



CHEMISTRY

BOOKS - R SHARMA CHEMISTRY (HINGLISH)

SOME BASIC CONCEPTS OF CHEMISTRY

Example

1. Calculate the density of silver if a silver coin has a mass of $16.6g$ and occupies a volume of $1.58cm^3$

Strategy: Divide the mass of object by its volume.



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2. In a certain car battery, the density of sulphuric acid is 1.41gML^{-1} . Calculate the mass of 242mL of the acid.

Strategy: Rearrange the density equation (1.1).

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3. Convert the melting point of lead (327.5°C) to degrees Fahrenheit and the boiling point of ethanol (172.9°F) to degrees Celsius.

Strategy: Use Eqs(1.3) or (1.4) to carry out the desired conversion.

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4. Find the Fahrenheit temperature when the absolute temperature is $400K$

Strategy: First convert Kelvin to degree Celsius using Eq. (1.2). Then carry out the next conversion from degree Celsius to Fahrenheit.

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5. Determine the number of significant figures in the following measured quantities:

(i) $478cm$, (ii) $7.01g$

(iii) $0.852m$, (iv) $0.034kg$

(v) 1.410×10^{22} atoms, (vi) $8000mL$.

Strategy: Use the simple rules mentioned above to count the number of significant figures.

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6. (i) Add 73.24mL and 20.3mL (ii) Subtract 21.2342g from 27.87g

Strategy: We first ensure that the quantities to be added or subtracted are expressed in the same units. We carry out the addition or subtraction. Then we follow rule 1 to express the answer to the correct number of significant figures, i.e., in the final answer, the number of digits to the right of the decimal point should be equal to the number of digits after the decimal point.



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7. What is the area of a rectangle 12.34cm wide and 1.23cm long?

Strategy: The area of a rectangle is its length times its width.

First, we must check that the width and length are expressed in the same units. Then we multiply the length by the width. Finally, we follow rule 3 to find the correct number of significant figures. The units for the result are equal to the product of the units for the individual terms in the multiplication.

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8. If an object has mass $0.2876g$, then find the mass of nine such objects.

Strategy: Follow rule 3, but keep in mind that exact numbers obtained from determinos (e.g. dozen) or by counting the number of objects have an infinite number of significant figures.

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9. Length conversion: Convert $58.7m$ to centimeters

Strategy: Express the problem as

$$?cm = 58.7m$$

Use definition $1cm = 1 \times 10^{-2}m$.

Now choose the unit factor has the meters in the denominator,

$$\frac{1cm}{1 \times 10^{-2}m} = 1$$



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10. Length conversion: Angstrom (\AA), a unit of length ($1 \times 10^{-10}m$) is commonly used to describe the radii of atoms, which are often expressed in other units. Find the radius of a silicon atom (1.17\AA) in centimeters and nanometers. Itbgt

Strategy:

$$\text{\AA} \rightarrow m \rightarrow cm$$

$$\text{\AA} \rightarrow m \rightarrow nm$$

Use the equations $1\text{\AA} = 1 \times 10^{-10}m$, $1cm = 1 \times 10^{-2}m$, and $1mm = 1 \times 10^{-9}m$ to construct the unit factors that convert 1.17\AA to the required units.

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11. Mass conversion: A sample of platinum has a mass of $0.432mg$. What is its mass in kilogram?

Strategy: Construct the required unit factors using the relationship $1g = 1000mg$ and $1kg = 1000g$ and follow the sequence

$mg \rightarrow g \rightarrow kg$

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12. Volume conversion : The volume of a cubical is $7.6m^3$. What is the volume in cubci centimeter ?

Strategy : First find the suitable unit factor using the relationship $1cm = 10^{-2}m$. The cube this unit factor.

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13. Density conversion : The density of liquid metal, mercucy,n is $13.6gcm^{-3}$. What is the density in kgm^{-3} ?

Strategy : We need two unit factors-one to convert gram to kilogram and the other to convert cubic meter to cubic centimeter. Use the relationships $1kg = 1000g$ and $1cm = 1 \times 10^{-2}m$.

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14. Law of conservation of mass: When $4.2g$ of sodium hydrogen carbonate ($NaHCO_3$) is added to a solution of acetic acid (CH_3COOH) weighing $10.0g$ then $2.2g$ of carbon dioxide (CO_2) is released into the atmosphere and the residue left weighs $12.0g$. Show that these observations are in agreement with the law of conservation of mass.

Strategy: Find the sum total of mass of reactants before the reaction and sum total of mass of products after the reaction.



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15. $1.59g$ of first sample of cupric oxide (CuO) on complete reduction by hydrogen (H_2) gas gave $1.27g$ of pure copper (Cu) metal. Second pure sample of cupric oxide weighing $3.18g$ yielded $2.54g$ of pure copper metal on complete reduction by hydrogen gas. Show that the law of definite proportions is

valid.

Strategy: Find the ratio by mass of copper to oxygen in both the samples.

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16. Law of multiple proportions: sulphur forms two chlorides. A 30.00g sample of one chloride decomposes to give 5.53g of sulphur (S) and 24.47g of chlorine (Cl). A 30.00g sample of the other chloride decomposes to give 3.93g of S and 26.07g of Cl . Show that these compounds obey the law of multiple proportions.

Strategy: First we calculate the mass of Cl that combines with 1g of S in each compound. Then we determine the ratio of the different masses of Cl for the two compounds.

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17. Copper sulphide (CuS) contains 66.5% Cu copper oxide (CuO) contains 79.9% Cu and sulphur trioxide (SO_3) contains 40% S . Shows that these compounds obey the law of reciprocal proportions.

Strategy: Elements S and O chemically combine separately with element Cu to form CuS and CuO . Elements S and O also chemically combine with each other to form SO_3 . Find the ratio of masses of S to O combining with a given mass of Cu and also find the ratio of masses of S to O in SO_3 .

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18. Law of combining volumes: if ten volumes of dihydrogen gas react with five volumes of dioxygen gas, how many volumes of water vapor are produced?

Strategy : According to the law of combining volumes, if the product is a gas (or vapor), its volume is related to the volume of the gaseous reactants by a simple ratio.

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19. Avogadro's law: When half a liter of carbon dioxide gas is passed over red coke, a reducing agent, the volume becomes 700mL . Assuming that volumes are measured at the same temperature and pressure, find the composition of product.

Strategy: The term composition indicates that we are dealing with a mixture. Write the correct balanced equation and use volume in place in moles.

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20. Calculation of average atomic mass: The atomic atoms for the two stable isotopes of boron, ${}^{10}_5\text{B}$ (19.78 %) and ${}^{11}_5\text{B}$ (80.22 %), are $10.0129u$ and $11.0093u$, respectively. Calculate the average atomic mass of boron.

Strategy : The atomic mass of an element existing in nature as isotopes is the weighted average of the isotope masses. Thus, multiply the fraction of each isotope by its mass and add these numbers to obtain the mass of boron.



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21. Calculation of isotopic abundance: The atomic mass of gallium (Ga) is $69.72 u$. The masses of the naturally occurring isotopes are $68.9257u$ for ${}^{69}_{31}\text{Ga}$ and $70.9249u$ for ${}^{71}_{31}\text{Ga}$. Calculate the present abundance of each isotope.

Strategy : We present the fraction of each isotope algebraically.

The atomic mass of an element is the weighted average of the isotope masses, which equals the sum of the masses of each isotope times the fraction of that isotope.



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22. Empirical formula: Write the empirical formulas for the following molecule compounds: (i) dinitrogen tetroxide (N_2O_4), (ii) acetylene (C_2H_2).

