

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

1) Which element would have physical and chemical properties similar to chlorine?

- A) S B) Br C) Mg D) Ar E) O

Answer: B

2) Heating the mixture of reactants is sometimes necessary to bring about a chemical reaction and what Greek letter is placed above the yield arrow to denote the heating process?

- A) ϵ B) β C) Δ D) Ω E) γ

Answer: C

3) What is the mass percent composition of oxygen in phosphoric acid (H_3PO_4)?

- A) 45.8% B) 52.5% C) 65.3% D) 72.5% E) 50.4%

Answer: C

4) Which of the following polyatomic ions has a positive charge?

- A) nitrite
B) hydroxide
C) hydrogen carbonate
D) cyanide
E) ammonium

Answer: E

5) The reactant that is consumed in a chemical reaction that limits the amount of products formed is called:

- A) limiting reagent
B) catalyst
C) unit
D) mole
E) excess reagent

Answer: A

6) The molar mass of a substance is expressed as the unit:

- A) g/L B) mole/L C) g/mole D) mg/mole E) kg/L

Answer: C

7) What is the molarity or molar concentration of a solution in which 333g potassium hydrogen carbonate is dissolved in enough water to make 10.0 liter of solution?

- A) 0.666 M B) 0.234M C) 0.333 M D) 0.33 M E) 0.110 M

Answer: C

8) What is the definition of a compound in Dalton's Atomic Theory?

- A) All compounds are alike in mass and other properties.
B) All compounds contain the same numbers of protons and neutrons.
C) Compounds are composed of divisible small particles.
D) The relative numbers of each kind of atom in a compound form a simple ratio.
E) Compounds are formed when atoms of different elements unite in the same proportions.

Answer: D

9) What is the SI base unit for the amount of substance?

- A) mole B) kilogram C) second D) ampere E) meter

Answer: A

10) How many grams of CaCO_3 are consumed when the solid CaCO_3 interacts with 225 mL of 3.25 M hydrochloric acid (HCl) to form $\text{CaCl}_2(\text{aq})$, $\text{H}_2\text{O}(\text{l})$, and $\text{CO}_2(\text{g})$?

- A) 30.2 g B) 36.6 g C) 20.6 g D) 18.4 g E) 28.4 g

Answer: B

11) In an atom, the nucleus contains;

- A) all the electrons and protons
B) only neutrons
C) an equal number of protons and electrons
D) only protons
E) all the neutrons and protons

Answer: E

12) Compounds that have the same molecular formula but different structural formula are called:

- A) isoelectronic points
B) isolation
C) isobars
D) isotopes
E) isomers

Answer: E

13) Potassium is an element whose chemical symbol is derived from its Latin name and the correct symbol for Potassium is:

- A) Be B) Ca C) N D) Fe E) K

Answer: E

14) An important principle in organic chemistry is the concept of the functional group. A functional group is:

- A) a group of atoms attached to water
B) a group of atoms attached to alcohols only
C) a group of atoms attached to a hydrocarbon chain
D) an atom unreactive in a chemical reaction
E) an atom not attached to a hydrocarbon chain

Answer: C

15) Which of the following is a quantitative physical property?

- A) color
B) electrical conductivity
C) hardness
D) solubility
E) density

Answer: E

16) How many electrons will aluminum gain or lose when it forms an ion?

- A) lose 3
- B) lose 2
- C) gain 1
- D) no electrons gain or lose
- E) gain 4

Answer: A

17) The mass of sodium chloride relative to the mass of a carbon-12 atom is expressed as the term:

- A) structural mass
- B) formula mass
- C) empirical mass
- D) atomic mass
- E) molecular mass

Answer: B

18) Chemists generally choose to work with molarity because:

- A) masses of solutions are more convenient to measure than volumes of solutions
- B) chemicals are all dissolved in one kind of solvent in chemical reactions
- C) substances enter into chemical reactions according to certain molar ratios
- D) none of the statements above is correct
- E) substances enter into chemical reactions according to their volumes

Answer: C

19) Which is the SI length unit that is commonly used for measurements at the atomic or molecular level?

- A) meter
- B) decimeter
- C) centimeter
- D) millimeter
- E) nanometer

Answer: E

20) Atoms that have the same number of protons but different numbers of neutrons are called:

- A) subatomic particles
- B) nucleus
- C) electrons
- D) isotope
- E) photons

Answer: D

21) When nitroglycerin explodes, it decomposes to a mixture of different gases. Hence, nitroglycerin is :

- A) a compound
- B) a compound and is also a molecule
- C) an element
- D) a molecule
- E) an ion

Answer: B

22) Body Mass Index (BMI) is a commonly accepted measurement by dietary specialist in assessing whether a person is overweight. BMI is calculated by dividing the mass (in Kg) of a person by the square of his height in meters. If a person weights 158 pounds and has a BMI of 23.3, which of the following number best matches his height in centimeter?

- A) 181
- B) 175
- C) 163
- D) 170
- E) 155

Answer: B

23) What is the symbol for the ion with 19 protons and 18 electrons?

- A) Ar^+ B) K^+ C) Na^+ D) S^{2-} E) F^-

Answer: B

24) If you balance the chemical equation $\text{H}_3\text{PO}_4 + \text{KCN} \rightarrow \text{HCN} + \text{K}_3\text{PO}_4$, what is the stoichiometric coefficient in front of KCN?

