CHEMISTRY

BOOKS - CENGAGE CHEMISTRY

CHEMICAL ARITHMETIC

Worked Example

1. Calcultae the relative mass of the compound:

sulphuric acid H_2SO_4

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2. Calcultae the relative mass of the compound:

Ammonia : NH_3

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3. Calcultae the relative mass of the compound:

Hydrated ferrous suplhate : $FeSO_4 . 7H_2O$

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4. Calculate the mass precentage composition of magnesium sulphate [given the atomic masses $Mg = 24, S = 32$ and $O = 16$]

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5. Find the mass percentage of watr of hydration in blue vitrio $(CuSO_4, 5H_2O)$. [Given the atomic masses, $Cu = 63.6$, $S = 32$, $H = 1$, and $O = 16$]

6. Find the percentage of carbon dioxide by mass in calcuim crbonate [Give the atomic masses, Ca = 40, C = 12 and O = 16]

7. Molecular formula of acetic acid is CH_3COOH. Calculate its percentage composition by mass [Given the atomic masses, $C = 12, H = 1,$ and $O = 16$]

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Mandatory Exercise Exercise Set I

1. In $MnO_2,$ valency of Mn is

A. 2

B. 1

C. 4

D. 6

Answer: C

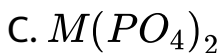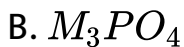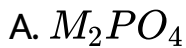**2.** Formula of a metallic sulphide is M_2S. The valency of the metal 'M' is

A. 1

B. 2

C. 4

D. none

Answer: A

3. The formula of a metal chloride is MCl_3. The formula of its phosphate is

    A. M_2PO_4

    B. M_3PO_4

    C. $M(PO_4)_2$

    D. MPO_4

Answer: D

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4. Find the valency of M (element) in compound

MCl_5

5. Find the valency of M (element) in compound

MCl_3

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6. Find the valency of M (element) in compound

M_2O_3
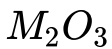
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7. Find the valency of M (element) in compound
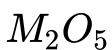
M_2O_5

8. Find the valency of M (element) in compound
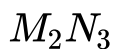
M_2N_3

9. Find the valency of M (element) in compound
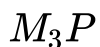
M_3P

10. Find the valency of M (element) in compound

M_2O
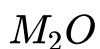
11. Find the valency of M (element) in compound

MO

12. Find the valency of M (element) in compound

MCO_3

13. Find the valency of M (element) in compound

$MHCO_3$

14. Write the formula of each of the compound.

Magnesium Chloride

15. Write the formula of each of the compound.

Ferric oxide

16. Write the formula of each of the compound.

Ammonium Hydroxide

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17. Write the formula of each of the compound.

Phosphorous pentoxide

▶ View Text Solution

18. Write the formula of each of the compound.

Sodium Bicarbonate

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Mandatory Exercise Exercise Set Ii

1. Find the oxidation number of N in the compound:

NH_3

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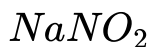**2.** Find the oxidation number of N in the compound:

NH_4^+

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3. Find the oxidation number of N in the compound:

NH_4Cl

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4. Find the oxidation number of N in the compound:
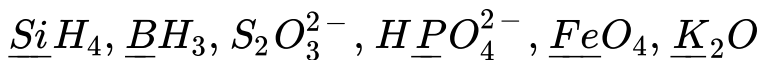
$NaNO_2$

▶ View Text Solution

5. Find the oxidation number of N in the compound:

NH_4NO_2

▶ View Text Solution

6. Determine the oxidation number of the underlined elements in the following

$\underline{Si}H_4, \underline{B}H_3, \underline{S_2}O_3^{2-}, H\underline{P}O_4^{2-}, \underline{Fe}O_4, \underline{K_2}O$

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7. Calculate the valency and oxidation number of C in the following compounds:

$$CH_4CH_3OH, CH_2O, HCOOH, C_2H_4, C_2H_2$$
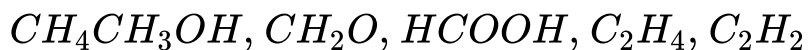
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8. Which of these can have both positive as well as negative oxidation states ?

