Class:- 7

IIT Foundation Plus

Chemistry of Carbon Compounds

Organic Chemistry

Teaching Task

Q1) Ans:- 3

Solution:- The unique property of carbon atoms responsible for the formation of a vast no of organic compounds is catenation.

Q2) Ans:- 3

Solution:- Both graphite and diamond are crystalline allotropic forms of carbon.

Q3) Ans:- 4

Solution:- The vast no. of organic compounds is due to the unique properties of carbon, specially tetravalency, catenation, & ability to form multiple bonds.

Q4) Ans:- 3

Solution:- C_5H_{12} → Three possible structures.

1) n-Pentane 2) Iso pentane 3) Neopentane

Q5) Ans:- 3.

Solution:- Carbon can exist in the gaseous state in both oxides and hydrocarbons.

Q6) Ans:- 3.

Solution:- Allotropy is due to the difference in the arrangement of atoms in solid state

Q7) Ans:- 4.

Solution:- The crystalline allotropic form of carbon are diamond, graphite & fullerenes.

Q8) Ans:- 4.

Solution:- The purest form of carbon are diamond, graphite & C_{60}.

Q9) Ans:- 3.

Solution:- Bond angle → 109.5° or 109°28'

Bond length → 1.54 A°.

Q10) Ans:- 1

Solution:- In graphite, the adjacent layers are held together by weak vander waals forces

Advanced Level Questions

Q11) Ans:- 1, 2, 3, 4.

Solution:- Carbon exhibits

1) Catenation 2) Isomerism

3) Tetravalency 4) Allotropy.

Q12) Ans:- 1, 2, 3, 4.

Solution:- The description accurately portrays the properties of diamond, a form of carbon with a tetrahedral structure, 109°28' bond angles, 1.54A° bond length, density of 3.51 g/cc & refractive index of 2.41.

Q13) Ans:- 1

Solution:- In diamond, three-dimensional network of carbon atoms bonded by strong covalent bonds, making it extremly hard which is used to cut glass.

Q14) Ans:- 1

Solution:- Loosely held electrons is present in graphite. So, Graphite acts as good conductor of heat & Electricity.

Q15) Ans:- 2.

Solution:- Graphite is used as a lubricant because its adjacent layers are held together by weak vander waals forces, allowing them to slide over each other easily.

Q16) Ans:- 3.

Solution:- Graphite is insoluble in ordinary solvents. It act as good conductor of heat & Electricity.

Integer Type.

Q17) Ans:- 120.

Solution:- Bond angle in graphite is 120°

Matrix Matching

Ans:- 1) R 2) P 3) Q 4). S.

Solution:-

1) Grayish coloured crystalline solid. → R) Graphite.
2) Black lead → P) Plumbago
3) Moderator → Q) Slow down the high energy neutrons
4) Buckminsterfullerene → S) Bucy balls.

Learners Task

Q1) Ans:- 2.

Solution:- Graphite is a crystalline allotrope, not amorphous.

Q2) Ans:- 3.

Solution:- In diamond, carbon atoms are arranged in tetrahedral arrangement.

Q3) Ans:- 3.

Solution:- Buckminsterfullerene is a molecular form of carbon consisting of 60 Carbon atoms (C_{60})

Q4) Ans:- 2.

Solution:- The refractive index of diamond is approximately 2.45

Q5) Ans:- 3.

Solution:- Both coal tar and petroleum are primary sources of organic compounds

Q6) Ans:- 3

Solution:- Generally Organic compounds are covalent in nature

Q7) Ans:- 2

Solution:- The first organic compound synthesised in the laboratory from an inorganic compound was urea (NH_2CONH_2)

Q8) Ans:- 2

Solution:- Organic compounds usually have low melting and boiling points

Q9) Ans:- 1.

Solution:- C-12 is the most stable and aburdant

Q10) Ans:- 1.

Solution:- Catenation is the property of a carbon atoms to form long chains or rings by bonding with other carbon atoms

JEE Main level Questions

Q11) Ans:- 4.

Solution:- The factor contribute to the vast no. of organic compounds are Isomerism, Tetravalency & catenation.

Q12) Ans:- 1

Solution:- The interlayer distance in graphite is 3.4 A°.

Q13) Ans:- 4

Solution:- Pure diamond is transparent to X-rays, UV rays and visible rays.

Q14) Ans:- 1

Solution:- Graphite is more chemically active than diamond because of its layered structure with loosely held electrons.

Q15) Ans:- 1

Solution:- Loosely held, delocalized electrons allow graphite to conduct heat and electricity.

Q16) Ans:- 2

Solution:- Diamond is insoluble in ordinary solvents due to its strong three dimensional covalent network structure. However, diamond can dissolve in strong solvents like molten metals.

Q17) Ans:- 3.

Solution:- Catenation occurs in both same and different elements.

Q18) Ans:- 1

Solution:- Pentane is an alkane with five carbon atoms.

$C_nH_{2n+2} = C_5H_{2(5)+2} = C_5H_{12}$.

Q19) Ans:- 3.

Solution:- C-14 is used in radio carbon dating to determine the age of ancient fossils and artifacts

Q20) Ans:- 2

Solution:- Allotropes have different physical properties but the same chemical properties

Advanced Level Questions

Q21) Ans:- 4

Solution:- Diamond & graphite are true allotropes of carbon along with fullerene & graphene.

Q22) Ans:- 1

Solution:- Graphite is soft and has a low density because its structure consits of layers of carbon atoms arranged in hexagonal rings

Q23) Ans:- 1

Solution:- Presence of loosely held electrons, graphite conducts heat and electricity. So it is used in electrodes

Q24) Ans:- 1

Solution:- Helium-doped fullerene have been found to exhibit superconducting properties.

Integer Type

Q25) Ans:- 700°c to 900°c.

Solution:- The ignition temperature of graphite is around 700°c to 900°c.

Matrix Matching

Q26) Ans:- 1) Q 2) R 3) P 4). S.

Solution:-

1) Amorphous forms → Q) Graphite.

2) Crystalline forms → R) Diamond

3) Same molecular formula → P) Isomers.

4) Catenation → S) Open chain or closed chain of compounds