

1051-1st Chem Exam_1051026(A)

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

- 1) The width, length, and height of a large, custom-made shipping crate are 1.20 m, 2.12 m, and 0.54 m, respectively. The volume of the box using the correct number of significant figures is _____ m³.
A) 1.4 B) 1.37 C) 1.3738 D) 1.37376 E) 1.374

Answer: A

- 2) In the following list, only _____ is not an example of a chemical reaction.
A) a burning candle
B) the rusting of iron
C) the condensation of water vapor
D) dissolution of a penny in nitric acid
E) the formation of polyethylene from ethylene

Answer: C

- 3) The temperature of -25 °C is _____ in Kelvins.
A) 103 B) 248 C) 166 D) 138 E) 298

Answer: B

- 4) Of the following, only _____ is an extensive property.
A) freezing point
B) density
C) mass
D) boiling point
E) temperature

Answer: C

- 5) Accuracy refers to _____.
A) how close a measured number is to other measured numbers
B) how close a measured number is to infinity
C) how close a measured number is to the calculated value
D) how close a measured number is to zero
E) how close a measured number is to the true value

Answer: E

- 6) How many significant figures are in the measurement 5.34 g?
A) 1 B) 4 C) 3 D) 2 E) 5

Answer: C

- 7) The law of constant composition says _____.
A) that all substances have the same composition
B) that the composition of a heterogeneous mixture is always the same
C) that the composition of an element is always the same
D) that the composition of a compound is always the same
E) that the composition of a homogeneous mixture is always the same

Answer: D

8) Which one of the following is the highest temperature?

- A) The boiling point of water
- B) 373 K
- C) 220 °F
- D) 100°C
- E) All of the above are identical temperatures

Answer: C

9) The density of silver is 10.5 g/cm³. A piece of silver that occupies a volume of 63.1 cm³ would have a mass of _____ g.

- A) .445
- B) 112
- C) 663
- D) 23.6
- E) 2.25

Answer: C

10) Which species is an isotope of ³⁹Cl?

- A) ³⁴S²⁻
- B) ³⁹Ar
- C) ⁴⁰Ar⁺
- D) ³⁶Cl⁻
- E) ⁸⁰Br

Answer: D

11) Which pair of elements below should be the most similar in chemical properties?

- A) K and Kr
- B) I and Br
- C) B and As
- D) C and O
- E) Cs and He

Answer: B

12) The gold foil experiment performed in Rutherford's lab _____.

- A) led to the discovery of the atomic nucleus
- B) confirmed the plum-pudding model of the atom
- C) was the basis for Thomson's model of the atom
- D) utilized the deflection of beta particles by gold foil
- E) proved the law of multiple proportions

Answer: A

13) The formula for the compound formed between aluminum ions and phosphate ions is _____.

- A) AlP
- B) Al₂(PO₄)₃
- C) Al(PO₄)₃
- D) Al₃(PO₄)₃
- E) AlPO₄

Answer: E

14) Formulas that show how atoms are attached in a molecule are called _____.

- A) molecular formulas
- B) structural formulas
- C) empirical formulas
- D) ionic formulas
- E) diatomic formulas

Answer: B

15) In the symbol below, X = _____.



- A) K
- B) C
- C) N
- D) Al
- E) not enough information to determine

Answer: B

16) The correct name for MgF_2 is _____.

- A) magnesium difluoride
- B) manganese bifluoride
- C) manganese difluoride
- D) monomagnesium difluoride
- E) magnesium fluoride

Answer: E

17) The element X has three naturally occurring isotopes. The masses (amu) and % abundances of the isotopes are given in the table below. The average atomic mass of the element is _____ amu.

Isotope	Abundance	Mass
^{221}X	74.22	220.9
^{220}X	12.78	220.0
^{218}X	13.00	218.1

- A) 221.0
- B) 220.42
- C) 218.5
- D) 220.4
- E) 219.7

Answer: D

18) Which formula/name pair is incorrect?

- A) $\text{Mn}(\text{NO}_3)_2$ manganese(II) nitrate
- B) Mg_3N_2 magnesium nitrite
- C) $\text{Mg}(\text{MnO}_4)_2$ magnesium permanganate
- D) $\text{Mg}(\text{NO}_3)_2$ magnesium nitrate
- E) $\text{Mn}(\text{NO}_2)_2$ manganese(II) nitrite

Answer: B

19) Which species has 48 electrons?