Strategy: Divide all the subscripts, if possible by a suitable number so that the subscripts are converted to the smallest whole numbers.



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23. Molecule mass: Calculate the molecule mass of vitamin *C* or ascorbic acid ($C_6H_8O_6$) using rounded values for atomic masses.

Strategy: Add the atomic masses of the elements in the formula, each multiplied by the number of times the element occurs.

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24. Platinum (*Pt*) is a hard silvery-white metal. How many moles of *Pt* atoms are in 292.64g of *Pt* metal?

Strategy: Elementary entities of *Pt* metal are atoms. The atomic mass of *Pt* is 195.09u thus, the molar mass of *Pt* is 195.09g mol^{-1} .

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25. Hydrogen cyanide (HCN) is a volatile, colorless liquid with the odor of certain fruit pits (such as peach and cherry pits). The compound is highly poisonous. How many molecules are there in $56\text{mg}HCN$ the average toxic dose ?

Strategy : The molecule mass of HCN is 27.03 amu. Thus, its molar mass is 27.03 g. First convert the mass of sample in moles, then convert moles to number of molecules.

grams of HCN \rightarrow mole of HCN \rightarrow molecules of HCN



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26. Gold (Au) is a precious metal used mainly in jewelry. What is the mass in grams of one Au atoms ?

Strategy : We expect that the mass of a single Au atoms in grams would be very small number. The atomic mass of Au is $197.97u$. Thus, its molar mass is 196.97g . Because each mole of

a substance contains Avogadro's number of units of that substance contains. Avogadro's number of units of that substance dividing the mass of the substance in one mole (molar mass) by Avogadro's constant gives the mass of that unit of substance.



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27. Mass of molecules : What is the mass (in grams of 10.0 billion sulphur dioxide (SO_2) molecules?

Strategy : The molecular mass of SO_2 is 64.1 u. Thus, its mole and then find the mass using Eqs(1.7).



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28. Number of molecules: What is the number of molecules
11.2L of nitrogen dioxide gas (NO_2) at *NTP*

Strategy: First find the number of molecules using Avagadro's constant.

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29. Number of molecules: What is the number of molecules in a
diatomic gas present in 1L flask at $0^\circ C$ and under a pressure
of $7.6 \times 10^{-19} mmHg$?

Strategy : Express the pressure in atmospheres and use Eq.(1.10)
to calculate the number of moles. Using Avoagdro's
constant,find the number of molecules.

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30. Number of atoms: How many C atoms are present in $342.3g$ of table sugar or sucrose ($C_{12}H_{22}O_{11}$?

Strategy : The molecule mass of sucrose is $342.3u$. Thus, its molar mass is $342.3 g$. First calculate the number of moles, then calculate the number of molecules, and finally use the information that there are $12C$ atoms in every molecule to find the number of C atoms.

grams \rightarrow moles of sucrose \rightarrow molecules of sucrose
 \rightarrow number of C atoms



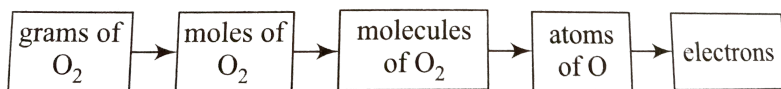
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31. Mole concept: Calculate the following in $48g$ of oxygen gas (dioxygen) at room temperature ($25^\circ C$): (i) moles of O_2 , (ii) number of O_2 molecules, (iii) number of O atoms, and (iv) number of electrons.

Strategy: The molecular mass of dioxygen (O_2) is 32μ . Thus, its molar mass is 32.0g mol^{-1} . Now, use the needed information:

(a) one mole of O_2 contains Avogadro's number of O_2 molecules,

(b) one O_2 molecules contains 2 oxygen atoms, and (c) one oxygen atom contains 8 electrons.



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32. Percentage composition: Ammonia (NH_3) is a pungent smelling very soluble gas, given an alkaline solution containing ammonium hydroxide. It is used as a refrigerant and for the manufacture of fertilizers. Calculate the mass percentage of the elements in ammonia.

Strategy: We need the mass of an element in a given mass of

compound. To get this information, we interpret the formula in molar terms and then convert moles to masses. Every molecule of ammonia always has the formula NH_3 , *i. e.*, 1 mol of NH_3 always contains 1 mol of N atoms and 3 mol of H atoms.



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33. Simplest or empirical formula: Ascorbic acid (vitamin C) a white crystalline solid, that is present in fruits and vegetables, cures scurvy and may help prevent the common cold. It is composed of 40.92% C , 4.58% H , and 54.50% O by mass. Determine its empirical formula.

Strategy: Because one mole of atoms of any given element is 6.022×10^{23} atoms, the ratio of the numbers of atoms the ratio of the numbers of atoms in any sample for a compound is the same as the ratio of moles of atoms in that compound. Thus, the strategy is to, find the relative number of moles of each

element in the compound and then use the numbers to establish the mole ratio of the elements which in turn give the subscripts in the empirical formula. This calculation is carried out as follows:

Step 1: Because the sum of all the percentages is 100% it is convenient to solve this type of problem by considering exactly 100g of the substance, which means 100.00g of ascorbic acid contains 40.92g of *C*, 4.58g of *H*, and 54.50g of *O*

Next we need to calculate the number of moles of atoms of each element in the compound.

Step 2: We then obtain the simplest whole number ratio between these numbers that gives that ratio of atoms in the sample and hence, the simplest or empirical formula for the compound.



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34. Balancing chemical equation: Propane (C_3H_8) is a colorless, odorless gas often used as a heating and cooking fuel in rural homes, Write a balanced equation for the combustion reaction of propane with oxygen to yield carbon dioxide and water.



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35. Molecular interpretation: How many O_2 molecules react with $74CH_4$ molecules according to the precddign equation?

Strategy: The balanced equation tells us that one CH_4 molecule always reacts with two O_2 molecules. Either we go for unitary method or construct a unit factor from the above fact:

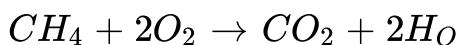
$$\frac{2O_2 \text{ molecules}}{1CH_4 \text{ molecule}}$$



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36. Number of moles formed: How many moles of water are produced when $4.5m$ mol of methane reacts with excess oxygen?

Strategy: According to the balanced equation for the combustion of methane,



1 mol of methane always reacts with 2 mol of oxygen to produce 2 mol of water. Either we use unitary approach or factor- we use unitary approach or factor-label method by constructing the unit factor.

$$\frac{2molH_2O}{1molCH_4}$$

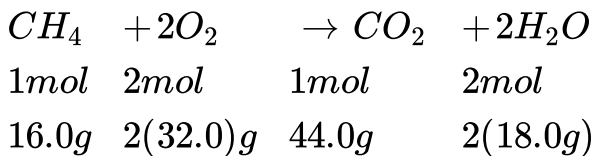


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37. What mass of oxygen gas is required to burn completely $2.5mol$ of methane?

Moles of \rightarrow Mass of
one reactant another reactant

Strategy : Use the balanced equation



to find the relationship among moles and grams of reactants :

Mole of \rightarrow Moles of \rightarrow grams of
 CH_4 O_2 O_2

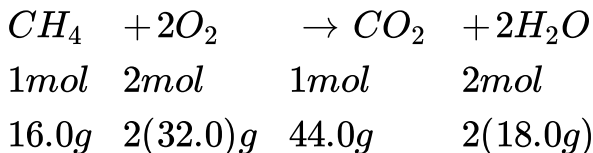


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38. What mass of oxygen gas is required to burn completely $2.5mol$ of methane?

