

FUNDAMENTALS OF CHEMISTRY

Sr. #	Questions	A	B	C	D
1 (c) (2016) (2017)	Industrial chemistry deals with the manufacturing of compounds: انڈسٹریل کیمسٹری کا تعلق کمپاؤنڈز کی ایسی تیاری سے ہے جو:	In the laboratory لیبارٹری میں ہو	On micro scale مائیکروسکیل پر ہو	On commercial scale تجارتی پیمانے پر ہو	On economic scale معاشیاتی پیمانے پر ہو
2 (a) (2016) (2016) (2016)	Which one of the following compounds can be separated by physical means? درج ذیل میں سے کس کے اجزاء کو طبعی طریقوں سے الگ الگ کیا جاسکتا ہے؟	Mixtures مکسچرز	Elements ایلیمنٹس	Compounds کمپاؤنڈز	Radicals ریڈیکلز
3 (a) (2014) (2017) (2018) (2023)	The most abundant element occurring in the oceans is: سمندر میں پائے جانے والے ایلیمنٹس میں سب سے زیادہ کونسا ایلیمنٹ پایا جاتا ہے؟	Oxygen آکسیجن	Hydrogen ہائیڈروجن	Nitrogen نائٹروجن	Silicon سیلیکان
4 (a)	Which one the following elements are found in most abundance in the Earth's crust? درج ذیل میں سے کون سا ایلیمنٹ کرہ ارض میں سب سے زیادہ پایا جاتا ہے؟	Oxygen آکسیجن	Aluminum ایلو مینیم	Silicon سیلیکان	Iron آئرن
5 (d)	The third abundant gas found in the Earth's atmosphere is? کرہ ارض میں کثرت کے لحاظ سے تیسرے نمبر پر کون سی گیس پائی جاتی ہے؟	Carbon monoxide کاربن ڈائی آکسائیڈ	Oxygen آکسیجن	Nitrogen نائٹروجن	Argon آرگون
6 (b) (2014) (2016) (2019)	One amu (atomic mass unit) is equivalent to: ایک amu (ایٹامک ماس یونٹ) کس کے برابر ہے؟	1.66×10^{-24} mg ملی گرام	1.66×10^{-24} g گرام	1.66×10^{-24} kg کلو گرام	1.66×10^{-23} g گرام
7 (a) (2017)	Which one the following molecule is not tri-atomic? درج ذیل میں سے کون سا ٹرائی ایٹامک مالیکیول نہیں ہے؟	H ₂	O ₃	H ₂ O	CO ₂
8 (a) (2021)	The mass of one molecule of water is: پانی کے ایک مالیکیول کا ماس کتنا ہے؟	18 amu	18 gram 18 گرام	18 mg 18 ملی گرام	18 kg 18 کلو گرام
9 (a) (2015) (2021) (2023)	The molar mass of H ₂ SO ₄ is: H ₂ SO ₄ کا مولر ماس ہے؟	98 gram 98 گرام	98 amu	9.8 gram 9.8 گرام	9.8 amu
10 (a)	Which one of the following is a molecular mass of O ₂ in amu? درج ذیل میں سے O ₂ کا مولر ماس amu میں کون سا ہے؟	32 amu	53.12×10^{-24} amu	1.92×10^{-25} amu	192.64×10^{-25} amu

11 (b)	How many number of moles are equivalent to 8 grams of CO ₂ ? CO ₂ کے 8 گرامز اس کے کتنے مولز کے برابر ہیں؟	0.15	0.18	0.21	0.24
12 (c)	In which one of following pairs has the same number of ions? درج ذیل میں سے کس جوڑے کے ارکان میں آئنز کی تعداد برابر ہے؟	1 mole of NaCl and 1 mole of MgCl ₂ 1 mole NaCl یا 1 mole MgCl ₂	½ mole of NaCl and ½ mole of MgCl ₂ ½ mole NaCl یا ½ mole MgCl ₂	½ mole of NaCl and 1/3 mole of MgCl ₂ ½ mole NaCl یا 1/3 mole MgCl ₂	1/3 mole of NaCl and ½ mole of MgCl ₂ 1/3 mole NaCl یا ½ mole MgCl ₂
13 (a)	Which one the following pairs has the same mass? درج ذیل میں سے کس جوڑے کے ارکان کا ماس برابر ہے؟	1 mole of CO and 1 mole of N ₂ 1 mole CO یا 1 mole N ₂	1 mole of CO and 1 mole of CO ₂ 1 mole CO یا 1 mole CO ₂	1 mole of O ₂ and 1 mole of N ₂ 1 mole O ₂ یا 1 mole N ₂	1 mole of O ₂ and 1 mole of CO ₂ 1 mole O ₂ یا 1 mole CO ₂

