



CHEMISTRY

BOOKS - MTG IIT JEE FOUNDATION

ATOMS, MOLECULES AND ATOMIC STRUCTURE

Illustration

1. Calculate the molecular masses of



Given atomic masses $C = 12.0u$, $H = 1.0u$

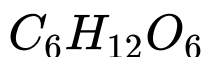
$O = 16.0u$, $K = 39.0u$, $Mn = 55.0u$

$Fe = 56.0u$, $N = 14.0u$



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2. Calculate the molecular masses of



Given atomic masses $C = 12.0u$, $H = 1.0u$

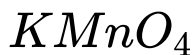
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3. Calculate the molecular masses of



Given atomic masses $C = 12.0u$, $H = 1.0u$

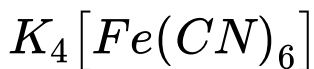
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4. Calculate the molecular masses of



Given atomic masses $C = 12.0u$, $H = 1.0u$

$O = 16.0u$, $K = 39.0u$, $Mn = 55.0u$

$Fe = 56.0u$, $N = 14.0u$



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5. Calculate the formula mass of sodium carbonate (Na_2CO_3). (Given : Atomic masses : Na = 23 u, C = 12 u, O= 16 u)

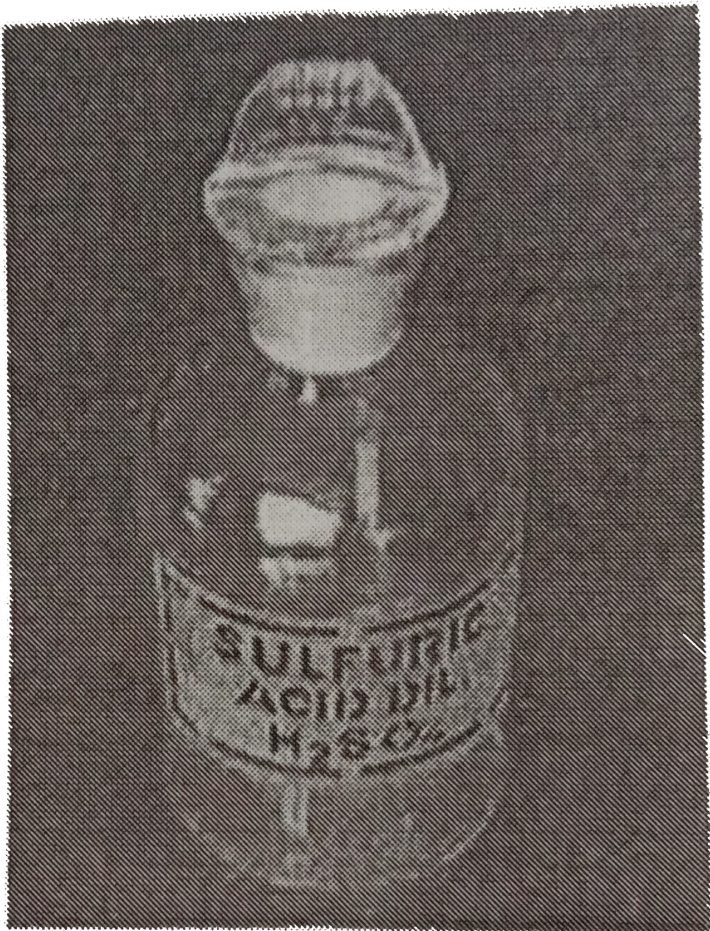


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6. Calculate the molecular mass of sulphuric acid (H_2SO_4).

(Given : Atomic masses :

$H = 1, S = 32u, O = 16u$).





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7. Calculate the molar masses of the following:

Phosphorous molecule (P_4)

Atomic masses : C = 12 u, H=1 u, S=32 u, Na = 23

u, P=31 u, Cl = 35.5 u, N = 14 u, O = 16 u



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8. Calculate the molar masses of the following:

Sodium chloride (NaCl)

Atomic masses : C = 12 u, H=1 u, S=32 u, Na = 23 u, P=31 u, Cl = 35.5 u, N = 14 u, O = 16 u



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9. Calculate the molar masses of the following:

Nitric acid (HNO_3)

Atomic masses : C = 12 u, H=1 u, S=32 u, Na = 23 u, P=31 u, Cl = 35.5 u, N = 14 u, O = 16 u



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10. Calculate the molar masses of the following:

Ethyne (C_2H_2)

Atomic masses : C = 12 u, H=1 u, S=32 u, Na = 23 u, P=31 u, Cl = 35.5 u, N = 14 u, O = 16 u



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11. How many grams of magnesium will have the same number of atoms as 6 grams of

carbon ?

$$(Mg = 24u, C = 12u)$$



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12. Calculate the number of moles in 12.044×10^{23} atoms of phosphorus.



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13. Which contains more moles, 4 g of methane (CH_4) or 4g of oxygen (O_2) ?