Moles of \rightarrow Mass of
one reactant another reactant

Strategy : Use the balanced equation



to find the relationship among moles and grams of reactants :

Mole of \rightarrow Moles of \rightarrow grams of
 CH_4 O_2 O_2

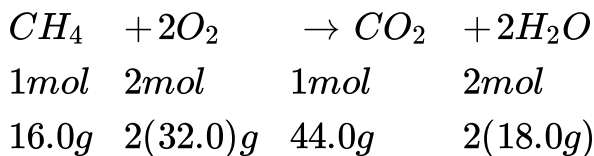


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39. Most combustion reactions occur in excess of O_2 (i.e., more than enough O_2 to burn the substance completely). Calculate the mass of CO_2 (in grams) produced by burning 4.00mol of CH_4 in excess O_2 .



Strategy: using the balanced equation



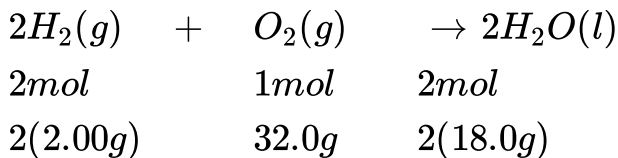
we find out that 1 mol of CH_4 is chemically equivalent to 1 mol of CO_2 or 44.0g of CO_2 .



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40. Limiting reactant: What mass of water (H_2O) can be formed by the reaction of $3.00g$ of $H_2(g)$ with $29.0g$ of $O_2(g)$?

Strategy: Using the balanced equation

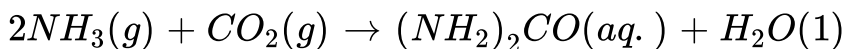


find out the numbers of moles of each reactant required to react with the other. Using the given masses, calculate the number of moles of each reactant. Finally, identify the limiting reactant and base the rest of the calculation on it.



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41. Limiting reactant: Urea [$(NH_2)_2CO$] used as fertilizer as animal feed, and in polymer industry, is prepared by the reaction between ammonia and carbon dioxide:



In one process, 637.2g of NH_3 is allowed to react with 11.42g of CO_2

- (i) Which of the two reactants is the limiting reactant?
- (ii) Calculate the mass of $(NH_2)_2CO$ formed?
- (iii) How much of the excess reagent (in grams) is left at the end of the reaction?

Strategy: (i) Since we cannot tell by inspection which of the two reactants is the limiting reactant, we have to proceed by first converting their masses into number of moles. Take each reactant in turn and ask how many moles of product (urea) would be obtained if each were completely consumed. The reactant that gives the smaller number of moles of product is the limiting reactant.

(ii) Convert the moles of product obtained to grams of product.

(iii) From the moles of product, calculate to grams of excess reactant needed in the reaction. Then subtract this quantity

from the grams of the reactant available to find the quantity of the excess reactant remaining.

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42. Percent of solute: Calculate the mass of calcium sulphate ($CaSO_4$) contained in 200g of a 6.00 % solution of $CaSO_4$

Strategy: Percent information means the solution contains 6.00g of $CaSO_4$ per 100g of solution. To solve the problem, we can use either unitary method or Eq (1.16) or construct a unit factor.

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43. Mass of solute : Calculate the mass of $CaSO_4$ present in 200mL of a 6.00 % solution of $CaSO_4$. The density of the

solution is 1.06gmL^{-1} at 25°C

Strategy: Find the mass of solution by multiplying the volume of solution with its density and then find the mass of CaSO_4 as discussed in the previous example.

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44. Mole fraction: A solution contains 127g of methanol (CH_3OH) in 108g of water (H_2O). What are the mole fractions of CH_3OH and H_2O ?

Strategy: Convert the masses of both components to their moles, and then apply the definition of mole fraction.

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45. Molarity: A solution contains $3.65g$ of hydrogen chloride (HCl) in $2.00L$ of solution. Calculate the molarity (M) of the solution.

Strategy: Convert grams of HCl to moles of HCl and then apply Eq(1.20).



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46. Mass of solute: How many grams of barium hydroxide [$Ba(OH)_2$] are required to prepare $1.75L$ of a $0.0500M$ solution of barium hydroxide?

Strategy: Find the number of moles solute by multiplying the molarity of solution with its volume and then multiply the number of moles of solute with its molar mass.



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47. Molarity: A sample of commercial sulphuric acid is 98 % H_2SO_4 by mass and its specific gravity is 1.84. Calculate the molarity of this sulphuric acid solution.

Strategy: The density of a solution (grams per milliliter) is numerically equal to its specific gravity. Thus, the density of the solution is 98 % H_2SO_4 by mass. Thus, every 100g of solution contains 98g of pure H_2SO_4 . From the mass of H_2SO_4 , we calculate its moles and from the density, we calculate its volume. Finally, we calculate molarity using its definition.



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48. Dilution: How many milliliters of 18.4M H_2SO_4 are required to prepare 1L of 0.940M solution of H_2SO_4 ?

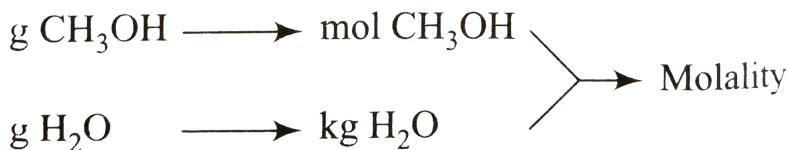
Strategy: Since the concentration of the final solution is less than that of the original one, this is a dilution process. We are

given the molarity of the original solution and the volume (V_f) and molarity (M_f) of the final solution. Thus, Eq (1.21) can be used.

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49. Molarity: An aqueous solution contains 128g of methanol (CH_3OH) in 108g of water. Calculate the molarity of the solution.

Strategy: Convert the grams of CH_3OH to moles of CH_3OH express the mass of H_2O in kilogram and apply the definition of molality.



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50. Normally: An aqueous solution contains 4.202g of HNO_3 in 600mL of solution. Calculate the normality of solution?

Strategy: Convert grams of HNO_3 to moles of HNO_3 to moles of HNO_3 and then to equivalents of HNO_3 . Finally, apply the definition of normality.

$$\frac{gHNO_3}{L} \rightarrow \frac{molHNO_3}{L} \rightarrow \frac{eqHNO_3}{L} \rightarrow \frac{eqHNO_3}{L} = N_{HNO_3}$$



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51. Normality and molarity: An aqueous solution contains 9.50g of barium hydroxide in 200mL of solution. Calculate (i) the molarity and (ii) the normality of the solution.

Strategy : Convert grams of $Ba(OH)_2$ to moles of $Ba(OH)_2$ and then calculate molarity. Because each formula unit of $Ba(OH)_2$ furnishes two OH ions, 1 mol

$Ba(OH)_2 = 2eqBa(OH)_2$. Thus, normally is twice of molarity for $Ba(OH)_2$ solution.



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Follow Up Test 1

1. Which of the following life saving drugs is effications in cancer therapy?

- A. Cisplatin
- B. Taxol
- C. Azidothymidine (AZT)
- D. Both(1) and (2)

Answer: D

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2. Barnett Roseberg is the discover of cisplatin a leading anti-cancer drug. The substance contains the metal

A. plutonium

B. platinum

C. palladium

D. plonium

Answer: B

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3. *AZT* (azidothymidine) is used for helpingvictims.

- A. arthritis
- B. thalassemia
- C. AIDS
- D. tuberculosis

Answer: C



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4. Which of the following are environmentally hazardous refrigerants responsible for ozone depletion in the stratosphere ?