MCQs of previous all Punjab Board papers

14 (b) (2012)	Number of carbon atoms present in one molecule of glucose are: گلوکوز کے ایک مالیکیول میں کاربن کے ایٹمز کی تعداد کتنی ہے؟	12	6	11	22
15 (c) (2014)	The symbol of boron is: بورون کا سمبل ہے؟	Be	Br	B	Ba
16 (a) (2014)	Gram atomic mass of hydrogen is ہائیڈروجن کا گرام ایٹمک ماس ہے؟	1.008 g	2.016 g	1.008 amu	2.016 amu
17 (c) (2015) (2023)	Empirical formula of benzene is: بینزین کا امپیریکل فارمولا ہے؟	C ₆ H ₆	C ₂ H ₂	CH	CH ₂ O
18 (c) (2015)	Mass of Neutron is? نیوٹرون کا ماس ہے:	1.0073 amu	1.0080 amu	1.0087 amu	2.016 amu
19 (a) (2015)	12 g of carbon contain atoms: کاربن کے 12 گرام میں ایٹموں کی تعداد ہے؟	6.02×10^{23}	12.04×10^{23}	1.672×10^{-24}	18.06×10^{23}
20 (b) (2016)	Atomic number of element is expressed by the letter: ایلیمنٹ کا ایٹمک نمبر حرف سے ظاہر کیا جاتا ہے؟	Q	Z	N	O
21 (b) (2016)	The molar mass of H ₃ PO ₄ is: H ₃ PO ₄ کا مولر ماس ہے؟	98 amu	98 g 98 گرام	9.8 g 9.8 گرام	96 g 96 گرام
22 (b) (2016)	Example of diatomic molecule is: ڈائی ایٹمک مالیکیول کی مثال ہے۔	CO ₂	HCl	H ₂ O	O ₃
23 (c) (2017)	Atomic number of oxygen: آکسیجن کا ایٹمک نمبر ہے۔	6	9	8	10
24 (c) (2018)	The most abundant gas found in the atmosphere is?	Carbon monoxide کاربن ڈائی آکسائیڈ	Oxygen آکسیجن	Nitrogen نائٹروجن	Argon آرگون

	کرہ اہوائی میں سب سے سے زیادہ پائی جانے والی کون سی گیس ہے؟				
25 (a) (2018)	Empirical formula of benzene is: بنزین کا امپیریکل فارمولا ہے:	CH	OH	NH ₃	CH ₄
26 (a) (2019)	The formula of aluminium sulphate is: ایلو مینیم سلفیٹ کا فارمولا ہے:	Al ₂ (SO ₄) ₃	AlSO ₄	Al(SO ₄) ₃	Al ₃ (SO ₄) ₃
27 (d) (2022)	Which one is the example of mixture? کونسی ایک مکسچر کی مثال ہے؟	Sugar شوگر	Oxygen آکسیجن	Water پانی	Air ہوا
28 (b) (2022)	The study of manufacturing of chemical compounds on commercial base is: تجارتی پیمانے پر کمپاؤنڈز کے بنانے کے طریقوں کا مطالعہ ہے۔	Physical chemistry فزیکل کیمسٹری	Industrial chemistry انڈسٹریل کیمسٹری	Inorganic chemistry ان آرگینک کیمسٹری	Biochemistry بائیو کیمسٹری
29 (b) (2022)	The study of manufacturing of sulphuric acid on commercial base is an application of: صنعتی (تجارتی) پیمانے پر سلفیورک ایسڈ کی تیاری کس کے تحت آتی ہے؟	Organic chemistry آرگینک کیمسٹری	Industrial chemistry انڈسٹریل کیمسٹری	Inorganic chemistry ان آرگینک کیمسٹری	Biochemistry بائیو کیمسٹری
30 (c) (2022)	The development of chemical industry has generated: کیمیکل انڈسٹری کی ترقی نے پیدا کی ہے:	Un-employment بے روزگاری	Malnutrition غذائیت کی کمی	Polluted air آلودہ ہوا	Lack of transport ٹرانسپورٹ کی کمی
31 (c) (2023)	The removal of electrons from an atom gives? ایٹم سے الیکٹرون کے اخراج سے بنتا ہے۔	Anion اینائن	Molecule مالیکیول	Cation کیٹائن	Molecular ion مالیکیولر آئن

(1) Define industrial chemistry.

Industrial chemistry can be defined as “The branch of chemistry which deals with the manufacturing of chemical compounds on commercial scale” e.g. preparation oxygen (O₂), chlorine (Cl₂), ammonia (NH₃) caustic soda (NaOH) etc.

(2) Define analytical chemistry.

Analytical chemistry is defined as “The branch of chemistry which deals with separation and analysis of a sample to identify its components”.

(3) Define physical chemistry.

