



CHEMISTRY

JEE (MAIN AND ADVANCED) CHEMISTRY

ELEMENTS OF CARBON FAMILY

PROBLEMS

1. What is the peculiarity of group 14 elements in respect of electronegativity?

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2. What is the stability order of these elements in their compounds in +2 oxidation states? Why?

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3. Is Pb^{4+} a reducing agent or an oxidising agent? Why?



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4. SiF_6^{2-} is known while $SiCl_6^{2-}$ is not - explain.



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5. Among elements of carbon family, which act as 7 semi conductors?



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6. CCl_4 does not act as Lewis acid while $SiCl_4$ and $SnCl_4$ act as Lewis acids. Why?



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7. Stannous chloride has high melting point (is a solid) while stannic chloride has low melting point (is a liquid). Why?



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8. Name the elements other than carbon in group IVA elements that exhibit catenation.



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9. Sn^{2+} and Fe^{3+} cannot coexist in the same solution. Why?



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10. Diamond is covalent. Yet it has high melting point Why?



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11. Diamond is insulator, but graphite is a conductor. Why?



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12. Why graphite can be used as a lubricant?



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13. Which is the most acidic oxide of group 14 elements?



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14. Why dilute hydrochloric acid is preferred to dilute sulphuric and for the preparation of carbondioxide from marble?



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15. Carbondioxide does not support combustion but a burning magnesium ribbon continues to burn in it. Why?



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16. Why is CO_2 used as fire extinguisher ?



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17. Water gas is 3 times more efficient than producer gas as fuel. Why?



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18. What are silicones ?



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19. Support the acidic nature of silica



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20. What is the covalency of silicon in H_2SiF_6 ?



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21. What is the peculiarity of group 14 elements in respect of electronegativity?



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40. What is the covalency of silicon in H_2SiF_6 ?



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SUBJECTIVE EXERCISE - 1 (LONG ANSWER QUESTIONS)

1. Name the group IVA elements in the order, Write note on the following.

a) Electronic configuration b) Occurrence c) Variation of oxidation states.



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2. How does the first element of group 14 differ from other elements of the group?



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3. Are BCl_3 and $SiCl_4$ electron deficient compounds explain.



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4. What is allotropy? Name the crystalline allotropes of Carbon. What are their uses?



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SUBJECTIVE EXERCISE - 1 (SHORT ANSWER QUESTIONS)

1. Explain irregularity in IE of group 14 elements.



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2. Why does EN value remain constant in Si , Ge , Sn and Pb ?



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3. Why is CCl_4 not effected by H_2O while $SiCl_4$ is readily changed?



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4. Mention a method to synthesize carbon disulphide? How is it useful?



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5. SiO_2 is solid while CO_2 is a gas at ordinary temperature. Explain.



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6. Explain the properties of graphite in terms of its structure. Mention the uses of graphite.



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7. What happens when the following are heated?

a) $CaCO_3$ alone b) $CaCO_3$ and Silica together



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SUBJECTIVE EXERCISE - 1 (VERY SHORT ANSWER QUESTIONS)

1. Mention one dissimilarity between C and Si .



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2. Write the electronic configurations of group IVA elements.



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3. What is catenation? Give an example.



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4. Explain why diamond is very hard.



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5. Name an allotrope of carbon that has lowest energy.



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6. Name the crystalline allotropes of carbon and mention any hybridization involved in them



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7. Why graphite can be used as a lubricant?



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8. Graphite is a good conductor. Explain.



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9. Why is CO gas poisonous.



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10. What synthetic gas.



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11. What is producer gas.



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12. Give one use of dry ice.



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SUBJECTIVE EXERCISE - 2 (LONG ANSWER QUESTIONS)

1. Give an account of the following

i) silicones ii) Zeolites iii) SiCl_4 .



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2. How does SiO_2 react with a) NaOH b) HF . Explain its structure.



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SUBJECTIVE EXERCISE - 2 (SHORT ANSWER QUESTIONS)

1. Write the structure of the product formed, when the starting material for the manufacture of silicones is $RSiCl_3$



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2. Write a brief note on Zeolites & silicates



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3. Why SiO_2 does not dissolve in water.



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4. What are silicones ?