- A. *CFCs*
- B. *FCCs*
- C. *CCFs*

D. Both(1) and (2)

Answer: A



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Follow Up Test 2

1. Which of the following is not a matter?

A. Facebook

B. Pen drive

C. Light

D. Mobile Phone

Answer: C



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2. Which of the following materials cannot be detected by our senses?

- A. A still body of air
- B. Ammonia gas
- C. Hydrogen sulphide gas
- D. Nitrogen dioxide gas

Answer: A



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3. Which of the following fills any container completely irrespective of the amount?

A. Gas

B. Liquid

C. Solid

D. Both(1) and (2)

Answer: A



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4. Which of the following is a solid element?

A. Fluorine

B. Bromine

C. Iodine

D. Chlorine

Answer: C



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5. Which of the following is not a mixture but a pure substance?

- A. CNG (compressed natural gas)
- B. LPG (liquefied natural gas)
- C. Distilled water
- D. Kerosene

Answer: C



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6. Which of the following is a homogenous mixture?

A. Milk

B. A mixture of two minerals such as galena (black) and quartz (white)

C. Blue copper (II) sulphate solution

D. Foggy air

Answer: C



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7. Which of the following is not an element but a compound?

A. Graphite

B. Ozone

C. Diamond

D. Dry ice

Answer: D



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8. A mixture of salt and water can be separated by

A. hand picking

B. distillation

C. filtration

D. crystallization

Answer: B



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1. Which of the following is not related to physical property?

- A. Melting of ice
- B. Flow of current through copper
- C. Burning of magnesium in the oxygen of the air
- D. Boiling of water

Answer: C



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2. Which of the following is related to chemical property?

- A. Dissolution of zinc in hydrochloric acid

B. Dissolution of sugar in water

C. Dissolution of sulphur in carbon disulphide

D. Dissolution of benzene in ethyl alcohol

Answer: A



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Follow Up Test 4

1. In *SI* base units, the amount of substance is expressed in

A. kg

B. *L*

C. molL^{-1}

D. mol

Answer: D



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2. Internatinal prototype of the kilogram is made up of

A. paladium-osmium

B. platinum-iridium

C. potassium-caseium

D. plutonium-indium

Answer: B



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3. Correct order of prefixes is

A. pico < nano < micro < milli

B. nano < pico < micro < milli

C. micro < pico < milli < nano

D. milli < micro < pico < nano

Answer: A



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4. Which of the following is not equal to one gram?

A. $1000mg$

B. $1000000\mu g$

C. $10000dg$

D. $100cg$

Answer: C



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5. Which of the following is not correct regarding *SI* derived units?

A. Pressure in pascal (pa)

B. Density in kilogram per cubic meter (kgm^{-3})

C. Electric charge in coulomb (C)

D. Energy in electron volt (eV)

Answer: A



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Follow Up Test 5

1. One gram of oxygen is equal to

A. $10^5 \mu g$

B. $10^6 \mu g$

C. $10^4 \mu g$

D. $10^3 \mu g$

Answer: B



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2. The capacity of a tank $0.6m$ long, $10cm$ wide, and $50mm$ deep in liters is

A. $3L$

B. $0.3L$

C. $30L$

D. $0.03L$

Answer: A



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3. Densities of Change greatly with changes in temperature and pressure

A. solids

B. liquids

C. crystals

D. gases

Answer: D



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4. $14^{\circ} F$ is equal to.....

A. $298K$

B. $273K$

C. $263K$

D. $245K$

Answer: C



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1. The number of significant figures in 38.57mL is

- A. two
- B. four
- C. infinite
- D. three

Answer: B



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2. The number of significant figures in 0.0000349g is

- A. three

B. four

C. seven

D. five

Answer: A



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3. The number of significant figures in $40,501\text{kg}$ is

A. three

B. two

C. five

D. infinite

Answer: C



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4. The number of significant figures in 3.040dm is

A. infinite

B. three

C. two

D. four

Answer: D



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5. The number of significant figures in 0.030050L is

A. five

B. four

C. two

D. six

Answer: A



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6. The number of significant figures in 560kg is

A. three

B. two

C. three or two

D. infinite

Answer: C



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7. In the addition of 89.332 and 1.1, the correct number of significant figures in the reported answer will be

- A. two
- B. five
- C. four
- D. three

Answer: D



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8. In the multiplication of 2.097 and 012, the correct number of significant figures in the reported answer will be

- A. three
- B. two
- C. four
- D. five

Answer: A



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9. In the multiplication of 2.8 and 4.5039, the correct number of significant figures in the reported answer will be

- A. five

B. two

C. six

D. seven

Answer: B



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10. In the division of 6.85 by 112.04, the correct number of significant figures in the reported answer will be

A. five

B. nine

C. eight

D. three

Answer: D



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Follow Up Test 7

1. How many picometers (\pm) are equivalent to 0.48\AA ?

A. 84

B. 8.4

C. 8.40

D. 8400

Answer: A



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2. How many seconds are there in 4 days?

A. $172800s$

B. $345600s$

C. $259200s$

D. $216000s$

Answer: B



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3. How many meters are equivalent to 5.00 in?

A. $12.7m$

B. $127m$

C. $0.127m$

D. $1.27m$

Answer: C



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4. How many grams are equivalent to $66lb$ (pound) of sulphur?

A. 20000

B. 30000

C. 40000

D. 25000

Answer: B



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5. The speed limit on a highway is 55 mile h^{-1} . Express this speed in *SI* base units.

A. $25ms^{-1}$

B. $35ms^{-1}$

C. $20ms^{-1}$

D. $30ms^{-1}$

Answer: A



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Follow Up Test 8

1. The law of conservation of mass is not obeyed by a

- A. redox reaction
- B. double decomposition reaction
- C. nuclear reaction
- D. neutralization reaction

Answer: C



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2. Which of the following laws of chemical combination differentiate a compound from a mixture?

- A. Law of multiple proportions
- B. Law of definite proportions

C. Law of reciprocal proportions

D. Law of combining volumes

Answer: B



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3. Which of the following pairs of compounds obeys the law of multiple proportions?

A. H_2O and H_2O_2

B. CO and CO_2

C. SO_2 and SO_3

D. All of these

Answer: D



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4. The law reciprocal proportions is obeyed by

A. NaH , NCl , NaCl

B. NaCl , NaBr , NaI

C. HCl , HBr , HI

D. LiH , NaH , KH

Answer: A



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5. Two elements A and B combine chemically to form compounds combining with a fixed mass of A in I, II and III is 1:3:5, if 32 parts by mass of A combine with 84 parts by mass

of B in II, then III, 16 parts of A will combine with..... by mass of B .

A. 42 parts

B. 70 parts

C. 64 parts

D. 96 parts

Answer: B



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Follow Up Test 9

1. Which of the following hypotheses of Dalton's atomic theory explains the law of constant composition?

(i) All matter is composed of atoms.

(ii) Atoms cannot be created, divided or destroyed.

(iii) All the atoms of one element are alike, and different from those of any other element.

(iv) Atoms combine together in the ratio of small whole numbers.

A. (i),(ii),(iii),(iv)

B. (ii),(iii),(iv)

C. (i),(iii),(iv)

D. (i),(ii),(iii)

Answer: C



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2. Which of the following laws of chemical combinations cannot be explained by Dalton's atomic theory?

- A. Law of conservation of mass
- B. Law of constant composition
- C. Law of multiple proportions
- D. Law of combining volumes

Answer: D



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3. Equal volumes of two different gases 1 and 2 with respective molecular masses M_1 and M_2 are at the same temperature (T) and pressure (P), if $M_1 > M_2$, then which of the following is true regarding the number of molecules (N) ?