(Atomic masses : $C = 12u$, $H = 1$, $O = 16u$)



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14. In what ways, are the atoms ${}^{16}_8O$ and ${}^{17}_8O$ similar to each other



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15. In what ways, are the atoms ${}^{16}_8O$ and ${}^{17}_8O$ different from each other ?



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16. An oxide of an element Z has a formula Z_2O_3 .

How many electrons are there in the outermost shell of an atom of element Z?



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17. An oxide of an element Z has a formula Z_2O_3 .

Write down the formula for the chloride of Z



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18. How is an α -particle different from a helium atom?



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19. If the number of electrons in an ion is 10 and the number of protons is 9, then what would be the atomic number of the ion?



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20. If the number of electrons in an ion is 10 and the number of protons is 9, then what is the charge on the ion?



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21. An ion M^{2+} contains 10 electrons and 12 neutrons. What is the atomic number and mass number of the element M? Name the element.



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22. Most of the space in an atom is empty.

Justify.



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23. The elements are identified by their atomic numbers and not by their mass numbers.

Justify.



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24. Differentiate between isotope and isobars.



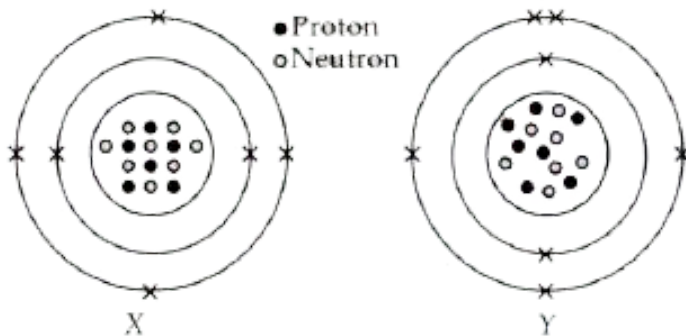
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25. Which of the two elements would be more reactive, element A of atomic number 18 or element B of atomic number 19?



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26. The given diagrams show the atomic structures of elements X and Y.

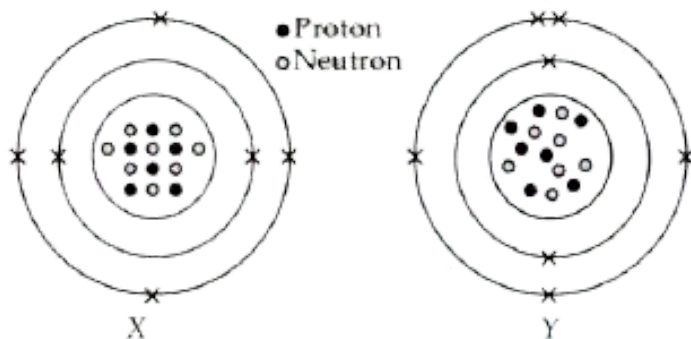


What are the proton numbers of elements X and Y?



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27. The given diagrams show the atomic structures of elements X and Y.

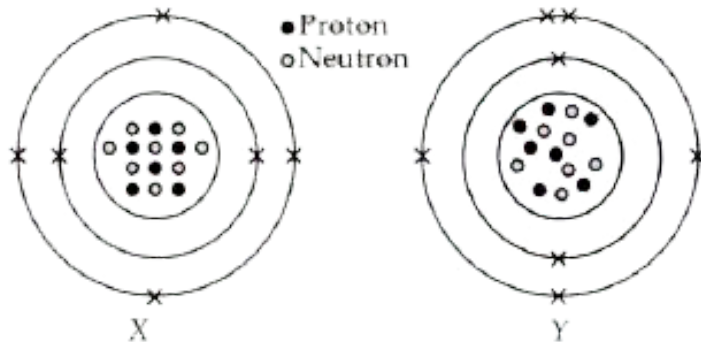


What are the nucleon numbers of elements X and Y?



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28. The given diagrams show the atomic structures of elements X and Y.

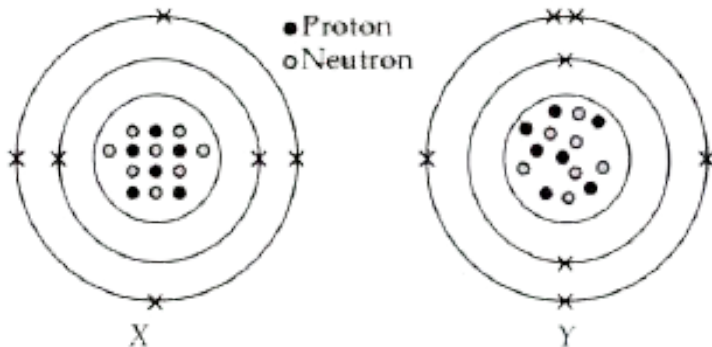


What are the electronic configurations of elements X and Y?



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29. The given diagrams show the atomic structures of elements X and Y.



What name is given to the pair of elements X and Y? Explain.



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30. Atoms of elements R, S and T have 8, 9 and 11 protons respectively. Neon has 10 protons.

What is the chemical formula of the

compound formed between

(i) R and T. (ii) S and T



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31. Atoms of elements R, S and T have 8, 9 and 11 protons respectively. Neon has 10 protons.

