^{21}$  atoms of lead-204? The density of lead is  $11.35 \text{ g/cm}^3$ .

- A)  $3.75 \times 10^{-3}$
- B) 0.253
- C) 194
- D) 17.1
- E) 16.8

Answer: D

Diff: 3 Type: BI

Reference: Section 2-8

99) Lead-206 has a relative abundance of 23.6%. What size block of lead (in cubic centimeters) will contain  $8.34 \times 10^{21}$  atoms of lead-206? The density of lead is  $11.35 \text{ g/cm}^3$ .

- A) 0.0107
- B) 0.253
- C) 1.07
- D) 0.330
- E) 12.1

Answer: C

Diff: 3 Type: BI

Reference: Section 2-8

100) What is the thickness in mm of the sheet  $75.0 \text{ cm} \times 35.0 \text{ cm}$  formed by  $7.88 \times 10^{23}$  atoms of lead? The density of lead is  $11.35 \text{ g/cm}^3$ .

- A) 9.10
- B) 0.0910
- C)  $1.88 \times 10^4$
- D) 0.273
- E) 2.73

Answer: B

Diff: 3 Type: BI

Reference: Section 2-8