A. $N_1 > N_2$

B. $N_1 = N_2$

C. $N_1 < N_2$

D. Cannot be predicated

Answer: B



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4. Which of the following relationships is true?

A. Molecular mass = (Vapor density of gas)²

B. Molecular mass = $\frac{1}{2}$ (Vapor density of gas)

C. Molecular mass = $2 \times$ (Vapor density of gas)

D. Molecular mass = $\sqrt{\text{Vapor density of gas}}$

Answer: C



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5. Standard molar volume is the volume occupied by 1 mol of a gas at and 1 atm pressure.

A. $0^{\circ}C$

B. $0K$

C. $25^{\circ}C$

D. $273K$

Answer: A



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1. Atoms of which fo the following elements have independent existence?

- A. Halogens
- B. Noble gases
- C. Oxygen
- D. Nitrogen

Answer: B



[Watch Video Solution](#)

2. Atomicity of which of the following molecules is minimum ?

- A. Monoclinic sulphur
- B. Buckminsterfullerene
- C. White phosphorus
- D. Ozone

Answer: D



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3. When we use the atomic masses of elements in calculations, we actually use the average atomic masses of elements because most elements occur naturally as a mixture of different

- A. isotopes
- B. isobars
- C. isotones

D. isoelectronics

Answer: A



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4. Defining 1 amu as $1/12$ of the mass of a ${}^{12}_6\text{C}$ atom means that protons and neutrons each have a mass of almost exactly 1 amu, because

- A. atom as a whole is electrically neutral
- B. C atom contains equal number of protons and neutrons
- C. the mass of an electron is negligible compared with the mass of proton and neutron
- D. neutrons are slightly heavier than protons

Answer: C



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5. The mass of an atom in atomic mass units (called the atom's isotopic mass) is numerically close to the atom's

- A. atomic number
- B. mass number
- C. atomic weight
- D. atomicity

Answer: B



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1. The smallest electrically neutral unit of ionic compounds is called

- A. molecule
- B. formula unit
- C. unit cell
- D. crystal

Answer: B



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2. A notation that uses atomic symbols with numerical subscripts to convey the relative proportions of atoms of

different elements in the substance is called the of a substance.

- A. molecular formula
- B. empirical formula
- C. chemical formula
- D. simplest formula

Answer: C



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3. Which of the following is a polyatomic ion?

- A. Oxide ion
- B. Peroxide ion

C. Superoxide ion

D. Both(1) and (2)

Answer: D



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4. A molecule is a definite group of atoms that arebonded together, that is, tightly connected by attractive forces.

A. ionically

B. metaliically

C. physically

D. convalently

Answer: D



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5. A substance that is composed of molecules all of which are alike is

- A. an element
- B. a molecular substance
- C. a covalent compound
- D. an ionic compound

Answer: B



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6. Which of the following is not a molecular substance?

A. Chlorine

B. Sulphur

C. Phosphorus

D. Neon

Answer: D



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7. Which of the following elements does not have a simple molecular structure but consist of a very large, indefinite number of atoms bonded together?

A. White phosphours

B. Rhombic sulphur

C. Carbon

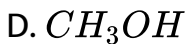
D. Red phosphorous

Answer: C



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8. Which of the following compounds is not a molecular substance?



Answer: A



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Follow Up Test 12

1. The molecular mass of glucose ($C_6H_{12}O_6$) molecule to three significant figures is

A. $180.162u$

B. $180.0u$

C. $180.00u$

D. 1.80×10^2u

Answer: D



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2. Strictly speaking the term molecular mass has no meaning for

A. ethylene, C_2H_2

B. acetic acid, (CH_3COOH)

C. zinc phosphate, $Zn_3(PO_4)_2$

D. benzene, C_6H_6

Answer: C



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3. Strictly speaking the term formula mass has no meaning for

A. radon gas

B. nitrogen dioxide gas

C. ordinary table salt

D. sugar

Answer: A



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Follow Up Test 13

1. One ream of copier paper containssheets of paper

A. 500

B. 400

C. 600

D. 300

Answer: A



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2. The number of atoms in a 12g sample ofis called Avogadro's number.

A. $C - 14$

B. $C - 12$

C. $C - 13$

D. $C - 15$

Answer: B



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3. In order to determine Avogadro's number precisely, the mass of a $C - 12$ atom was determined by

A. a physical balance

B. an analytical balance

C. a mass spectrometer

D. a weighing machine

Answer: C



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4. The value of Avogadro's constant depends on the

A. temperature

B. pressure

C. mass

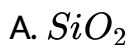
D. atomic mass scale

Answer: D



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5. Stricly speaking the term gram molecular mass cannot be applied for



Answer: A



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Follow Up Test 14

1. Zinc (Zn) a silvbery metal is used to from brass (with copper) and to plate iron to prevent corrosion. How many grams of Zn are there in $0.25mol$ of Zn ?

A. $16g$

B. $13g$

C. $15g$

D. $20g$

Answer: A



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2. How many molecules are there in $3.46g$ sample of hydrogen chloride (HCl)?

A. 3.72×10^{22}

B. 4.87×10^{22}

C. 1.95×10^{22}

D. $3.786 \times 10^{22} g$

Answer: D



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3. Calculate the mass (in grams) of a single $C - 12$ atom.

A. $1.993 \times 10^{-23} g$

B. $2.875 \times 10^{-23} g$

C. $4.162 \times 10^{-23} g$

D. $3.786 \times 10^{-23} g$

Answer: A



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4. One atom mass unit (amu) is equivalent to

A. $3.786 \times 10^{-24} g$

B. $1.661 \times 10^{-24} g$

C. $2.687 \times 10^{-24} g$

D. $5.099 \times 10^{-24} g$

Answer: B



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5. How many moles of CO_2 are left if 0.15×10^{21} molecules are removed from 220mg of CO_2 ?

A. 0.00025

B. 0.0067

C. 0.005

D. 0.091

Answer: A



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6. 5.6L of ozone gas is equivalent to

A. $1/4$ mol ozone

B. $1/2$ mol ozone

C. 1molO_3

D. $1/8$ mol ozone

Answer: A



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7. Calculate the volume occupied by 5.25g of nitrogen gas under a pressure of 74.2cmHg and at 26°C .

A. 7.4L

B. 4.67L

C. 5.93L

D. 6.86L

Answer: B



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8. Calculate the number of H atoms in $39.6g$ of ammonium sulphate, $(NH_4)_2SO_4$.