What is the formula of a molecule of R?



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Solved Examples

1. Calculate the number of moles in 162 g of Al,



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2. Calculate the number of moles in 69 g of Na.

given : Atomic masses : Al=27.0 u, Na=23.0 u



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3. Calculate the number of molecules in each of the following :

124 g of phosphorus

Given atomic masses : P = 31 u, C = 12 u, O = 16

u



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4. Calculate the number of molecules in each of the following :

11 g of CO_2

Given atomic masses : P = 31 u, C = 12 u, O = 16

u



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5. Calculate the weight of carbon monoxide having the same number of oxygen atoms as are present in 22g of carbon dioxide



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6. Calculate the number of atoms of each element in 3.42 g of sucrose ($C_{12}H_{22}O_{11}$) and the total number of atoms.



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7. Calculate the mass of a single atom of sulphur and a single molecule of carbon dioxide?



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8. Which has more number of atoms: 115 g of sodium or 168 g of iron? (Given : atomic masses Na = 23 u, Fe = 56 u)



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9. Calculate the number of gram atoms and gram molecules in 2.54 mg of iodine (I_2) .
(Atomic mass of I = 127 amu).



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10. 10^{22} atoms of an element 'X' are found to have a mass of 531 mg. Calculate the molar mass of the element X.



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11. Elements from A to F have in them the distribution of electrons, neutrons and protons as follows:

Atoms/ Ions	Number of electrons	Number of neutrons	Number of protons
A	4	10	3
B	10	12	11
C	17	18	17
D	17	20	17
E	18	22	18
F	19	21	19

Making use of these data, find

a pair of ions



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12. Elements from A to F have in them the distribution of electrons, neutrons and protons as follows:

Atoms/ Ions	Number of electrons	Number of neutrons	Number of protons
A	4	10	3
B	10	12	11
C	17	18	17
D	17	20	17
E	18	22	18
F	19	21	19

Making use of these data, find
an atom of a noble gas



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13. Elements from A to F have in them the distribution of electrons, neutrons and protons as follows:

Atoms/ Ions	Number of electrons	Number of neutrons	Number of protons
A	4	10	3
B	10	12	11
C	17	18	17
D	17	20	17
E	18	22	18
F	19	21	19

Making use of these data, find
a pair of isobars



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14. Elements from A to F have in them the distribution of electrons, neutrons and protons as follows:

Atoms/ Ions	Number of electrons	Number of neutrons	Number of protons
A	4	10	3
B	10	12	11
C	17	18	17
D	17	20	17
E	18	22	18
F	19	21	19

Making use of these data, find
a pair of isotopes.



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15. Y is the ion of an element X. Y contains 13 protons, 14 neutrons and 10 electrons.

What is the nucleon number of Y?



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16. Y is the ion of an element X. Y contains 13 protons, 14 neutrons and 10 electrons.

Give schematic representation to show how the electrons are arranged in an atom of X.



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17. Y is the ion of an element X. Y contains 13 protons, 14 neutrons and 10 electrons.

Predict the formula of the compound that contains Y and the oxide ion.



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Exercise Multiple Choice Questions

1. Which of the following have maximum mass?

A. 1 g iron

B. 10^{20} molecules of CO_2

C. 0.1 mole of NH_3

D. 10^{22} atoms of carbon

Answer: C



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2. 0.001 g of C is required to write a letter with a graphite pencil. The total number of C atoms used in writing the letter is

A. 5.00×10^{12}

B. 5×10^{19}

C. 5.0×10^{24}

D. 6.023×10^{23}

Answer: B



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3. Which of the following would weigh the highest?

A. 0.2 mol of sucrose ($C_{12}H_{22}O_{11}$)

B. 2 mol of CO_2

C. 2 mol of $CaCO_3$

D. 10 mol of H_2O

Answer: C



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4. Number of atoms in 560 g of

Fe (atomic mass 56 g mol^{-1})

A. is twice that of 70 g N

B. is half that of 20 g H

C. both of these

D. none of these.

Answer: C



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

A. 16 g of O_2 and 14g of N_2

B. 8 g of O_2 and 22 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. If 10^{21} molecules are removed from 200 mg of CO_2 , the number of moles of CO_2 left will be ?

A. 2.88×10^{-3}

B. 1.66×10^{-3}

C. 2.54×10^{-3}

D. 1.66×10^{-2}

Answer: A



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7.52 u of He contains

A. $4 \times 6.022 \times 10^{23}$ atoms

B. 13 atoms

C. $13 \times 6.022 \times 10^{23}$ atoms

D. 4 atoms

Answer: C



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8. The number of gram atoms of oxygen present in 0.25 mole of $(COOH)_2 \cdot 2H_2O$ is

A. 0.125

B. 0.50

C. 1.0

D. 1.5

Answer: D



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9. The mass of 112 cm of O_2 gas at STP is

A. 0.16g

B. 0.8g

C. $0.08g$

D. $1.6g$

Answer: A



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10. A sample of phosphorus trichloride (PCl_3) contains 1.4 moles of the substance. How many atoms are there in the sample ?

