CHEMISTRY

NCERT - NCERT CHEMISTRY(HINGLISH)

SOME BASIC CONCEPTS OF CHEMISTRY

Solved Example

1. A piece of metal is 3 inch (represented by in) long. What is its length in cm?

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2. A jug contains 2L of milk. Calcualte the volume of the milk in m^3

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3. How many seconds are there in 2 days?

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

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5. 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

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6. Calculate the amount of water (g) produced by the combustion of 16 g of methane

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7. Consider the following reactions,

$$CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$$

How many moles of methane are required to produce 22g of CO_2(g) after combustion?

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8. $50.0kg$ of $N_2(g)$ and $10kg$ of $H_2(g)$ are mixed to produce $NH_3(g)$. Calculate the $NH_3(g)$ formed. Identify the limiting reagent.

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9. A solution is prepared by adding 2 g of a substance A to 18 g of water. Calculate the mass per cent of the solute.

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10. Calculate the molarity of NaOH in the solution prepared by dissolving its 4 g in enough water to form 250 mL of the solution.

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11. The density of $3M$ solution of $NaCl$ is $1.25 gmL^{-1}$. The molality of the solution is

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Exercise

1. Calculate the molecular mass of the following:

a. H_2O

b. CO_2

c. CH_4

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2. Calculate the mass precent of different elements present in sodium sulphate (Na_2SO_4).

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3. Determine the empirical formula of an oxide of iron which has $69.9\,\%$ iron and $30.1\,\%$ dioxygen by mass.

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4. Calculate the amount of carbon dioxide that could be produced when

a. 1 mol of carbon is burnt in air

b. 1 moles of carbon is burnt in $16g$ of dioxygen.

c. 2 moles of carbon are burnt in $16g$ of dioxygen.

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5. Calculate the mass of sodium acetate (CH_3COONa) required to make $500mL$ of 0.375 molar aqueous solution. Molar mass of sodium of acetate is $82.0245gmol^{-1}$.

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6. Calculate the concentration of nitric acid in moles per litre in a sample which has a density $1.41 gmL^{-1}$ and the mass percent of nitric acid in it being $69\ \%$.

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7. How much copper can be obtained from $100g$ of copper sulphate $(CuSO_4)$?

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8. Determine the molecular formula of an oxide of iron in which the mass percent of iron and oxygen are 69.9 and 30.1, respectively.(molecular mass is 159.8).

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9. Calculate the atomic mass (average) of chlorine using the following data:

	% natural abundance	Molar mass
$._{}^{35}Cl$	75.77	34.9689
$._{}^{37}Cl$	24.23	36.9659

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10. In three moles of ethane(C_2H_6), calculate the following:

(i) Number of moles of carbon atoms.

(ii) Number of moles of hydrogen atoms.`

(iii) Number of molecules of ethane.

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11. What is the concentration of sugar $(C_{12}H_{22}O_{11})$ in $molL^{-1}$ if its $20g$ are dissolved in enough water to make a final volume up to $2L$?

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12. If the density of methanol is $0.793kgL^{-1}$ what is its volume needed for making 2.5 L of its $0.25M$ solution?

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13. Pressure is determined as force per unit area of the surface. The SI unit of pressure, pascal is as shown below:

$1Pa = Nm^{-2}$

If the mass of air at sea level is $1034 gcm^{-2}$, calculate the pressure in pascal.

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14. What is the SI unit of mass? How is it defined?

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15. Match the following prefixes with their multiples:

	Prefixes	Multiples
(i)	micro	10^{6}
(ii)	deca	10^{9}
(iii)	mega	10^{-6}
(iv)	giga	10^{-15}
(v)	femto	10

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16. What do you mean by significant figures?

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17. A sample of drinking water was found to be severely contaminated with chloroform, $CHCl_3$, supposed to be carcinogen. The level of contamination was 15 ppm (by mass).

(i) Express this in per cent by mass.

(ii) Determine the molality of chloroform in the water sample.