A. $4.41 \times 10^{24} H$ atoms

B. $7.86 \times 10^{24} H$ atoms

C. $1.44 \times 10^{24} H$ atoms

D. $5.72 \times 10^{24} H$ atoms

Answer: C



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Follow Up Test 15

1. Nitric acid (HNO_3) is 1.6 % H , 22.2 % N , and 76.2 % O by mass. All pure samples of HNO_3 have this composition according to the

- A. law of multiple proportions
- B. law of reciprocal proportions
- C. law of definite proportions
- D. law of conservation of mass

Answer: C

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2. Red colored compound, hemoglobin present in blood contains 0.355 % Fe ($AM = 56u$) If four atoms of Fe are

present per molecule of hemoglobin, its molecular mass would be

A. $63098u$

B. $78654u$

C. $54786u$

D. $98036u$

Answer: A



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3. A compound having the formula $Br_3C_6H_3(C_3H_9)_n$ contains 10.46% Br by mass, the value of n is

A. 54

B. 65

C. 45

D. 35

Answer: C



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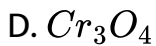
Follow Up Test 16

1. Determine the empirical formula (*EF*) of the oxide of chromium containing 68.4% *Cr* by mass.

A. CrO_3

B. Cr_2O_3

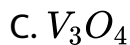
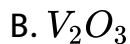
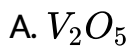
C. CrO_5



Answer: B

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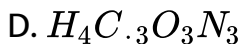
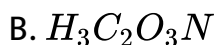
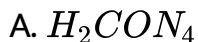
2. If 2.73g of oxide of vanadium contains 1.53g of the metal vanadium, the empirical formula of the oxide is



Answer: A

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3. In a given compound the elements H , C , O , and N are in the mass ratio 1 : 3 : 4 : 7 The empirical formula of the compound is

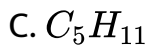
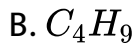
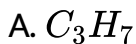


Answer: C



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4. Composition fo a colorless liquid is 84.1 % C and 15.9 % H by mass. Its empirical formula is

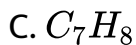
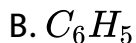
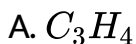


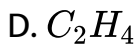
Answer: B



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5. A gaseous hydrocarbon gives upon combustion 0.72g of water and 3.08g of CO_2 . The empirical formula of the hydrocarbon is





Answer: C

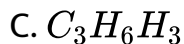
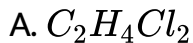


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Follow Up Test 17

1. A compound contains 4.07 % H , 24.27 % C , and 71.65 % Cl .

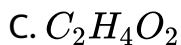
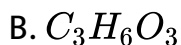
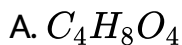
If its molar mass is 98.96, the molecular formula will be



Answer: A

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2. 0.30g of an organic compound containing C , H , and O on combustion yields 0.44g of CO_2 and 0.18g of H_2O . If its molecular mass is 60g then molecular formula will be



Answer: C

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1. A chemical equation does not show

- A. the substance that react
- B. the substances formed
- C. the relatives amounts of the substances involved
- D. how products are formed from reactants

Answer: D



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2. A chemical equation does not tell us

- A. the physical states of the reactants and products

B. the special conditions required for some reactions

C. how long it will take for the change to occur

D. which chemical bonds are broken and which new ones are formed.

Answer: C



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Follow Up Test 19

1. The stoichiometric coefficients do not represent

A. relative number of molecules of the reactants and products

B. relative number of moles of the reactants and products

C. relative volumes of each gaseous reactant and product

under the identical conditions of temperature and pressure

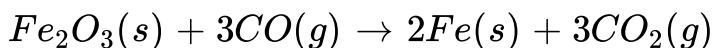
D. the relative mass of reactants and products

Answer: D



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2. Hematitic (Fe_2O_3) is an important ore of iron. The free metal (Fe) is obtained by reducing hematite with carbon monoxide (CO) in a blast furnace:



How many grams of Fe can be produced from $1.00\text{kg } Fe_2O_3$?

A. 698g

B. 786g

C. 896g

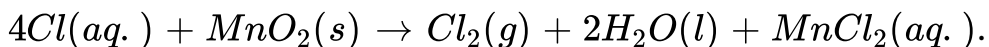
D. 968g

Answer: A



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3. Yellowish-green gas chlorine (Cl_2) can be prepared in the laboratory by heating hydrochloric acid (HCl, aq) with pyrolusite (manganese dioxide, MnO_2):



How many grams of HCl reacts with 5.00g of manganese dioxide?

A. $4.80gHCl$

B. $8.40gHCl$

C. $6.95gHCl$

D. $5.69gHCl$

Answer: B



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4. How many grams of oxygen (O_2) gas reacts completely with $1.0g$ of calcium?

A. $0.6g$

B. $1.6g$

C. $4.0g$

D. $0.4g$

Answer: D



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Follow Up Test 20

1. If 0.50mol of barium chloride ($BaCl_2$) is mixed with 0.20 mol of sodium phosphate (Na_3PO_4) the maximum number of moles of barium phosphate [$Ba_3(PO_4)_2$] formed is

A. 0.25

B. 0.10

C. 0.40

D. 0.50

Answer: B



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2. The moles of product are always determined by the starting moles of

- A. excess reactant
- B. more reactive reactant
- C. limiting reactant
- D. less reactive reactant

Answer: C



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1. An aqueous solution that is 3.5 % sodium chloride by mass can be prepared by dissolving 3.5g of $NaCl$ ing of H_2O

A. 100

B. 103.5

C. 96.5

D. less than 100

Answer: C



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2. A sample of commercial sulphuric acid is 98 % H_2SO_4 by mass. Calculate the mole fractions of H_2SO_4 and H_2O .

A. 0.9, 0.1

B. 0.1, 0.9

C. 0.2, 0.8

D. 0.8, 0.2

Answer: A



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3. Molarity of pure water is

A. $18M$

B. $10M$

C. $55.5M$

D. $1000M$

Answer: C



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4. A molal solution is one that contains 1 mol of a solute dissolved in

A. $22.4L$ of solution

B. $1L$ of solution

C. $1L$ of solvent

D. $1000g$ of solvent

Answer: D



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5. The normality of $0.3M$ phosphorus acid (H_3PO_3) is

A. $0.6N$

B. $0.3N$

C. $0.9N$

D. $0.1N$

Answer: A



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6. Calculate the number of grams of H_2SO_4 in $500mL$ of $0.324MH_2SO_4$ solution.

A. $19.5g$

B. $15.9g$

C. 17.8g

D. 7.86g

Answer: B



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7. Calculate the volume of 0.324M aq. H_2SO_4 required to react completely with 2.9792g of Na_2CO_3 .

A. 3.81mL

B. 81.3mL

C. 78.6mL

D. 68.7L

Answer: B



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Question Bank

1. Which of the following is not a compound?

A. Common salt

B. Marble

C. Sugar

D. Coal

Answer: D



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2. Which of the following is a homogenous mixture?

A. Smoke

B. Milk

C. Iodized table salt

D. Gasoline

Answer: D



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3. Laws of chemical combinations are important because they provided the first scientific evidence for

A. rate of reaction

B. energy exchanged during a reaction

C. existence of atoms

D. mechanism of reaction

Answer: C



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4. Standard molar volume of all gases is

A. $22.4L$

B. $22.4m^3$

C. $22.4ml$

D. $22.4cm^3$

Answer: A



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5. Which of the following has the minimum mass?

A. $6.02 \times 10^{22} H_2$ molecules

B. 1120cc of CO_2 at *STP*

C. 0.1 mol of NH_3

D. 0.1g atom of carbon

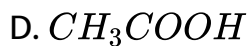
Answer: A



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6. The empirical formula fo a compound is CH_2O . Its vapor density is 30. It reacts with sodium metal. The compound is

A. $HCOOCH_3$



Answer: D



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7. On heating 100g of $Na_2SO_4 \cdot 10H_2O$ will lose % of water.

A. 44.1

B. 65.3

C. 55.9

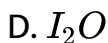
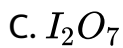
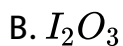
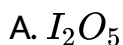
D. 34.7

Answer: C



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8. An oxide of iodine ($I = 127$ atoms) contains $42.3g$ of iodine and $8g$ of oxygen. Its formula could be



Answer: B



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9. Which pair of species has the same percentage composition?

A. $C_6H_{12}O_6$ and $C_{12}H_{22}O_{11}$

B. $C_6H_{12}O_6$ and CH_3COOH

C. C_2H_5OH and CH_3COOH

D. $C_{12}H_{22}O_{11}$ and $HCOOH_3$

Answer: B



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10. 10g of a piece of marble (50% pure) was into excess of dilute HCl acid. When the reaction was complete,.....of CO_2 was obtained at STP

A. 22.4L

B. 5.6L

C. 1.12L

D. 7.4L

Answer: C

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11. Which of the following laws of chemical combination is illustrated by the balanced chemical equation?