A. Na

B. F

C. Fe

D. H

Answer: D

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9. The oxidation number of iron in $Fe_2(CO)_9$ is

A. $+1$

B. 9

C. $+9$

D. 0

Answer: D

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10. the oxidation number of carbon in CN^- is

A. $+1$

B. 0

C. -1

D. $+2$

Answer: D

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11. The oxidation number of P in P_4 molecule is

A. $+4$

B. 4

C. 0

D. $+2$

Answer: C

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12. In which of the following compounds, Cr has minimum oxidation number

A. K_2CrO

B. CrO_2Cl_2

C. $Cr(CO)_6$

D. $CrCl_3$
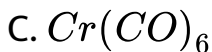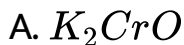
Answer: C

13. The oxidation state of which element is constant in all its compounds ?

A. H

B. O

C. N

D. F

Answer: D

14. The oxidation number and valency of S in S_8 is

A. 0

B. 2

C. 0 and 2

D. 2 and 0

Answer: A

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15. Nirogen has fractional oxidation number in

A. N_2H_4

B. NH_4^+

C. HN_3

D. N_2F_2
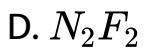
Answer: C

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16. Oxidation number of sodium in sodium amalgam is

A. $+2$

B. $+1$

C. 2

D. 0

Answer: D

17. A compound contains atoms of three elements A, B, and C with following oxidation number $A = +2, B = +5,$ and $C = -2.$ Possible formula of the compound is

    A. $A_2(BC_3)_2$

    B. $A_3(BC_4)_2$

    C. $A_3(B_4C)_2$

    D. ABC_2
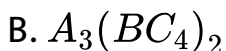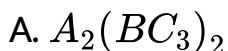
Answer: B

18. What is the oxidation number of tungsten in the ion
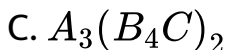
$W_6O_6C_{12}^2$?
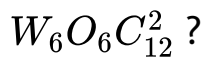
A. 2.7

B. 3.3

C. 3.7

D. 4.3

Answer: C

19. Which quantities are conserved in all oxidation Reduction reaction ?

    A. Charge only

    B. Mass only

    C. Both charge and mass

    D. None

Answer: C

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20. Oxidation state of sulphur in $Na_2S_4O_6$ is

    A. 2

B. 0

C. 2.5

D. 3.5

Answer: C

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21. Oxidation number of S in caro's acid is

A. $+6$

B. $+4$

C. $+8$

D. $+7$

Answer: A

22. The oxidation state of Cr in Chromium trioxide is

A. $+3$

B. $+4$

C. $+5$

D. $+6$

Answer: D

23. The oxidation states of Iodine in HIO_5 and H_5IO_6 are respectively.

A. $+1, +3, +7$

B. $+7, +7, +3$

C. $+7, +7, +7$

D. $+7, +5, +3$

Answer: C

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24. Oxidation states of x,y,z are $+2, +5,$ and -2 respectively. Formula of the compound formed by these will be.

A. x_2yz_6

B. xy_2z_6

C. xy_5

D. x_3yz_4
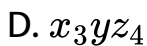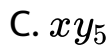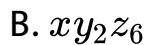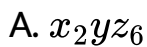
Answer: B

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25. In which of the following compounds, the oxidation number of Iodine is fractional ?

A. IF_3

B. IF_5

C. I_3^-

D. IF_7

Answer: C

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26. When $K_2Cr_2O_7$ is converted into K_2CrO_4, the change in oxidation number of chromium is

A. 0

B. 5

C. 7

D. 9

Answer: A

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27. The oxidation state of I in IPO_4 is

A. $+2$

B. $+3$

C. $+5$

D. $+7$

Answer: B

28. Which of the oxidation state is not possible for oxygen ?

    A. 0

    B. $-\dfrac{1}{2}$

    C. -1

    D. $+3$

Answer: D

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29. What is the oxidation state of P in $Ba(H_2PO_2)_2$

    A. $+1$

B. $+2$

C. $+3$

D. -1

Answer: A

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30. Arrange the following in increasing order oxidation number of Mn

A. MnO

B. MnO_2

C. $KMnO_4$

D. K_2MnO_4

Answer: B

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31. In which of the following oxygen shows -1 oxidation state ?