- A) 3 B) 4 C) $\frac{1}{2}$ D) 1 E) 2

Answer: A

25) The functional group common to alcohols is:

- A) methyl group
B) hydroxyl group
C) alkyl group
D) carboxyl group
E) double bond

Answer: B

26) Protons and neutrons are both subatomic particles of an atom. The sum of the numbers of protons and neutrons is called:

- A) isotope number
B) mass number
C) atomic mass unit
D) atomic number
E) compound number

Answer: B

27) A molecular formula shows the difference between compounds with identical empirical formulas by giving the symbol and :

- A) the approximate atomic number of each kind of atom in a molecule
B) the approximate number of protons in a molecule
C) the actual number of chemical bonds in a molecule
D) the actual number of each kind of atom in a molecule
E) the small whole number ratio of each kind of atom in a molecule

Answer: D

28) Ascorbic acid (vitamin C) is composed of 40.92% carbon, 4.58% hydrogen, and 54.50% oxygen by mass. Its empirical formula should be:

- A) $\text{C}_3\text{H}_5\text{O}_2$ B) $\text{C}_4\text{H}_5\text{O}_3$ C) $\text{C}_3\text{H}_4\text{O}_3$ D) $\text{C}_2\text{H}_2\text{O}_2$ E) C_3HO_3

Answer: C

29) Perform the calculation $265.4 \text{ mm} \times 0.00541 \text{ mm} \times 12.18 \text{ mm}$ and the answer with proper numbers of significant figures is:

- A) 17.0 mm^3 B) 17.488 mm^3 C) 17.5 mm^3 D) 17.4 mm^3 E) 17.49 mm^3

Answer: C

30) Which of the following characteristics is correct for electrons?

- A) Its relative charge is zero when compared to proton.
- B) Its number is different in isotopes of the same element
- C) It is located inside nucleus.
- D) Its relative mass is one when compared to proton.
- E) Its symbol is e^-

Answer: E

31) Which of the following binary molecular compounds is expressed in correct formula?

- A) OCl_2
- B) CH_2O_3
- C) S_9P_4
- D) F_6S
- E) IF_7

Answer: E

32) Weather report said that the temperature was 34.2 in Keelung on August 19, 2009, what would be this temperature in Fahrenheit scale

- A) 72.7
- B) 104.3
- C) 85.5
- D) 93.6
- E) 68.8

Answer: D

33) The compound MgCl_2 is named:

- A) magnesium(II) chloride
- B) magnesium chloride
- C) magnesium chlorine
- D) dimagnesium chloride
- E) magnesium dichloride

Answer: B

34) Please tell which of the following chemical symbols of elements is written incorrectly:

- A) Xe
- B) Ca
- C) SC
- D) Si
- E) Po

Answer: C

35) A molecule is a group of two or more atoms held together in a definite spatial arrangement by forces called:

- A) noncovalent bonds
- B) metal bonds
- C) atomic mass unit
- D) ionic bonds
- E) covalent bonds

Answer: E

36) What is the formula of a compound that contains Na^+ and PO_4^{3-} ions?

- A) Na_3PO_4
- B) Na_3P
- C) Na_2PO_4
- D) Na_3PO_3
- E) NaPO_4

Answer: A

37) Which of the following statements regarding scientific laws is correct?

- A) Scientific laws are tentative explanations concerning some phenomena.
- B) Scientific laws are stated mathematically or expressed as scientific models.
- C) Scientific laws are not associated with data collection.
- D) Scientific laws are established based on educated guess only.

Answer: B

38) The facts obtained through careful observations and measurements during experiments are called:

- A) number B) scientific law C) theory D) data E) prediction

Answer: D

39) What is the molecular formula of magnesium nitride?

- A) MgF_2 B) Mg_3N_2 C) MgSO_4 D) MgC_2 E) $\text{Mg}(\text{OH})_2$

Answer: B

40) Which of the following is the correct value for the number of atoms in 1.00 g of helium (He)?

- A) 1.50×10^{24} B) 2.50×10^{24} C) 1.50×10^{23} D) 6.02×10^{23} E) 4.00×10^{23}

Answer: C

41) One distinguishing physical property of the element mercury is:

- A) it is less dense than water
B) it has a dull, blackish appearance
C) it is soluble in water
D) it is a solid at room temperature
E) it is a liquid at room temperature

Answer: E

42) What is the chemical name of NaClO_4 ?

- A) sodium chlorite
B) sodium hypochlorite
C) sodium chloride
D) sodium chlorate
E) sodium perchlorate

Answer: E

43) Which of the following processes does not involve a chemical change?

- A) spoil of food
B) breaking of glass
C) burning of alcohol
D) cooking of food
E) rusting of iron

Answer: B

44) The geometric shapes of molecules are difficult to represent through structural formulas and these shapes are best represented by:

- A) three-dimensional molecular models
B) empirical formulas
C) molecular formulas
D) mass number formula
E) law of multiple proportions

Answer: A

45) Because the components of a homogenous mixture have the same composition and properties, a homogenous mixture is also called a:

- A) chemical symbol
- B) element
- C) metal
- D) solution
- E) compound

Answer: D

46) How many significant numbers are there in the measured quantity 0.201×10^{-8} ?

- A) 4
- B) 1
- C) 5
- D) 3
- E) 2

Answer: D

47) The mass of a molecular substance relative to the mass of a carbon-12 atom is:

- A) atomic mass
- B) structural mass
- C) molecular mass
- D) empirical mass
- E) chemical body mass

Answer: C

48) A chemical formula that shows how atoms are attached to one another is called a:

- A) empirical formula
- B) molecular formula
- C) mass number formula
- D) structural formula
- E) cation formula

Answer: D

49) The process of preparing a solution by adding solvent to a concentrated solution is named:

- A) observation
- B) evaporation
- C) illustration
- D) dilution
- E) filtration

Answer: D

50) The calculated quantity of product in a chemical reaction is called:

- A) mass percent composition
- B) actual yield
- C) stoichiometric coefficient
- D) conversion factor
- E) theoretical yield

Answer: E