A. 4

B. 8.4×10^{23}

C. 3.36×10^{24}

D. 5.6

Answer: C



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11. The total number of electrons present in 18mL of water is

A. 6.022×10^{23}

B. 6.022×10^{24}

C. 6.022×10^{25}

D. 6.022×10^{21}

Answer: B



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12. The number of water molecules present in a drop of water weighing 0.018 g is

A. 6.022×10^{26}

B. 6.022×10^{23}

C. 6.022×10^{20}

D. 6.022×10^{19}

Answer: C



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13. The element whose one atom has mass of 10.86×10^{-26} kg is (Atomic masses : B = 10.8 u, Ca = 40 u, Ag = 107.8 u, Zn = 65.4 u).

A. boron

B. coalcium

C. silver

D. zinc

Answer: D



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14. What are the total number of moles of atoms in 4.32 g of $Sc(NO_3)_3$?

(Atomic weights: Sc = 45.0, O = 16.0, N = 14.01).

A. 0.0132

B. 0.324

C. 0.0187

D. 0.24

Answer: C



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15. The total number of protons in 10g of calcium carbonate is ($N_0 = 6.023 \times 10^{23}$)

A. 1.5057×10^{24}

B. 2.0478×10^{24}

C. 3.0115×10^{24}

D. 4.0956×10^{24}

Answer: C



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16. The number of molecules in 16 g of methane is

A. 3.01×10^{23}

B. 6.022×10^{23}

C. $16 / 6.022 \times 10^{23}$

D. $16 / 3.0 \times 10^{23}$

Answer: B



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17. How many moles are present in 11.5 g of sodium?

A. 0.05 mole

B. 5.0 mole

C. 1.5 mole

D. 0.5 mole

Answer: D



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18. Number of electrons present in 3.6 mg of

NH_4^+ are : ($N_A = 6 \times 10^{23}$)

A. 1.2×10^{21}

B. 1.2×10^{20}

C. 1.2×10^{22}

D. 2×10^{-3}

Answer: A



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19. A quantity of aluminium has a mass of 54 g.

What is the mass of same number of magnesium atoms?

A. $12.1g$

B. $24.3g$

C. $48.6g$

D. $97.2g$

Answer: C



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20. Number of atoms of oxygen present in 10.6 g of Na_2CO_3 will be

A. 6.02×10^{22}

B. 12.04×10^{22}

C. 1.806×10^{23}

D. 31.80×10^{28}

Answer: C



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21. 2 g of oxygen contain same number of atoms as contained by

A. 0.5 g hydrogen

B. 4.0 g sulphur

C. 7.0 g nitrogen

D. 2.3 g sodium

Answer: B



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22. The largest number of N-atoms are found

in

A. 50 g NO_2

B. 150 mL of liquid pyridine (C_5H_5N

density = 0.983 g/mL)

C. 25 g of N_2O

D. 0.5 mol of N_2

Answer: B



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23. How many molecules are present in 3 moles of ethane?

A. $11 \times 6.022 \times 10^{23}$

B. 3

C. $3 \times 6.022 \times 10^{23}$

D. $3 \times 8 \times 6.022 \times 10^{23}$

Answer: C



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24. Which of the following has greatest number of atoms?

A. 1 g of butane (C_4H_{10})

B. 1 g of nitrogen (N_2)

C. 1 g of silver (Ag)

D. 1 g of water (H_2O)

Answer: A



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25. 1 kg mole of oxygen (O_2) has electrons.

A. 6.022×10^{26}

B. 16.022×10^{26}

C. 16.022×10^{23}

D. 16.022×10^{20}

Answer: B



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26. One mole of hydrogen peroxide (H_2O_2) has a mass same as that of

A. 0.2 mol of sucrose ($C_{12}H_{22}O_{11}$)

B. 2.0 mol of ammonia

C. 11.2 L of SO_2 at N.T.P.

D. 0.1 mol of SO_3

Answer: B



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27. 1 g atom of nitrogen represents

A. 14 g nitrogen

B. 11.2 litre of N_2 at NTP

C. 22.4 litre of N_2 at NTP

D. 6.022×10^{23} molecules of N_2

Answer: A, B



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28. How many gram atoms of oxygen are contained in 0.25 mole of $Na_2S_2O_3 \cdot 5H_2O$ (hypo)?

A. 0.5

B. 0.75

C. 2.0

D. 1.20

Answer: C



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29. A sample of AlF_3 contains 3.0×10^{24} F^- ions. The number of formula units of the sample are

A. 2.0×10^{24}

B. 1.0×10^{24}

C. 5×10^{23}

D. 9.0×10^{20} .

Answer: B



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30. What is the total number of atoms present in 25.0 mg of camphor, $C_{10}H_{16}O$?

A. 2.57×10^{21}

B. 9.89×10^{19}

C. 2.67×10^{21}

D. 6.02×10^{20}

Answer: C



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31. The ion of an element has 3 positive charges. Mass number of the atom is 27 and the number of neutrons is 14. What is the number of electrons in the ion?