- A. Law of multiple proportions
- B. Law of definite proportions
- C. Law of reciprocal proportions
- D. Law of conservation of mass

Answer: D

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12. How many molecules are present in 1g of hydrogen gas?

A. 5.301×10^{23}

B. 6.346×10^{23}

C. 4.346×10^{22}

D. 3.01×10^{23}

Answer: D



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13. Dissolving 120g of urea ($M_w = 60$) in 1000g of water gave a solution of density 1.15 gmL^{-1} . The molarity of solution is:

A. $1.78M$

B. $1.02M$

C. $0.50M$

D. $2.05M$

Answer: D



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14. In which of the following numbers are all the zeros significant?

A. 10.00

B. 0.200

C. 0.0020

D. 0.00002

Answer: A



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15. Five thousands, with three significant figures, is written as

A. 0.50×10^3

B. 5000

C. 5.00×10^3

D. 5.0×10^3

Answer: C



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16. The height of a person has been reported in the following different ways. Which of these is the most accurate?

A. 160.000cm

B. 160.00cm

C. 160.0cm

D. 160cm

Answer: A



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17. Which of the following consists of two or more than two different types of atoms?

A. Silica

B. Graphite

C. Diamond

D. Ozone

Answer: A



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18. Which of the following is a pure substance?

A. Gasoline

B. Distilled water

C. Iodized table salt

D. Liquefied petroleum gas

Answer: B



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19. At what temperature the Celsius and Fahrenheit readings have the same numerical value?

A. -35°

B. -40°

C. -45°

D. -30°

Answer: B



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20. The number of significant figures in pi (π) is

A. three

B. one

C. infinite

D. two

Answer: C



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21. Which of the following is true?

(i) The result of a measurement may be absolutely precise or it may have some uncertainty.

(ii) Scientists have agreed that a number expressing a measurement will include all digits which are certain and a last digit which is uncertain. (iii) Total number of digits in the

number expressing a measurement is called the number of significant figures.

A. (i),(ii)

B. (ii),(iii)

C. (i),(iii)

D. (i),(ii),(iii)

Answer: D



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22. Suppose the mass of an object has been determined to be $14.5678g$. If the accuracy of the analytical balance used is $0.0001g$. This means that the actual mass of the object is

A. $14.5678g$

B. $14.5677g$

C. $14.5679g$

D. between $14.5677g$ and $14.5679g$

Answer: D



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23. Numbers are expressed in scientific notation. In this notation, every number is written as $N \times 10^n$, where

$N = a$ number with a single non-zero digit to the left of the decimal point

$n = an$ interger

How many different scientific notations may be written for the result $10500g$

A. Four

B. three

C. Five

D. Two

Answer: B



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24. Which of the following is correct for luminous intensity?

A. It is amount of light emitted per second in unit solid

angle by a point source direction.

B. The *SI* unit of luminous intensity is candela

C. The term "luminous intensity" is restricted to point sources only.

D. All of these

Answer: D



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25. Candela is the *SI* unit of

A. luminous intensity

B. luminous flux

C. luminosity

D. luminescence

Answer: A



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26. The dimensions of Planck's constant are

A. kgm^2s^{-1}

B. $kgms^{-2}$

C. $kg^2m^2s^{-1}$

D. kgm^2s^{-2}

Answer: A



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27. The prefix yotta stands for

A. 10^{15}

B. 10^{24}

C. 10^{21}

D. 10^{18}

Answer: B



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28. Which of the following has an ambiguous number of significant figures?

A. 7.03

B. 500

C. 0.05

D. 705.7

Answer: B



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29. The diameter of the nucleus of an atom is measured in fermi (femto)meter (fm) which is equal to

A. $10^{-18}m$

B. $10^{21}m$

C. $10^{-15}m$

D. $10^{-24}m$

Answer: C



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30. Which of the following is correct?

- A. When we are dealing with objects which can be counted, we always get an exact answer.
- B. Though the height of a person is an exact quantity, it is not possible to measure it exactly.
- C. Chairs are measured by a continuous variable, height is measured by a discrete variable
- D. The measurement of a continuous variable can only be as precise as the choice of the measuring apparatus but no matter what we do, some uncertainty always remains.

Answer: C



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31. Which of the following is wrong?

A. $22.2 + 2.22 + 0.222$, reported sum is 24.6

B. $4.53 + 2.3 + 6.24$, reported sum is 13.063

C. $7.21 + 12.141 + 0.0028$, reported sum is 19.35

D. $3.74 - 0.0016$, reported difference is 3.74

Answer: B



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32. Which of the following is wrong?

A. 1.234 is rounded off to 1.23

B. 1.236 is rounded off to 1.24

C. 1.235 is rounded off to 1.23

D. 1.225 is rounded off to 1.22

Answer: C



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33. Which of the following is not true?

A. 51.028×1.31 , reported product is 66.8

B. 4.327×2.8 , reported product is 1.3×10^1

C. 1.235 is rounded off to 1.23

D. 1.225 is rounded off to 1.22

Answer: D



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34. Which of the following is correct?

(i) $\frac{5.28 \times 0.156 \times 3}{0.0428} = 55.7$

(ii) $\frac{5.28 \times 0.156 \times 3}{0.0421} = 56.7$

(ii) $\frac{42.967 \times 0.02435}{0.34 \times 4} = 0.77$

A. (i),(ii)

B. (i),(ii),(iii)

C. (i),(iii)

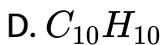
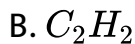
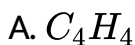
D. (ii),(iii)

Answer: B



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35. A container contains $0.32g$ of O_2 and the same volume of an unknown gas at the same T and P weighing $0.26g$. If the gas obtain only C and H in the ratio $1:1$ its molecular formula will be



Answer: B



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36. The total number of atoms present in $10.6g$ of Na_2CO_3 will be

A. 1.89×10^{23}

B. 3.61×10^{23}

C. 24.1×10^{23}

D. 12.0×10^{23}

Answer: B



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37. Which of the following has the minimum number of atoms?

A. $0.5g$ atom of Cu

B. $0.635g$ of Cu

C. 0.25 mol of Cu

D. $6.35 \times 10^{20}u$ of Cu

Answer: D



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38. Law of reciprocal proportions was establish by

A. Lavoisier

B. Proust

C. Dalton

D. Richter

Answer: D



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39. 5g of $KClO_3$ gives 1.36L of oxygen at *STP*. The law of conservation of mass is valid within limits oferror.

A. +0.4 %

B. -0.4 %

C. +0.2 %

D. -0.2 %

Answer: B



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40. 29.2 % (*W / W*) *HCl* stock solution has density of 1.25gmL^{-1} . The molar mass of *HCl* is 36.5gmol^{-1} . The volume (*mL*) of stock solution required to prepare a 200*mL* solution of 0.4*M* *HCl* is

A. $8mL$

B. $6mL$

C. $7mL$

D. $5mL$

Answer: A



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41. How many elements are found in nature?

A. 98

B. 92

C. 105

D. 100

Answer: A



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42. The number of synthetic elements are

A. 14

B. 25

C. 17

D. 20

Answer: D



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43. Barn is used to measure the cross-sectional area of the nucleus of an atom. It is equal to

A. $10^{-28} m^2$

B. $10^{-25} m^2$

C. $10^{-31} m^2$

D. $10^{-17} m^2$

Answer: C



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44. Loschmidt number is the number of molecules in 1.....of a gas at *STP*.

