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Solution 46
(a) Let the valency of element A be y, then
2y + 5(-2) = 0
So, y = valency of element A = 5
(b) As valency of element A is 5 and valency of chlorine is -1,
So, the formula of chloride of A is ACl_5.
Solution 47
Valency of X
(i) In H_2X : -2
(ii) In CX_2 : -2
(iii) In XO_2 : +4
(iv) In XO_3 : +6
Solution 48
Let the valency of X be y, then
2 x (+3) + 3 x y = 0
So, valency of X = y = -2
As valency of Mg is +2 and that of X is -2 so the formula of Magnesium salt of X will be MgX.
Solution 49
According to formula M_2CO_3, valency of M is +1.
(a) formula of iodide = MI (as valency of iodine is -1)
(b) formula of nitride = M_3N (as valency of nitrogen is -3)
(c) formula of phosphate = M_3PO_4
Solution 50
(a) Anion will be formed by element X ; Symbol : X^-
(b) (i) No. of protons in X = 17
(ii) No. of electrons in X = 18
(iii) No. of neutrons in X = 18
(c) Cation will be formed by element Y ; Symbol : Y^+
(d) (i) No. of protons in Y = 11
(ii) No. of electrons in Y = 10
(iii) No. of neutrons in Y = 12
(e) Atomic mass of X = No. of protons(17) + No. of neutrons(18) = 35 u
Atomic mass of Y = No. of protons (11) + No. of neutrons (12) = 23 u
(f) Element X is Chlorine (Cl).
Element Y is Sodium (Na).

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Solution 1
A mole
Solution 2
1 mole
Solution 3
$6.002x10^{23}$
Solution 4
one mole of atoms ($6.002x10^{23}$) atoms
Solution 5
$6.002x10^{23}$
Solution 6
Avogadro number
Solution 7

Given mass of oxygen = 12g
Molar mass of oxygen = 32g
No. of moles = Given mass / Molar mass = 12g /32g = 0.375
Solution 8
No. of moles = 3.6g / 18g = 0.2 mole
Solution 9
Mass of 0.2 moles of oxygen atoms = 0.2 x 16 = 3.2g
Solution 10
Mass of 2 moles of nitrogen atoms = 2 x 14 = 28g
Solution 11
Given mass of $CaCO_3$ = 10g
Molar mass of $CaCO_3$ = 1xCa + 1xC + 3xO = (40+12+48)gm = 100gm
So, no. of moles of $CaCO_3$ = Given mass/Molar mass = 10/100 = 0.1 moles
Solution 12
(a) $6.002x10^{23}$
(b) One Mole
(c) Avagadro's number
Solution 13

One mole of O_2 = 32 gm

6.022×10^{23} molecules of O_2 have mass = 32 gm

So, 12.044×10^{25} molecules of O_2 will have mass = 6400 gm = 6.4 Kg

Solution 14

One mole of ammonia contains = 6.022×10^{23} molecules of ammonia.

So, 1.5 moles of ammonia contains = $1.5 \times 6.022 \times 10^{23}$ molecules

= 9.033×10^{23} molecules of ammonia.

Solution 15

Given mass of $CaCO_3$ = 10g

Molar mass of $CaCO_3$ = 1xCa + 1xC + 3xO = (40+12+48)gm = 100gm

So, no. of moles of $CaCO_3$ = Given mass/Molar mass = 10/100 = 0.1 moles

Solution 16

One mole of O_2 contains = 6.022×10^{23} molecules of oxygen

So, 1 molecule of O_2 has = $1/6.022 \times 10^{23}$ moles of O_2

Therefore, 1.2×10^{22} molecules of O_2 will have = $1.2 \times 10^{22} / 6.022 \times 10^{23}$ moles of O_2

= 0.0199 moles of O_2

Solution 17

6.022×10^{23} molecules of N_2 weigh = 28 gm

So, 1 molecule of N_2 will weigh = $28 / 6.022 \times 10^{23}$ grams of N_2

= 4.648×10^{-23} grams of N_2

Solution 18

1 mole of sodium weighs = 23 gm

So, 1 gm of sodium will have = 1/23 moles of sodium

Therefore, 34.5 gm of sodium will have = 34.5/23 = 1.5 moles of sodium.

Solution 19

1 mole of Zn = 65gm of zinc = 6.022×10^{23} atoms of zinc

Given mass of zinc = 10gm

No. of moles of zinc = 10/65 = 0.15 moles of zinc

Total no. of atoms in 0.15 moles = $0.15 \times 6.022 \times 10^{23}$ atoms of Zn

= 9.264×10^{22} atoms of Zn

Solution 20

Mass of 6.022×10^{23} atoms of Carbon = 12 g

So, Mass of 1 Carbon atom = $12/6.022 \times 10^{23}$ g

Hence, mass of 3.011×10^{24} atoms of Carbon = $3.011 \times 10^{24} \times 12 / 6.022 \times 10^{23}$ = 60 g

Solution 21

6.022×10^{23} atoms of Oxygen weigh = 16 g

So, mass of 1 atom of Oxygen = $16/6.022 \times 10^{23} = 2.656 \times 10^{-23}$ g.