“The branch of chemistry which deals with the relationship between the composition and physical properties of matter and the changes in them, is called physical chemistry” e.g. behaviour of gases, liquids and solids etc.

(4) Define biochemistry and give its scope.

It deals with all the chemical processes taking place in living organisms. It has application in fields of medicine, food science etc.

(5) Define organic chemistry.

The branch of chemistry which deals with the study of covalent compounds of carbon, hydrogen (hydrocarbons) and their derivatives. Organic compounds may be natural or artificially synthesized.

(6) Define inorganic chemistry.

The branch of chemistry which deals with study of all elements and their compounds except hydrocarbons. It has vast applications in glass industry, cement industry etc.

(7) What is a mixture? Give one example.

Mixture is defined as "When elements or compounds are mixed in any ratio mixture is formed". For example air, ice cream, soil, rock wood etc.

(8) What is difference of homogeneous heterogeneous mixture? (پیپر میں دونوں الگ الگ بھی پوچھے جاسکتے ہیں)

Sr. No	Homogeneous mixture	Heterogeneous mixture
1	A mixture having throughout uniform composition is called homogeneous mixture.	A mixture having throughout non-uniform composition is called heterogeneous mixture.
2	Examples: Air, ice, cream, sugar, solution etc.	Examples: Wood, soil, rock, etc.

(9) What is relative atomic mass? How is it related to gram? Write its unit.

"The average mass of the atoms of an element as compared to $1/12^{\text{th}}$ the mass of an atom of C-12 isotope". The unit of relative atomic mass is called amu (atomic mass unit)

$$1 \text{ amu} = 1.66 \times 10^{-24} \text{ gram}$$

**(10) Define empirical formula with an example.**

The formula which shows the simplest whole number ratio of atoms present in a compound is called empirical formula. For example the empirical formula of benzene is CH.

(11) Define molecular formula with an example.

The formula which shows the actual number of atoms of each element in a molecule is called molecular formula. For example the molecular formula of benzene is C_6H_6 .

(12) How molecular formula is derived from empirical formula?

The molecular formula is derived from empirical formula by the following relationship.

$$\text{Molecular formula} = (\text{Empirical formula})_n$$

Where "n" is 1, 2, 3 and so on.

(13) Define valency. Write the valency of Na.

The combining capacity of an element with other element is called valency. The valency of Na is 1+.

(14) Determine the molecular mass of Nitric acid (HNO_3).

$$\begin{aligned}
 \text{Atomic mass of H} &= 1 \text{ amu} \\
 \text{Atomic mass of N} &= 14 \text{ amu} \\
 \text{Atomic mass of O} &= 16 \text{ amu} \\
 \text{Molecular formula} &= \text{HNO}_3 \\
 \text{Molecular mass} &= ? \\
 &= 1 (\text{At. Mass of H}) + 1 (\text{At. Mass of N}) + 3 (\text{At. Mass of O}) \\
 &= (1 \times 1) + (1 \times 14) + (3 \times 16) \\
 &= 1 + 14 + 48
 \end{aligned}$$

(15) Define free radical.

$$= 63 \text{ amu}$$

It is defined as "Atoms or group of atoms having odd number of electron i.e. unpaired electron is called free radical". e.g. H^\cdot , Cl^\cdot , H_3C^\cdot etc.

(16) Define ion with an example. How they are formed?

It can be defined as "An atom or group of atoms having a charge on it". For example Na^+ , Cl^- etc. These are formed when an electron is added or removed from the valance shell of an atom.

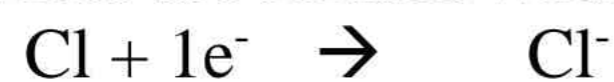
**(17) Define cations with an example. How they are formed?**

An atom or group of atoms having positive charge on it is called cation. For example Na^+ , K^+ etc. These are formed when atoms lose electrons from their valance shell.



(18) Define anions with an example. How they are formed?

An atom or group of atoms having negative charge on it is called anion. For example Cl^- , O^{2-} etc. These are formed when an atom gain electron.



(19) Define types of molecules and give example of each. (Also A long Question).

Monoatomic molecules: A molecule consisting of one atom is called monoatomic molecule. For example neon (Ne) argon (Ar) etc.

Diatomic molecules: A molecule consisting of two atoms is called diatomic molecule. For example H_2 , CO , O_2 , etc.

Triatomic molecules: A molecule consisting of three atoms is called triatomic molecule. For example H_2O , CO_2 , O_3 etc.

Polyatomic molecules: A molecule consisting of many atoms is called polyatomic molecule. For example methane (CH_4), benzene (C_6H_6) etc.

Homoatomic molecules: A molecule containing same type of atoms is called homoatomic molecule. For example Hydrogen (H_2) Sulphur (S_8) Ozone (O_3) Oxygen (O_2) etc.