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SUBJECTIVE EXERCISE - 2 (VERY SHORT ANSWER QUESTIONS)

1. Name any two man-made silicates.



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2. How is silicones useful ?



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3. Draw the structure of silica neatly.



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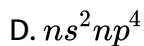
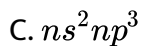
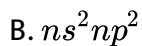
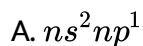
4. Write the use of ZSM-5.



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OBJECTIVE EXERCISE - 1 (INTRODUCTION AND VARIATION OF PROPERTIES)

1. The valency shell configuration of IVA element is



Answer: B



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2. Element with different EN among the following



B. *Ge*

C. *Si*

D. *C*

Answer: D



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3. Among group 14 elements, most acidic oxide is formed by

A. *Pb*

B. *C*

C. *Si*

D. *Ge*

Answer: B



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4. Si has diagonal relationship with

A. Sulphur

B. Boron

C. Phosphorus

D. Carbon

Answer: B



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5. The most common oxidation state of VI A group elements is

A. $+IV$

B. $+I$

C. $+III$

D. $+II$

Answer: A



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6. + 2 oxidation state of lead is more stable than + 4, because of

- A. penetration power
- B. octet configuration
- C. inert pair effect
- D. presence of vacant orbitals

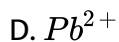
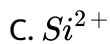
Answer: C



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7. Which of the following is most stable ?

- A. Sn^{2+}

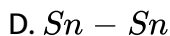
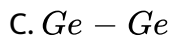
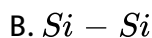
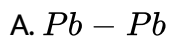


Answer: D



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8. Which of the following has least bond enthalpy ?

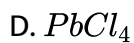
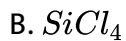


Answer: A



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9. An unstable compound is

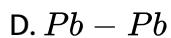
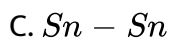
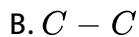
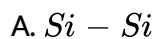


Answer: D



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10. The following bond has highest bond energy



Answer: B



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11. Inert pair effect is exhibited by

A. *Pb*

B. Boron

C. Si

D. Al

Answer: A



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12. Diamond is covalent. Yet it has high melting point Why?

A. A and R are true, R explains A

B. A and R are true, R does not explain A

C. A is true, but R is false

D. A is false, but R is true

Answer: A



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13. The reactivity of IVA group element is highest with

A. F_2

B. Cl_2

C. Br_2

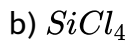
D. I_2

Answer: A



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14. Lewis acids among the following are



A. only a and b

B. only b and c

C. only a and c

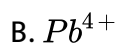
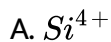
D. a, b and c

Answer: B



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15. Ionic radius is highest for



C. Ge^{4+}

D. Sn^{4+}

Answer: B



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OBJECTIVE EXERCISE - 1 (CARBON)

1. (A) : Carbon forms a large number of compounds

(R) : Carbon has high catenation power

A. A and R are true, R explains A

B. A and R are true, R does not explain A

C. A is true, but R is false

D. A is false, but R is true

Answer: A



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2. The percentage of lead in lead pencils is

- A. 0
- B. 100
- C. 80
- D. 50

Answer: A



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3. Thermodynamically most stable allotrope of carbon is

- A. Diamond
- B. Coal
- C. Coke

D. None

Answer: B



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4. In graphite, hybridization of carbon is

A. sp

B. sp^3d

C. sp^3

D. sp^2

Answer: B



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5. Diamonds are used in ornaments because of it's high

- A. density
- B. refractive index
- C. hardness
- D. density and hardness

Answer: B



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6. The following are some statements about graphite

- I) Used as a lubricant
- II) Used in lead pencils
- III) It has sp hybridised carbons

The correct combination is

- A. all are correct
- B. only I and II are correct
- C. only II is correct

D. only II and III are correct

Answer: B



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7. The following are some statements about graphite

- I) $C - C$ bond length is 1.42\AA
- II) distance between two layers is 3.35\AA
- III) bond angle is 60°

The correct combination is

- A. all are correct
- B. only I and II are correct
- C. only II is correct
- D. all are incorrect

Answer: B



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8. Covalency of carbon in diamond is

A. 4

B. 3

C. 2

D. 1

Answer: A



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9. Diamond is used in glass cutting due to its