A. 13

B. 10

C. 14

D. 16

Answer: B



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32. The isoelectronic species are

1. Na^+ 2. Al^{3+}
3. Mg^{2+} 4. Ca^{2+}

A. 1,2 and 3

B. 1,3 and 4

C. 1,2 and 4

D. 1,2,3 and 4

Answer: A



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33. Which one of the following is a correct electronic configuration of sodium?

A. 2,8

B. 8,2,1

C. 2,1,8

D. 2,8,1

Answer: D



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34. Electron was discovered by

A. J.J. Thomson

B. Dalton

C. Niels Bohr

D. none of these.

Answer: A



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35. Which of the following elements does not form isotopes?

A. Carbon

B. Neon

C. Chlorine

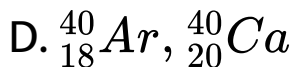
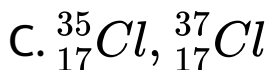
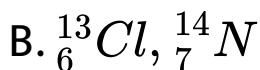
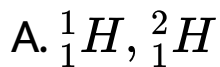
D. Iodine

Answer: B



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36. Pick out the isobar pair.



Answer: D



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37. Common hydrogen is also called

- A. protium atom
- B. deuterium atom
- C. tritium atom
- D. none of these.

Answer: A



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38. Deuterium and tritium are the isotopes of

- A. nitrogen

B. oxygen

C. hydrogen

D. helium

Answer: C



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39. The atomic number of an element X is 19.

The number of electrons in its ion X^+ will be

A. 18

B. 19

C. 20

D. 21

Answer: A



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40. Rutherford's experiments , which established the nuclear model of atom , used a beam of:-

- A. β -particles, impinged on a metal foil and got absorbed.
- B. α rays, which impinged on a metal foil and ejected electrons.
- C. Helium atom, impinged on a metal foil and got scattered
- D. Helium nuclei, impinged on a metal foil and got scattered.

Answer: D



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41. If there are 12 neutrons in an atom and its atomic number is 11, then how many electrons are present in it?

A. 23

B. 12

C. 10

D. 11

Answer: D



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42. Which of the following species does not have electrons equal to 18?



Answer: D



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43. An atom of an element (X) has its K, L and M shells filled with some electrons. It reacts with sodium metal to form a compound Na_x . The number of electrons in the M shell of an atom of element (X) will be

A. 7

B. 8

C. 2

D. 1

Answer: A



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44. X and Y are the two atomic species :

	X	Y
Number of Proton	8	8
Number of Neutron	8	10

Select the correct statement about X and Y.

A. X and Y are isobars.

B. X and Y have different chemical properties.

C. X and Y have different physical properties.

D. X and Y are the atoms of different elements.

Answer: C



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45. Number of which among the following is same in Al^{3+} and F^{-} ?

A. Proton

B. Neutron

C. Atomic mass

D. Electron

Answer: D



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46. The number of protons, neutrons and electrons in four elements 1, 2, 3 and 4 are as follows:

(1) $p = 6, n = 6, e = 6$

(2) $p = 6, n = 7, e = 6$

(3) $p = 18, n = 22, e = 18$

(4) $p = 19, n = 21, e = 19$

In these

A. element 1 and 2 are isotopes and
element 3 and 4 are isobars

B. element 1 and 2 are isotopes but
element 3 and 4 are not isobars

C. element 1 and 2 are isobars and element
3 and 4 are isotopes

D. element 1 and 2 are isobars but element 3 and 4 are not isotopes.

Answer: A



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47. An ion having a mass number 52 has 3 units of positive charge. The number of neutrons in the ion exceeds the number of electrons in it by 7. The atomic number of the element is

A. 28

B. 22

C. 26

D. 24

Answer: D



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48. Which of the following statements are correct about α (alpha) particle scattering experiment?

(i) Most of the fast moving α -particles passed straight through gold foil.

(ii) Some of α -particles were deflected by the foil by small angles.

(iii) Surprisingly one out of every 10 particles appeared to rebound

A. (i) and (iii) are correct.

B. (i) and (ii) are correct.

C. (i), (ii) and (iii) are correct.

D. only (ii) is correct.

Answer: B



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49. Adding an alpha particle to the nucleus of sodium atom produces which new element?