A. *L*

B. m^3

C. mL

D. unit volume

Answer: D



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45. Which of the following will not change if a mole were to contain 1×10^{24} particles?

A. Mass of 1 mol of oxygen molecule gas

B. Mass of a single oxygen molecule

C. Mass of a single oxygen

D. All of these

Answer: A

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46. A chemical equation for a gaseous reaction gives quantitative details about reactants and products in terms of

(i) molecules (or atoms) (ii) moles

(iii) grams (iv) volumes

A. (i),(ii)

B. (ii),(iv)

C. (ii),(iii),(iv)

D. (i),(ii),(iii),(iv)

Answer: D

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47. If 13.1g of $Na_2SO_4XH_2O$ contains 6g of H_2O , the value of X is

A. 10

B. 5

C. 3

D. 7

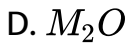
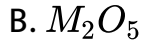
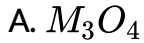
Answer: D



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48. Two metallic oxides contain 27.6% and 30% oxygen, respectively. If the formula of the second oxide is M_2O_3 , that of

the first will be



Answer: A

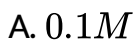


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Archives

$1.6.02 \times 10^{20}$ molecules of urea are present in $100mL$ solution.

The concentration of urea solution is:



B. $0.001M$

C. $0.1M$

D. $0.02M$

Answer: A



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2. $100mL$ of phosphine (PH_3) on heating forms phosphorous (P) and hydrogen (H_2). The volume change in the reaction is

A. a decrease of $50mL$

B. an increase of $100mL$

C. an increase of $150mL$

D. an increase of of $50mL$

Answer: D



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3. Common salt obtained from sea water contains 95 % $NaCl$ by mass. The approximate number of molecules present in 10.0g of the salt is

A. 10^{24}

B. 10^{23}

C. 10^{22}

D. 10^{21}

Answer:



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4. 10g of hydrogen and 64g of oxygen were filled in a steel vessel and exploded. Amount of water produced in this reaction will be

A. 2 mol

B. 3 mol

C. 4 mol

D. 3 mol

Answer: C



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5. How many moles of lead (II) chloride will be formed from a reaction between 6.5g of PbO and 3.2g of HCl ?

A. 0.333

B. 0.011

C. 0.044

D. 0.029

Answer: D



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6. What volume of oxygen gas (O_2) measured at $0^\circ C$ and 1 atm needed to burn completely $1L$ of propane gas (C_3H_8) measured under the same conditions?

A. $5L$

B. $7L$

C. $10L$

D. $6L$

Answer: A



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7. An element X has the following isotopic composition:

$^{200}\text{X}(90\%)$, $^{199}\text{X}(8.0\%)$, $^{202}\text{X}(2.0\%)$

The weighted average atomic mass of the naturally occurring element X is closest to

A. 202amu

B. 200amu

C. 199amu

D. 201amu

Answer: B



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8. Number of atoms of *He* in 100 atoms of *He* (at.mass 4 amu) is

A. $100 \times 6.022 \times 10^{23}$

B. 50

C. 25

D. 100

Answer: C



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9. Which among the following is the heaviest?

- A. 1 mol of oxygen
- B. One molecule of sulphur trioxide
- C. 100 amu of uranium
- D. 100 mol of hydrogen

Answer:



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10. The mass of carbon anode consumed (giving only carbon dioxide) in the production of 270kg of aluminium metal from bauxite by the Hall process is

- A. 180kg

B. 540kg

C. 270kg

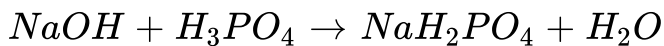
D. 90kg

Answer: D



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11. What is the equivalent weight of phosphoric acid (H_3PO_4) according to the equation



A. $98u$

B. $59u$

C. $49u$

D. $25u$

Answer: A



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12. 18 carat gold contains

A. 60 % gold

B. 75 % gold

C. 18 % gold

D. 60 % gold

Answer: B



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13. Number of water molecules in a drop of water, if 1mL of water has 20 drops and A is Avogadro's number, is

A. $0.05A$

B. $0.5A$

C. $\frac{0.05A}{18}$

D. $\frac{0.5A}{18}$

Answer: C



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14. The maximum number of molecules is present in

A. 15L of H_2 gas at STP

B. 0.5g of H_2 gas

C. $10g$ of O_2 gas

D. $5L$ of N_2 gas at STP

Answer: A



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15. What will be the volume of the mixture after the reaction

A. $1.5L$

B. $0.5L$

C. $1L$

D. $0L$

Answer: B



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16. In Haber process 30 litre of dihydrogen and 30 litres of dinitrogen were taken for reaction which yielded only 50% of the expected product. What will be the composition of gaseous mixture under the aforesaid condition in the end ?

- A. 20L ammonia, 25L nitrogen, 15L hydrogen
- B. 20L ammonia, 10L nitrogen, 30L hydrogen
- C. 10L ammonia, 25L nitrogen, 15L hydrogen
- D. 20L ammonia, 20L nitrogen, 20L hydrogen

Answer: C



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17. A compound has hemoglobin-like structure. It has one Fe and contains 4.6 % of Fe . The approximate molecular mass is

A. 1200u

B. 1000u

C. 1400u

D. 1600u

Answer: A



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18. Among (i) $FeSO_4 \cdot 7H_2O$, (ii) $CuSO_4 \cdot 5H_2O$, (iii) $ZnSO_4 \cdot 7H_2O$ and (iv) $MnSO_4 \cdot 4H_2O$, isomorphous salts are

A. (i) and (ii)

B. (i) and (iv)

C. (i) and (iii)

D. (iii) and (ii)

Answer: C



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19. If oxygen is present in $1L$ flask at a pressure of $7.6 \times 10^{-10} mmHg$ then the number of oxygen molecules in the flask at $0^\circ C$ will be

A. 0.27×10^{10}

B. 0.027×10^{10}

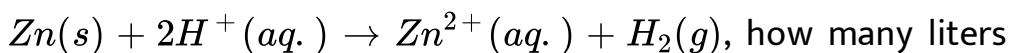
C. 2.7×10^{10}

D. 27×10^{10}

Answer: C

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20. In the reaction



how many liters of hydrogen gas measured at *STP* is produced when 6.54g of

Zn is used ($Zn = 65.4u$) ?

A. 22.4L

B. 11.2L

C. 2.24L

D. 1.12L

Answer: C

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21. Given the number: 161 cm, 0.161 cm, 0.0161 cm. The number of significant figures for the three numbers are

- A. 3, 3 and 4 respectively
- B. 3, 4 and 4 respectively
- C. 3, 3 and 3, respectively
- D. 3, 4 and 5, respectively

Answer: C



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22. Dimensions of pressure are same as that of

- A. force

B. energy per unit volume

C. force per unit volume

D. energy

Answer: B



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23. Number of significant figures in 5.23×10^5 is

A. 5

B. 3

C. 8

D. 7

Answer: B



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24. How many significant figures should be there in the answer

of $\frac{(1.79 \times 10^5)(29.2 - 20.2)}{1.39}$?

A. 3

B. 1

C. 4

D. 2

Answer: D



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25. Fractional distillation of crude petroleum is performed to obtain

- A. diesel
- B. petrol
- C. gasoline
- D. All of these

Answer: D



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26. Which of the following forms the largest number of compounds ?

- A. Carbon

B. Hydrogen

C. Oxygen

D. Nitrogen

Answer: A



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