Heteroatomic molecules: A molecule containing different type of atoms is called heteroatomic molecule. For example Carbon dioxide (CO_2), Water (H_2O) Ammonia (NH_3) Carbon monoxide (CO) etc.

(20) Differentiate between atomic number and mass number.

OR

Define atomic number and atomic mass. (پہرے میں دونوں الگ الگ بھی پوچھے جاسکتے ہیں)

Sr. No	Atomic number	Mass number
1	Atomic number of an element is equal to the number of protons present in the nucleus of its atoms	Mass number is the sum of protons and neutrons present in the nucleus of an atom.
2	It is denoted by Z.	It is denoted by A

(21) Calculate the number of moles in 9 gram of carbon.

$$\begin{aligned} \text{Given mass of carbon} &= 9 \text{ gram} \\ \text{Molar mass of carbon} &= 12 \text{ g mol}^{-1} \\ \text{Number of moles of carbon} &= \frac{\text{Known mass of Carbon}}{\text{Molar Mass of C}} \\ \text{Number of moles of carbon} &= \frac{9}{12} \\ \text{Number of moles of carbon} &= 0.75 \text{ moles} \end{aligned}$$

9 gram of carbon have 0.75 moles (Answer)

(22) Calculate the number of moles in 6 gram of water.

$$\begin{aligned} \text{Given mass of water} &= 6 \text{ gram} \\ \text{Molar mass of water} &= 18 \text{ g mol}^{-1} \\ \text{Number of moles of water} &= \frac{\text{Known mass of water}}{\text{Molar Mass of water}} \\ \text{Number of moles of water} &= \frac{6}{18} \\ \text{Number of moles of water} &= 0.33 \text{ moles} \end{aligned}$$

6 gram of water 0.33 moles (Answer)

(23) What is meant by mole? Give an example. (Also a long question)

A **mole** is defined as "The amount (mass) of a substance that contains 6.02×10^{23} number of particles (atoms, molecules or formula units)". It is abbreviated as "mol".

OR

The quantitative definition of **mole** is “The atomic mass, molecular mass or formula mass of a substance expressed in gram is called mole”.

Example: (مختصر سوال کے لیے کوئی ایک پوائنٹ یاد کر لیں)

- 6.02×10^{23} atoms of “C” are equivalent to one mole of carbon.
- 6.02×10^{23} molecules of H_2O are equivalent to one mole of water.
- 6.02×10^{23} formula units of NaCl are equivalent to one mole of sodium chloride.

LONG QUESTIONS



I. Write down differences between compound and mixture. (کوئی سے چار یا پانچ پوائنٹ یاد کر لیں اور پیپر میں دونوں الگ الگ بھی پوچھے جاسکتے ہیں)

Sr. No	Compound	Mixture
1	It is formed by the chemical combination.	It is formed by simple mixing of substances.
2	It cannot be separated by physical methods.	It can be separated into its components by physical methods.
3	It has fixed composition.	It does not have fixed composition.
4	It has chemical formula.	It does not have chemical formula.
5	It has sharp melting point.	It does not have fixed melting point.
6	It is always homogeneous.	It may be homogeneous or heterogeneous.
7	Components lose their identity.	Components show their identity.

II. How chemical formula is written? Explain its three steps.

There are following steps involved while writing the chemical formula of compound.

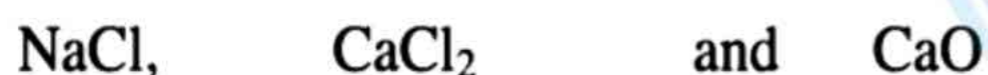
- Symbols of two elements are written side by side in such a way that positive ion first and negative ion latter.
- The valency of each ion is written on the upper right corner of its symbol e.g.



- The valency of each ion is brought to the lower right corner of other ion by cross exchange method e.g.



- If the valencies are same, they will be offset otherwise not. They are written as



- If a radical is present, then write it in parenthesis. For example aluminum sulphate $Al_2(SO_4)_3$ formation.

III. Write down significance of chemical formula.

Significance:

- It represent the name of compound e.g. H_2O (Water).
- It shows the name of the elements present in the compound.
- It shows the mass of the compound in amu or grams.
- It is one molecule or formula unit of the compound.
- In a balanced chemical equation, it shows the one of compound.

IV. Differentiate between molecule and molecular ion. (پہر میں دونوں الگ الگ بھی پوچھے جاسکتے ہیں)

Sr. No	Molecule	Molecular ion
1	It is the smallest particle of an element or compound.	It is formed by gain or loss of electrons by a molecule.
2	It can exist independently.	It cannot exist independently.
3	It is always neutral.	It have negative or positive charge.
4	It is a stable unit.	It is unstable unit (reactive specie).
5	It is formed by combination atoms.	It is formed by ionization of molecule.