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Solution 22

1 mole of hydrogen has = 6.022×10^{23} atoms of hydrogen

So, 0.25 moles of hydrogen will have = $6.022 \times 10^{23} \times 0.25 = 1.50 \times 10^{23}$ atoms of hydrogen.

Solution 23

6.022×10^{23} atoms of phosphorus has = 1 mole of phosphorus

So, 12.044×10^{25} atoms of phosphorus will have = $12.044 \times 10^{25}/6.022 \times 10^{23}$

= 200 moles

Solution 24

Given mass of $CHCl_3$ = 0.0239 g

Molar mass of $CHCl_3$ = 1 x C + 1 x H + 3 x Cl = 119.5 g

No. of moles = Given mass/ Molar mass

No. of moles = 0.0239/119.5 = 0.0002

So, no. of molecules present in 0.0239 g of chloroform = $0.0002 \times 6.022 \times 10^{23}$

= 12.044×10^{19} molecules

Solution 25

1 mole of Na_2CO_3 = 106g

So, 5 x mole of Na_2CO_3 = 5 x 106g = 530g

Solution 26

32 g of oxygen (1 mole of oxygen) has = 6.022×10^{23} molecules of oxygen

So, 4 g of oxygen will have = $6.022 \times 10^{23} \times 4/32 = 7.528 \times 10^{22}$ molecules of oxygen.

Solution 27

Molar mass of glucose = 180 g

180 g of glucose has = 1 mol

So, 100 g of glucose will have = 1 x 100/180 = 0.55 moles

Solution 28

1 mole of H_2S weighs = 34 g

So, 0.17 mole of H_2S will weigh = 34 x 0.17 g = 5.78 g

Solution 29

Molar mass of CO_2 = 44g

Molar mass of H_2O = 18g

Mass of 5 mole of H_2O = 5 x 18g = 90 g

Mass of 5 mole of CO_2 = 5 x 44g = 220 g

So, 5 mole of H_2O and 5 mole of CO_2 do not have same mass.

And the difference in their masses = 220 g - 90 g = 130 g

Solution 30

240g of calcium has = 240/40 = 6 moles

240g of magnesium has = 240/24 = 10 moles

So, required mole ratio = 6:10 = 3:5

Solution 31

(a). A group of 6.022×10^{23} particles (atoms, molecules or ions) of a substance is called a mole of that substance. One mole represents the amount of a substance equal to its 'GRAM ATOMIC MASS' or 'GRAM MOLECULAR MASS' and 6.022×10^{23} no. of particles of the substance.

(b). 1.5 moles of Na_2SO_3 has 3 moles of Na, 1.5 mole of S and 4.5 moles of O.

Thus, mass of sodium = 3 x 23 g = 69g

Mass of sulphur = 1.5 x 32 = 48g

Mass of oxygen = 4.5 x 16 g = 72g

Solution 32

(a) A mole of carbon atoms means a carbon sample weighing 12 g and containing 6.022×10^{23} carbon atoms.

(b) 1 mole of aluminium weighing 27g has = 6.022×10^{23} atoms of Al

So, 1g of Al has = 0.22×10^{23} atoms of Al

Hence, 50g of Al will have = $50 \times 0.22 \times 10^{23}$ atoms of Al

= 11×10^{23} atoms of Al

1 mole of iron weighing 56g has = 6.022×10^{23} atoms of Fe

So, 1g of Fe has = 0.10×10^{23} atoms of Fe

Hence, 50g of Fe will have = $50 \times 0.10 \times 10^{23}$ atoms of Fe = 5×10^{23} atoms of Fe

Thus, 50g of Al has more no. of atoms as compared to 50g of Fe.

Solution 33

(a). The amount of substance whose mass in grams is numerically equal to its atomic mass, is called gram atomic mass of that substance.

Gram atomic mass of oxygen is 16g.

(b). Moles of oxygen atom are -

(i). Al_2O_3 : 3 mole

(ii). CO_2 : 2 mole

(iii).Cl_2O_7 : 7 mole

(iv). H_2SO_4 : 4 mole

(v). $Al_2(SO_4)_3$: 12 mole

Solution 34

(a). The amount of substance whose mass in grams is numerically equal to its molecular mass is called gram molecular mass of that substance.

Gram molecular mass of the oxygen is 32g.

(b). Given mass of sulphur = 100g

Molar mass of S_8 = 32 x 8 g = 256g

No. of moles = Given mass / Molar mass = 100/ 256 = 0.39 moles.

Solution 35

(a). The molar mass of the substance is the mass of 1 mole of that substance. Molar mass is generally expressed in grams or 'g'.

(b).

(i). Molar mass of ozone (O_3) = 3 x gram atomic mass of O = 3 x 16 g = 48 g/ mole

(ii). Molar mass of Ethanoic acid (CH_3COOH) = 2xC + 4xH + 2xO

= (24 + 4 + 32)u = 60 g/ mole

********** END **********