A. Hard nature

B. High refractive index

C. High m.p.

D. High metallic bonding

Answer: A



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10. The geometry of 'C' in diamond is

A. Planar

B. Linear

C. Tetrahedral

D. Octahedral

Answer: B



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11. $C - C$ bond length in Diamond is

A. 1.338\AA

B. 1.548\AA

C. 1.20\AA

D. 1.8827\AA

Answer: B



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12. In buckminster fullerene, each carbon atom is

A. sp -Hybridised

B. sp^2 – Hybridised

C. sp^3 -Hybridised

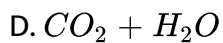
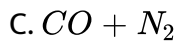
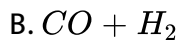
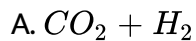
D. pure p - orbitals involved

Answer: B



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13. Water gas is a mixture of



Answer: B



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14. Major component present in producer gas



D. CO_2

Answer: B



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15. In Buckminster fullerene, the number of six membered and five membered rings respectively are

A. 20, 12

B. 12, 20

C. 6, 12

D. 12, 6

Answer: B



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16. Identify the correct statements.

- A. Lead forms compounds in $+2$ oxidation state due to inert pair effect
- B. All halogens form only negative oxidation
- C. Catenation property increases from boron to oxygen.
- D. Oxygen oxidation state is -1 in ozonides.

Answer: A



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17. White metal is an alloy of

- A. Na, Mg
- B. Na, Pb
- C. Li, Mg

D. *Li*, *Pb*

Answer: D



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18. The gas produced by the passage of air over hot coke is

A. Carbon monoxide

B. Carbon dioxide

C. Producer gas

D. Water gas

Answer: C



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OBJECTIVE EXERCISE - 1 (SILICON AND SILICON DIOXIDE)

1. (A) : Silica is used as acidic flux in metallurgy

(R) : Silica is basic in nature

- A. A and R are true, R explains A
- B. A and R are true, R does not explain A
- C. A is true, but R is false
- D. A is false, but R is true

Answer: C



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2. Quartz is a crystalline variety of

- A. Si
- B. SiO_2
- C. Na_2SiO_3
- D. SiC

Answer: B



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3. Silicon can be considered as

A. reductant

B. acid

C. oxidant

D. base

Answer: A



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4. Which of the following reacts with silica ?

A. HF

B. HCl

C. HBr

D. HI

Answer: B



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5. In SiO_2 , each silicon atom is surrounded by

A. 4 oxygen atoms in a square planar manner

B. 4 oxygen atoms in a tetrahedral manner

C. 6 oxygen atoms in a octahedral manner

D. 3 oxygen atoms in a planar fashion

Answer: B



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6. SiO_2 does not react with

A. HF

B. H_2SO_4

C. Na_2CO_3 (fused)

D. $NaOH$

Answer: B



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7. The covalency of silicon and oxygen in SiO_2 respectively

A. 2, 4

B. 4, 4

C. 4, 2

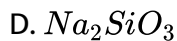
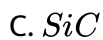
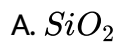
D. 4, 6

Answer: C



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8. Rock crystal is chemically



Answer: A



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OBJECTIVE EXERCISE - 1 (SIMILARITIES AND DISSIMILARITIES OF C AND SI)

1. (A): Diamond is harder than silica

(R): The $Si - O - Si$ bonds in silica are weaker than $C - C$ bonds in diamond

- A. A and R are true, R explains A
- B. A and R are true, R does not explain A
- C. A is true, but R is false
- D. A is false, but R is true

Answer: B



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2. Solid CO_2 is used as

- A. Poison
- B. Anaesthesia
- C. Refrigerant

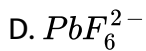
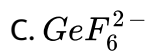
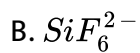
D. Artificial respirant

Answer: C



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3. Which of the following does not exist ?



Answer: A



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4. True statement about silicone is

- A. Silicon is bonded to another silicon
- B. Silicon is bonded through carbon to another silicon
- C. Silicon is bonded to oxygen and carbon
- D. Carbon is bonded to silicon and oxygen

Answer: C



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5. Which of the following is an amphoteric oxide ?

- A. CO_2
- B. SiO_2
- C. SnO_2
- D. CaO

Answer: C



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6. Which of the following cannot form complex compounds ?