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18. Express the following in the scientific notation:

a. 0.0048

b. 234000

c. 8008

d. 500.0

e. 6.0012

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19. How many significant figures are present in the following?

a. 0.0025

b. 208

c. 5005

d. 126000

e. 500.0

f. 2.0034

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20. Round up the following upto three significant figures:

a. 34.216

b. 10.4107

c. 0.04597

d. 2808

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21. The following data are obtained when dinitrogen and dioxygen react to gether to form different compounds:

	Mass of dinitrogen	Mass of dioxygen
$i.$	$14g$	$16g$
$ii.$	$14g$	$32g$
$iii.$	$28g$	$32g$
$iv.$	$28g$	$80g$

a. Which law of chemical combination is obeyed by the above experimental data? Give its statement.

d. Fill in the blanks in the following conversions:

I. $1km$= ..... mm= .....pm

II. $1mg =$ ..... $kg =$ ..... ng

III. $1mL$= ..... L= ..... dm^3

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22. If the speed of light is $3.0 \times 10^8 ms^{-1}$, calculate the distance covered by light in $2.00ns$.

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23. In a reaction

$A + B_2 \rightarrow AB_2$

Identify the limiting reagent, if any, in the following reaction mixtures.

a. $300\text{atoms of } A + 200$ molecules of B

b. $2molA + 3molB$

c. $100\text{atoms of } A + 100$ molecules of B

d. $5molA + 2.5molB$

e. $2.5molA + 5molB$

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24. Dinitrogen and dihydrogen react with each other to produce ammonia according to the following chemical equation:

$N_2(g) + 3H_2(g) \rightarrow 2NH_3(g)$

a. Calculate the mass of ammonia produced if $2.00 \times 10^3 g$ dinitrogen reacts with $1.00 \times 10^3 g$ of dihydrogen.

b. Will any of the two reactants remain unreacted?

c. If yes, which one and what would be its mass?

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25. How are $0.50 mol Na_2CO_3$ and $0.50 M Na_2CO_3$ different?

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26. If ten volumes of dihydrogen gas reacts with five volumes of dioxygen gas, how many volumes of water

vapour would be produced?

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27. Convert the following into basic units:

a. $28.7pm$

b. $15.15pm$

c. $25365mg$

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28. Which one of the following will have the largest number of atoms?

(i) 1 g Au (s)

(ii) 1 g Na (s)

(iii) 1 g Li (s)

(iv) 1 g of Cl_2(g)

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29. Calculate the molarity of a solution of ethanol in water in which the mole fraction of ethanol is 0.040.

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30. What will be the mass of one $.^{12}C$ atom in g?

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31. How many significant figures should be present in the answer of the following calculations?

a. $\frac{0.02856 \times 298.15 \times 0.112}{0.5785}$

b. 5×5.364

c. $0.0125 + 0.7864 + 0.0215$

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32. Use data given in the following table to calculate the molar mass of naturaly occuring argon isotopes:

Isotope	Isotopic molar mass	Abundance
$.^{36}Ar$	$35.96755 gmol^{-1}$	$0.337\ \%$
$.^{38}Ar$	$37.96272 gmol^{-1}$	$0.063\ \%$
$.^{40}Ar$	$39.9624 gmol^{-1}$	$99.600\ \%$

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33. Calculate the number of atoms in each of the following

(i) 52 moles of Ar (ii) 52 u of He (iii) 52 g of He.

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34. A welding fuel gas contains carbon and hydrogen only. Burning a small sample of it in oxygen gives 3.38 g carbon dioxide, 0.690 g of water and no other products. A volume of 10.0 litre (Measured at STP) of this welding gas is found weigh $11.6g$. Calculate

(i) empirical formula,

(ii) molar mass of the gas, and

(iii) molecular formula.

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35. Calcium carbonate reacts with aqueous HCl to give $CaCl_2$ and CO_2 according to the reaction:

$CaCO_3(s) + 2HCl(aq) \rightarrow CaCl_2(aq) + CO_2(g) + H_2O(l)$

What mass of $CaCO_3$ is required to react completely with $25mL$ of $0.75MHCl$?

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

$4HCl(aq.) + MnO_2(s) \rightarrow Cl_2(g) + 2H_2O(l) + MnCl_2(aq.)$

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

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