- A) $^{118}_{50}\text{Sn}^{+2}$
- B) $^{112}_{48}\text{Cd}^{+2}$
- C) $^{68}_{31}\text{Ga}$
- D) $^{116}_{50}\text{Sn}^{+4}$
- E) $^{48}_{22}\text{Ti}$

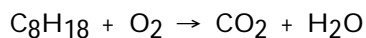
Answer: A

20) The molecular formula of a compound is always _____ the empirical formula.

- A) simpler than
- B) an integral multiple of
- C) the same as
- D) more complex than
- E) different from

Answer: B

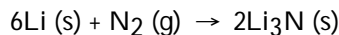
21) When the following equation is balanced, the coefficients are _____.



- A) 2, 12, 8, 9
- B) 1, 4, 8, 9
- C) 4, 4, 32, 36
- D) 2, 3, 4, 4
- E) 2, 25, 16, 18

Answer: E

22) Lithium and nitrogen react to produce lithium nitride:

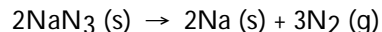


How many moles of lithium nitride are produced when 0.400 mol of lithium react in this fashion?

- A) 0.0667 B) 0.133 C) 0.800 D) 1.20 E) 0.200

Answer: B

23) Automotive air bags inflate when sodium azide decomposes explosively to its constituent elements:



How many moles of N₂ are produced by the decomposition of 3.55 mol of sodium azide?

- A) 2.37 B) 1.78 C) 5.33 D) 1.18 E) 10.7

Answer: C

24) Propane (C₃H₈) reacts with oxygen in the air to produce carbon dioxide and water. In a particular experiment, 38.0 grams of carbon dioxide are produced from the reaction of 22.05 grams of propane with excess oxygen.

What is the % yield in this reaction?

- A) 66.0 B) 94.5 C) 57.6 D) 38.0 E) 86.4

Answer: C

25) A 17.6-g sample of ammonium carbonate contains _____ mol of ammonium ions.

- A) 3.47 B) 0.176 C) 2.14 D) 0.183 E) 0.366

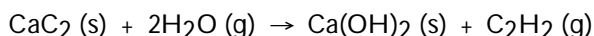
Answer: E

26) A sample of CH₄O with a mass of 32.0 g contains _____ molecules of CH₄O.

- A) 1.00 B) 32.0 C) 5.32×10^{-23} D) 1.88×10^{22} E) 6.02×10^{23}

Answer: E

27) Calcium carbide (CaC₂) reacts with water to produce acetylene (C₂H₂):

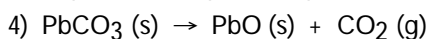
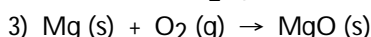
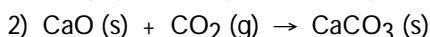
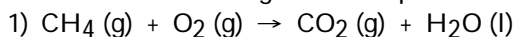


Production of 3.3 g of C₂H₂ requires consumption of _____ g of H₂O.

- A) 1.2 B) 4.6 C) 480 D) 0.048 E) 2.3

Answer: B

28) Which of the following are decomposition reactions?



- A) 2, 3, and 4 B) 4 only C) 2 and 3 D) 1, 2, and 3 E) 1, 2, 3, and 4

Answer: B

- 29) One mole of _____ contains the smallest number of atoms.
A) Na_3PO_4 B) C_{10}H_8 C) NaCl D) $\text{Al}_2(\text{SO}_4)_3$ E) S_8

Answer: C

- 30) A nitrogen oxide is 63.65% by mass nitrogen. The molecular formula could be _____.
A) N_2O
B) N_2O_4
C) NO
D) NO_2
E) either NO_2 or N_2O_4

Answer: A

- 31) What volume (mL) of 0.135 M NaOH is required to neutralize 13.7 mL of 0.129 M HCl ?
A) 14.3 B) 0.24 C) 6.55 D) 0.076 E) 13.1

Answer: E

- 32) Which one of the following compounds is insoluble in water?
A) K_2SO_4 B) $\text{Fe}(\text{NO}_3)_3$ C) Na_2CO_3 D) ZnS E) AgNO_3

Answer: D

- 33) A stock solution of HNO_3 is prepared and found to contain 13.5 M of HNO_3 . If 25.0 mL of the stock solution is diluted to a final volume of 0.500 L, the concentration of the diluted solution is _____ M.
A) 270 B) 1.48 C) 0.675 D) 0.270 E) 675

Answer: C

- 34) The net ionic equation for the reaction between aqueous sulfuric acid and aqueous sodium hydroxide is _____.