A. Mg

B. P

C. Al

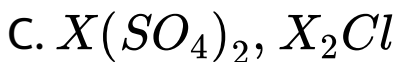
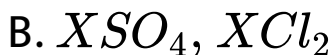
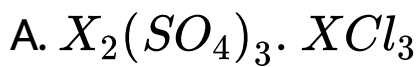
D. Ne

Answer: C



50. The formula of phosphate of X is XPO_4 .

The formula of its sulphate and chloride would be respectively



Answer: A



Exercise Match The Following

1. Match the following columns

List-I
(Compound)

- (P) Water
- (Q) Ammonia
- (R) Carbon dioxide
- (S) Sulphur dioxide

List-II
**(Ratio by weight
of atoms)**

- 1. 14 : 3
- 2. 1 : 8
- 3. 1 : 1
- 4. 3 : 8

A. P-2, Q-1, R-4, S-3

B. P-2, Q-4, R-1, S-3

C. P-4, Q-2, R-1, S-3

D. P-4, 2-2, R-3, S-1

Answer: A



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2. Match the following columns

List-I

(P) Phosphate

(Q) Sulphite

(R) Sulphate

(S) Carbonate

List-II

1. SO_3^{2-}

2. SO_4^{2-}

3. PO_4^{3-}

4. CO_3^{2-}

A. P-3, Q-1, R-4, S-2

B. P-3, Q-1, R-2, S-4

C. P-1, Q-3, R-2, S-4

D. P-1, Q-3, R-4, S-2

Answer: B



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3. Match the following columns

List-I (Compound)	List-II (Molecular mass)
(P) H_2O	1. 58.5
(Q) HNO_3	2. 111
(R) NaCl	3. 18
(S) CaCl_2	4. 63

A. P-4, Q-3, R-1, S-2

B. P-3, Q-4, R-1, S-2

C. P-1, Q-2, R-4, S-3

D. P-1, Q-2, R-3, S-2

Answer: B



4. Match the following columns

List-I

- (P) Molar volume
- (Q) Molecular wt. of HNO_3
- (R) Avogadro's number
- (S) Nitrogen element

List-II

- 1. 6.022×10^{23}
- 2. Diatomic
- 3. 22400 cm^3
- 4. 63

A. P-3, Q-1, R-4, S-2

B. P-3, Q-4, R-1, S-2

C. P-4, Q-3, R-2, S-1

D. P-4, 2-2, R-3, S-1

Answer: B



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5. Match the following columns

List-I

(P) 0.25 mole oxygen

(Q) 18 g water

(R) 46 g Na

(S) 1 mole C

List-II

1. 6.022×10^{23} molecules

2. 1.505×10^{23} molecules

3. 6.022×10^{23} atoms

4. 12.044×10^{23} atoms

A. P-3, Q-1, R-4, S-2

B. P-2, Q-1, R-4, S-3

C. P-4, Q-1, R-3, S-2

D. P-2, Q-1, R-3, S-4

Answer: B



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6. Match the following columns

List-I
(Shell)

List-II
(Maximum no. of
electrons)

(P) K

1. 2

(Q) N

2. 8

(R) M

3. 18

(S) L

4. 32

A. P-1, Q-3, R-4, S-2

B. P-1, Q-4, R-3, S-2

C. P-4, Q-3, R-2, S-1

D. P-3, Q-4, R-2, S-1

Answer: B



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Exercise Assertion Reason Type

1. Assertion : Number of gram-molecules of SO_2Cl_2 in 13.5 g of sulphuryl chloride is 0.2.

Reason : Gram-molecular mass of SO_2Cl_2 is 125 g.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B



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2. Assertion : Atomicity of O_3 is 3.

Reason : 1 mole of an element contains 6.022×10^{23} atoms.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C



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3. Assertion : Molecular weight of SO_2 is double to that of O_2

Reason : One mole of SO_2 contains double the number of molecules present in one mole of O_2

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C



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4. Assertion : Atomic mass of aluminium is 27.

Reason : An atom of aluminium is 27 times heavier than $\frac{1}{12}$ th of the mass of carbon-12 atom.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: D



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5. Assertion : 1 mole of H_2SO_4 contains same mass of oxygen and sulphur.

Reason : 1 mole of H_2SO_4 represents 49 g mass.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: D



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6. Assertion : Number of moles of H_2 in $0.0224L$ of H_2 is 0.01 mol.

Reason : 22.4 litres of H_2 at STP contains 6.022×10^{23} mol.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: A



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7. Assertion : 1 amu equals to $1.66 \times 10^{-24} g$.

$1.66 \times 10^{-24} g$ equal to 1/12 the mass of a ^{12}C atom.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B



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8. Assertion : 1 g O_2 and 1 g O_3 have different number of atoms.

Reason : Mass of 1 mole atom is equal to its gram-atomic mass.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: C



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9. Assertion : Atoms can neither be created nor destroyed.

Reason : Atoms of the same element always have the same atomic masses.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of

assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: D



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10. Assertion : Isobars are identical in chemical properties.

Reason : Isobars have different mass number.

A. If both assertion and reason are true and reason is the correct explanation of assertion.

B. If both assertion and reason are true but reason is not the correct explanation of assertion.

C. If assertion is true but reason is false.

D. If both assertion and reason are false.

Answer: B



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Exercise Comprehension Type Passage I

1. The percentage composition of elements in a compound is calculated from the molecular formula of the compound. The molecular mass of a compound is calculated from the atomic masses of the various elements present in the compound. The percentage of mass of each element is then calculated with the help of the following relation. Percentage mass of the element in the compound.

Mass of the element

Mass of the compound

What is the percentage of calcium in calcium carbonate?