A. CO_2

B. H_2O_2

C. H_2O

D. OF_2

Answer: B

Mandatory Exercise Exercise Set Iii

1. Calculate the relative molecular mass of the substance:

Cl_2

2. Calculate the percentage composition by mass of propanoic acid, $C_3H_6O_3$ and phenol, C_6H_5OH.

3. Calculate the molecular/formula mass of each of the substances, given the unit in each case:

   A. Sodium carbonate decahydate, $Na_2CO_3 . 10H_2O$

   B. Glucose ,$C_6H_{12}O_6$

   C. 1-bromobutane, C_4H_9Br

   D. Argon, Ar

Answer: A::B::C::D

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4. Calculate the mass percent composition of each of the substance:

Sulphuric acid, H_2SO_4

5. Calculate the mass percent composition of each of the substance:

Potassium permanganate, $KmnO_4$

6. Calculate the mass percent composition of each of the substance:

Glucoce,$C_6H_{12}O_6$

7. Calculate the mass percent composition of each of the substance:

Urea, CN_4N_2O

8. If a sample of copper contains $69.1\% \, of$ 63 Cu of isotopic mass 62.930 u and $30.9\% \, of\, ^{65}Cu$ of isotopic mass $64.298u$. Calculate the relative atomic mass of copper.

9. The percentage of water of crystallisation in washing soda

$Na_2CO_3.\ 10H_2O[Na = 23,\ C = 12,\ O = 16,\ H = 1]$ is

A. $62.92\ \%$

B. $50\ \%$

C. $75\ \%$

D. $90\ \%$

Answer: A

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10. What is the mass percent of oxygen in $Al_2(SO_4)_3 \cdot 18H_2O$?

(Give molar mass of $Al_2(SO_4)_3 \cdot 18H_2O = 666.43 gmol$)

A. 9.60

B. 28.8

C. 43.2

D. 72.0

Answer: D

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11. The oxidation state of Xe in $XeOF_2$, XeF_4 and XeO_2 is

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12. What is the relation between atomic mass and number of nucleon ?

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13. Write the atomic mass, atomic weight and relative atomic mass of calcium

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14. Calculate the no. of atoms of He in 56 amu of He simple.

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15. What is meant by 1 g atom of Na ?

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16. Express the relation between atomic mass and gram atomic weight ?

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17. Calculate the $\%$ mass of C in $H_2C_2O_42H_2O$

18. Calculate of $\%$ mass of H_2O in $MgSO_4.7H_2O$ sample.

19. Calcualte the weight of H_2O present in 100 g sample of $MgSO_4.\,7H_2O$

20. If two compounds have same Empirical form then mass percentage of both compound will be same justify the statement.

21. If mass $\%$ of N in an organic compound is 7% then minimum molar mass of compound will be ?

22. Calculate the mass $\%$ of $NH_4^{\oplus}$ in $(NH_4)_2 Cr_2 O_7$ (ammonium dichromate)

23. Calculate the mass $\%$ of C in first member of alkane and alkene homologous serise.

24. Calculate the mass % of C in carbon suboxide.

25. Calculate the percentage of carbonate ion in Na_2CO_3 and $NaHCO_3$.

26. Calculate the mass $\% \, of SO_4^{2-}$ in potash Alum $K_2SO_4^2 Al_2 (SO_4^2)_3 . 24H_2O$.

27. The formula of a metal chloride is MCl_3 and atomic weight of metal is . Find the molar mass of metal nitrate.

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28. Among NH_3, HNO_3, NaN_3 and Mg_3N_2 the numbers of molecules having nitrogen in negative oxidation state is

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29. The oxidation number of oxygen in KO_3 and Na_2O_2 is

30. Oxidation state of Br in Br_2 and BrO_3^- is

31. The difference of oxidation state of two s atoms in

$H_2S_2O_8$ is

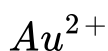**32.** Name the monoatomic cations using the IUPAC system

of nomenclature:

Ag^+

33. Name the monoatomic cations using the IUPAC system of nomenclature:

Au^{2+}

34. Name the monoatomic cations using the IUPAC system of nomenclature:

Ca^{2+}
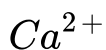
35. Name the ionic compound:

Li_2S

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36. Name the ionic compound:

SnO_2
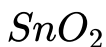
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37. Name the ionic compound:

Hg_2Cl_2

▶ View Text Solution

38. Name the ionic compound:

CuI_2

▶ View Text Solution

39. Name the ionic compound:

$CuCO_3$

▶ View Text Solution

40. Write the chemical formula for each of the compound:

Tetrasulphur dinitride

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41. Write the chemical formula for each of the compound:

Xenon tetrafluoride

▶ View Text Solution

42. Write the chemical formula for each of the compound:

Dinitrogen pentasulphide

▶ View Text Solution

43. Write the chemical formula for each of the compound:

Tetraphosphourus hexoxide

▶ View Text Solution

44. Write the chemical formula for each of the compound:

Hydrogen telluride

▶ View Text Solution

45. What is the name of the acid with the formula H_2CO_3 ?Write the formulae of the two anions derived from it and name these ions.

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46. Match the following ,

A	B
(1) Valency of P in PCl_5	(a) 44.86
(2) Atomic mass of lithium	(b) 2.66
(3) Molecular mass of fluorine	(c) 5
(4) Oxidation number of Fe in Fe_2O_3	(d) 38.00
(5) Mass percentage of water in $FeSO_4.7H_2O$	(e) 6.94

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47. Calculate the mass percent compositon of each of the

substance:

Malachite-a copper containing mineral, $Cu(OH)_2CO_3$

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48. Calculate the mass percent compositon of each of the substance:

Saccharin, $C_7H_5NO_5S$

49. Calculate the mass percent compositon of each of the substance:

Prussian blue, an ink pigment ,$Fe_4\left[Fe(CN)_6\right]_3$

50. Zinc has atomic mass $A = 65.39u$ and has five naturally occurring istopes: 64Zn,

$48.63\ \%$, $63.929u$, $66Zn$, $27.90\ \%$: u, ^{67}Zn, $0.62\ \%$, $69.925u$.

What is the isotopic mass of ^{66}Zn ?

Mandatory Exercise Exercise Set Iii Olympiad And Ntse Level Excercises

1. The oxidation number of Pt in $[Pt(C_2H_4C_3)]^-$ is

   A. $+1$

   B. $+2$

   C. $+3$

   D. $+4$

Answer: B

2. The valency of Cr in the complex $[CrH_2O)_4Cl_2]^+$ is

A. 1

B. 3

C. 5

D. 6

Answer: B

3. In the chemical reaction $Cl_2 + H_2S \rightarrow 2HCl + S,$ the oxidation number of suplphur changes from

    A. 0 to 2

    B. 2 to 0

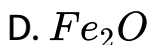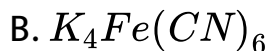   C. -2 to 0

    D. -2 to -1

Answer: C

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4. In which of the following compounds, iron has lowest oxidation state ?

A. $FeCO_5$

B. $K_4Fe(CN)_6$
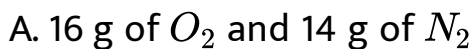
C. $FeSO_4(NH_4)_2SO_4.6H_2O$

D. Fe_2O

Answer: A

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5. Which one of the following pairs of gases contains the same number of molecules

A. 16 g of O_2 and 14 g of N_2

B. 8 g of O_2 and 22 g of CO_2

C. 28 g of N_2 and 22 g of CO_2

D. 32 g of O_2 and 32 g of N_2

Answer: A

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6. The number of oxygen atoms in $4.4 g of CO_2$ is approx.

A. 1.2×10^{23}

B. 6×10^{22}

C. 6×10^{23}

D. 12×10^{23}

Answer: A

7. Haemoglobin contains 0.33% of iron by weight. The molecular weight of haemoglobin is approximately 67200 . The number of iron atoms (At wt. of Fe = 56) present in one molecule of haemoglobin is

A. 6

B. 1

C. 4

D. 2

Answer: C

8. The number of gram atoms of oxygen present in 0.3 gram mole of $(COOH)_2. 2H_2O$ is

    A. 0.6

    B. 1.8

    C. 1.2

    D. 3.6

Answer: D

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9. Which of the following is a tetrabasic acid

A. Orthophosphorus acid

B. orthophosphoric acid

C. Metaphosphoric acid

D. Pyrophosphoric acid

Answer: B

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10. Which of the following compound is tribasic acid

A. H_3PO_2

B. H_3PO_5

C. H_5PO_4

D. $H_4P_2O_7$

Answer: C

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