- A) $\text{H}^+(\text{aq}) + \text{HSO}_4^-(\text{aq}) + 2\text{Na}^+(\text{aq}) + 2\text{OH}^-(\text{aq}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + 2\text{Na}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$
B) $\text{SO}_4^{2-}(\text{aq}) + 2\text{Na}^+(\text{aq}) \rightarrow 2\text{Na}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$
C) $\text{H}^+(\text{aq}) + \text{OH}^-(\text{aq}) \rightarrow \text{H}_2\text{O}(\text{l})$
D) $\text{H}^+(\text{aq}) + \text{HSO}_4^-(\text{aq}) + 2\text{OH}^-(\text{aq}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + \text{SO}_4^{2-}(\text{aq})$
E) $2\text{H}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq}) + 2\text{Na}^+(\text{aq}) + 2\text{OH}^-(\text{aq}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + 2\text{Na}^+(\text{aq}) + \text{SO}_4^{2-}(\text{aq})$

Answer: C

- 35) Oxidation is the _____ and reduction is the _____.
A) loss of electrons, gain of electrons
B) loss of oxygen, gain of electrons
C) gain of oxygen, loss of electrons
D) gain of oxygen, loss of mass
E) gain of electrons, loss of electrons

Answer: A

36) Which of the following is an oxidation-reduction reaction?

- A) $\text{AgNO}_3 (\text{aq}) + \text{HCl} (\text{aq}) \rightarrow \text{AgCl} (\text{s}) + \text{HNO}_3 (\text{aq})$
- B) $\text{HCl} (\text{aq}) + \text{NaOH} (\text{aq}) \rightarrow \text{H}_2\text{O} (\text{l}) + \text{NaCl} (\text{aq})$
- C) $\text{H}_2\text{CO}_3 (\text{aq}) + \text{Ca}(\text{NO}_3)_2 (\text{aq}) \rightarrow 2\text{HNO}_3 (\text{aq}) + \text{CaCO}_3 (\text{s})$
- D) $\text{Cu} (\text{s}) + 2\text{AgNO}_3 (\text{aq}) \rightarrow 2\text{Ag} (\text{s}) + \text{Cu}(\text{NO}_3)_2 (\text{aq})$
- E) $\text{Ba}(\text{C}_2\text{H}_3\text{O}_2)_2 (\text{aq}) + \text{Na}_2\text{SO}_4 (\text{aq}) \rightarrow \text{BaSO}_4 (\text{s}) + 2\text{NaC}_2\text{H}_3\text{O}_2 (\text{aq})$

Answer: D

37) The reaction between strontium hydroxide and chloric acid produces _____.

- A) two molecular compounds
- B) two weak electrolytes
- C) a molecular compound and a weak electrolyte
- D) a molecular compound and a strong electrolyte
- E) two strong electrolytes

Answer: D

38) The balanced molecular equation for complete neutralization of H_2SO_4 by KOH in aqueous solution is

- _____.
- A) $\text{H}_2\text{SO}_4 (\text{aq}) + 2\text{KOH} (\text{aq}) \rightarrow 2\text{H}_2\text{O} (\text{l}) + \text{K}_2\text{SO}_4 (\text{s})$
 - B) $\text{H}_2\text{SO}_4 (\text{aq}) + 2\text{KOH} (\text{aq}) \rightarrow 2\text{H}_2\text{O} (\text{l}) + \text{K}_2\text{SO}_4 (\text{aq})$
 - C) $2\text{H}^+ (\text{aq}) + 2\text{OH}^- (\text{aq}) \rightarrow 2\text{H}_2\text{O} (\text{l})$
 - D) $\text{H}_2\text{SO}_4 (\text{aq}) + 2\text{OH}^- (\text{aq}) \rightarrow 2\text{H}_2\text{O} (\text{l}) + \text{SO}_4^{2-} (\text{aq})$
 - E) $2\text{H}^+ (\text{aq}) + 2\text{KOH} (\text{aq}) \rightarrow 2\text{H}_2\text{O} (\text{l}) + 2\text{K}^+ (\text{aq})$

Answer: B

39) Which of the following are weak acids?

- A) HI , HF
- B) HF
- C) HI , HNO_3 , HBr
- D) HF , HBr
- E) none of the above

Answer: B

40) A solution is prepared by mixing 50.0 mL of 0.100 M HCl and 10.0 mL of 0.200 M NaCl . What is the molarity of chloride ion in this solution?

- A) 8.57
- B) 3.50
- C) 0.183
- D) 0.117
- E) 0.0500

Answer: D