A. 32.65

B. 40

C. 88.9

D. 18

Answer: C



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2. The percentage composition of elements in a compound is calculated from the molecular formula of the compound. The molecular mass of a compound is calculated from the atomic masses of the various elements present in the compound. The percentage of mass of each element is then calculated with the help of the following relation. Percentage mass of the element in the compound.

$$\frac{\text{Mass of the element}}{\text{Mass of the compound}}$$

Calculate the mass of carbon present in 2 g of carbon dioxide.

A. 12g

B. 6 g

C. 0.545g

D. 5.45g

Answer: B



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3. The percentage composition of elements in a compound is calculated from the molecular formula of the compound. The molecular mass

of a compound is calculated from the atomic masses of the various elements present in the compound. The percentage of mass of each element is then calculated with the help of the following relation. Percentage mass of the element in the compound.

$$\frac{\text{Mass of the element}}{\text{Mass of the compound}}$$

What is the molecular mass of calcium chloride?

A. 88 u

B. 11 u

C. 65 u

D. 100 u

Answer: B



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4. The percentage composition of elements in a compound is calculated from the molecular formula of the compound. The molecular mass of a compound is calculated from the atomic masses of the various elements present in the compound. The percentage of mass of each

element is then calculated with the help of the following relation. Percentage mass of the element in the compound.

$$\frac{\text{Mass of the element}}{\text{Mass of the compound}}$$

Percentage of S in aluminium sulphate is

A. 28

B. 56

C. 65

D. 75

Answer: A



Exercise Comprehension Type Passage Ii

1. In chemistry, 'mole' is an essential tool for the chemical calculations. It is a basic SI unit adopted by the 14th general conference on weights and measurements in 1971. A mole contains as many elementary particles as the number of atoms present in 12 g of ^{12}C . 1 mole of a gas at STP occupies 22.4 litre volume. Molar volume of solids and liquids is

not definite. Molar mass of a substance is also called gram-atomic mass or gram molecular mass. The virtual meaning of mole is plenty, heap or the collection of large numbers. 1 mole of a substance contains 6.022×10^{23} elementary particles like atom or molecule. Atomic mass unit (amu) is the unit of atomic mass, e.g., atomic mass of single carbon is 12 amu.

The mass of one molecule of water is approximately

A. 1 g

B. $0.5g$

C. $1.66 \times 10^{-24}g$

D. $3.0 \times 10^{-23}g$

Answer: D



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2. In chemistry, 'mole' is an essential tool for the chemical calculations. It is a basic SI unit adopted by the 14th general conference on weights and measurements in 1971. A mole

contains as many elementary particles as the number of atoms present in 12 g of ^{12}C . 1 mole of a gas at STP occupies 22.4 litre volume. Molar volume of solids and liquids is not definite. Molar mass of a substance is also called gram-atomic mass or gram molecular mass. The virtual meaning of mole is plenty, heap or the collection of large numbers. 1 mole of a substance contains 6.022×10^{23} elementary particles like atom or molecule. Atomic mass unit (amu) is the unit of atomic mass, e.g., atomic mass of single carbon is 12 amu.

How many atoms are present in 49 g of

H_2SO_4 ?

A. $7 \times 6.022 \times 10^{23}$

B. $5 \times 6.022 \times 10^{23}$

C. $6 \times 6.022 \times 10^{23}$

D. $7 \times 3.01 \times 10^{23}$

Answer: D



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3. In chemistry, 'mole' is an essential tool for the chemical calculations. It is a basic SI unit adopted by the 14th general conference on weights and measurements in 1971. A mole contains as many elementary particles as the number of atoms present in 12 g of ^{12}C . 1 mole of a gas at STP occupies 22.4 litre volume. Molar volume of solids and liquids is not definite. Molar mass of a substance is also called gram-atomic mass or gram molecular mass. The virtual meaning of mole is plenty, heap or the collection of large numbers. 1

mole of a substance contains 6.022×10^{23} elementary particles like atom or molecule. Atomic mass unit (amu) is the unit of atomic mass, e.g., atomic mass of single carbon is 12 amu.

x L N_2 , gas at STP contains 3×10^{22} molecules. The number of molecules in x L ozone at STP will be

A. 3×10^{22}

B. 4×10^{23}

C. 6.02×10^{23}

$$D. 3 \times 10^{24}$$

Answer: A



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4. In chemistry, 'mole' is an essential tool for the chemical calculations. It is a basic SI unit adopted by the 14th general conference on weights and measurements in 1971. A mole contains as many elementary particles as the number of atoms present in 12 g of ^{12}C . 1

mole of a gas at STP occupies 22.4 litre volume. Molar volume of solids and liquids is not definite. Molar mass of a substance is also called gram-atomic mass or gram molecular mass. The virtual meaning of mole is plenty, heap or the collection of large numbers. 1 mole of a substance contains 6.022×10^{23} elementary particles like atom or molecule. Atomic mass unit (amu) is the unit of atomic mass, e.g., atomic mass of single carbon is 12 amu.

The mass of 1 amu is approximately

A. 1 g

B. 0.5g

C. $1.66 \times 10^{-24} g$

D. $3.2 \times 10^{-24} g$

Answer: C



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Exercise Comprehension Type Passage Iii

1. According to Dalton's atomic theory, all matter whether an element, a compound or a mixture is composed of small particles called atoms which can neither be created nor destroyed during a chemical reaction. Dalton's theory provides a simple explanation for the laws of chemical combination. He used his theory to explain law of conservation of masses, law of constant proportions and law of multiple proportions, based on various postulates of the theory. Dalton was the first scientist to use the symbols for the elements

in a very specific sense. When he used a symbol for an element he also meant a definite quantity of that element, that is one atom of that element.

Which postulate of Dalton's atomic theory is the result of the law of conservation of mass?

A. Atoms can neither be created nor destroyed.

B. Each element is composed of extremely small particles called atoms.

C. All the atoms of a given element are identical.

D. During chemical combination, atoms of different elements combine in simple ratios.

Answer: A



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2. According to Dalton's atomic theory, all matter whether an element, a compound or a mixture is composed of small particles called atoms which can neither be created nor destroyed during a chemical reaction. Dalton's theory provides a simple explanation for the laws of chemical combination. He used his theory to explain law of conservation of masses, law of constant proportions and law of multiple proportions, based on various postulates of the theory. Dalton was the first scientist to use the symbols for the elements

in a very specific sense. When he used a symbol for an element he also meant a definite quantity of that element, that is one atom of that element.

Which postulate of Dalton's atomic theory explains law of definite proportions?

A. Atoms of an element do not change during a chemical reaction.

B. The elements consist of atoms having fixed mass and the number and kind of atoms in a given compound is fixed.

C. Different elements have different kind of atoms.

D. Atoms are of various kinds.

Answer: B



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3. According to Dalton's atomic theory, all matter whether an element, a compound or a mixture is composed of small particles called atoms which can neither be created nor

destroyed during a chemical reaction. Dalton's theory provides a simple explanation for the laws of chemical combination. He used his theory to explain law of conservation of masses, law of constant proportions and law of multiple proportions, based on various postulates of the theory. Dalton was the first scientist to use the symbols for the elements in a very specific sense. When he used a symbol for an element he also meant a definite quantity of that element, that is one atom of that element.

When 5 g calcium is burnt in 2 g oxygen, 7 g of

calcium oxide is produced. When 5 g of calcium is burnt in 20 g of oxygen, then also 7 g of calcium oxide is produced. Which law of chemical combination is being followed?

- A. Law of conservation of mass
- B. Law of multiple proportions
- C. Law of constant proportions
- D. No law is being followed

Answer: C



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Exercise Comprehension Type Passage Iv

1. P A S S A G E - I V : The molecular mass of a substance is the relative mass of its molecule as compared with the mass of a carbon-12 atom taken as 12 units. The molecular mass of a substance indicates the number of times one molecule of a substance is heavier than $\frac{1}{12}$ of C-12 atom. It is equal to the sum of atomic masses of all the atoms present in a molecule. Depending on the number of atoms

of same or different elements present in the molecule, it can be monoatomic, diatomic, triatomic, tetratomic or a polyatomic molecule.

Which is an example of a polyatomic molecule?



D. All of these

Answer: A



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2. The molecular mass of a substance is the relative mass of its molecule as compared with the mass of a carbon-12 atom taken as 12 units. The molecular mass of a substance indicates the number of times one molecule of a substance is heavier than $\frac{1}{12}$ th of C-12 atom. It is equal to the sum of atomic masses of all the atoms present in a molecule. Depending on the number of atoms of same or different elements present in the molecule,

it can be monoatomic, diatomic, triatomic, tetraatomic or a poly-atomic molecule.

Carbon dioxide, hydrogen sulphide, calcium chloride and sodium oxide are examples of

A. monoatomic

B. diatomic

C. triatomic

D. tetra-atomic

Answer: C



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3. The molecular mass of a substance is the relative mass of its molecule as compared with the mass of a carbon-12 atom taken as 12 units. The molecular mass of a substance indicates the number of times one molecule of a substance is heavier than $\frac{1}{12}$ th of C-12 atom. It is equal to the sum of atomic masses of all the atoms present in a molecule. Depending on the number of atoms of same or different elements present in the molecule,

it can be monoatomic, diatomic, triatomic, tetraatomic or a poly-atomic molecule.

- A. triatomic molecules
- B. triatomic and tetra-atomic molecules
- C. diatomic and triatomic molecules
- D. tetra-atomic molecules.

Answer: A



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1. Mass of CO_2 (in gram) which have 2.55 L volume at S.T.P. is



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2. Number of diatomic molecules among the following is hydrogen molecule, ozone, water, carbon dioxide, sulphur dioxide, carbon monoxide, hydrogen chloride, oxygen molecule, sodium chloride.



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3. The total number of molecules present in 6.6 g of CO_2 and 4.8 g of SO_2 is



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4. The valency of an element with atomic number 15 is



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5. The total number of electrons present in the M-shell of sulphur is



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