A. C

B. Si

C. Ge

D. Al

Answer: A



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7. The following is an acidic gaseous oxide

A. PbO_2

B. SnO_2

C. SiO_2

D. CO_2

Answer: D



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8. Nature of CO_2 and SiO_2 are respectively

A. Acidic, Basic

B. Basic, Basic

C. Acidic, Acidic

D. Basic, Acidic

Answer: C



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9. The anhydride of carbonic acid is

A. CO

B. CO_2

C. C_3O_2

D. C_2O

Answer: B



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OBJECTIVE EXERCISE - 1 (SILICATES AND SILICONES)

1. (A): Silicones are synthetic organosilicon compounds

(R) : Silicones contain $Si - O - Si$ linkages

A. A and R are true, R explains A

B. A and R are true, R does not explain A

C. A is true, but R is false

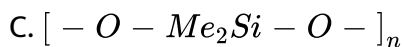
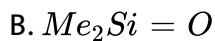
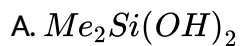
D. A is false, but R is true

Answer: B



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2. Me_2SiCl_2 on hydrolysis will produce

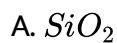


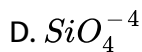
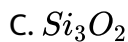
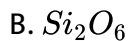
Answer: A



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3. The basic structural unit in silicates is





Answer: D



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4. Silicones are the polymers formed by hydrolysis of

A. Silicondioxide

B. Silanes

C. Silicates

D. Chlorosilanes

Answer: D



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5. The starting materials for the formation of silicone polymers are

- A. Silicates
- B. Chlorosilanes
- C. Silanes
- D. Silicon carbide

Answer: B



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6. Monomer in silicone is

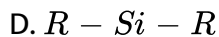
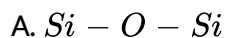
- A. $R_2Si(OH)_2$
- B. $R_2Si = O$
- C. R_2SiCl_2
- D. $R_2SiC(OH)$

Answer: A



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7. Bonds that are absent in silicone



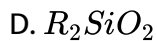
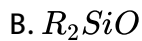
Answer: B



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8. The repeating unit of silicones





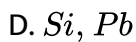
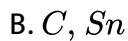
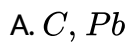
Answer: B



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OBJECTIVE EXERCISE - 2 (INTRODUCTION AND VARIATION OF PROPERTIES)

1. The IV A element with highest and lowest first ionization potential values



Answer: B



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2. Among the following, amphoteric element is

A. *C*

B. *S*

C. *Ge*

D. *Pb*

Answer: C



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3. Carbon has the highest catenation character because

A. C is more electronegative

B. C has higher ionisation potential value

C. C has only one stable isotope

D. $C - C$ bond is strong

Answer: D



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4. The general trend in the properties of elements of carbon family shows that, with the rise in atomic number.

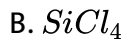
- A. The tendency towards catenation increases
- B. The tendency to show $+2$ oxidation state increases
- C. The metallic character decreases
- D. The tendency to form complexes with covalency higher than four decreases .

Answer: B



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5. Which of the following cannot act as Lewis acid ?



D. None

Answer: A



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6. Which of the IVA group element does not exhibit allotropy ?

A. C

B. Si

C. Sn

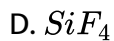
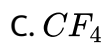
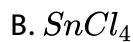
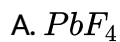
D. Pb

Answer: D



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7. Which of the following is ionic



Answer: A



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8. Oxidation state +4 is less common in



B. Si

C. Ge

D. Pb

Answer: D



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OBJECTIVE EXERCISE - 2 (CARBON)

1. Layer structure is present in

A. Graphite is used as a solid lubricant, because it is soft. Due to weak van der Waals forces between the layers of graphite, the layers have sliding nature.

B. Coal

C. Diamond

D. Coke

Answer: A



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2. The correct statement regarding Graphite

- A. Graphite is not a conductor because, it does not contain free electrons
- B. Graphite is a three dimensional conductor because, the p-electrons are delocalised three dimensionally
- C. Graphite is a two dimensional conductor because p-electrons are delocalised two dimensionally
- D. In graphite all the carbon atoms undergo sp^3 hybridization

Answer: C



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3. Regarding diamond

- I) $C - C$ bond length is 1.54\AA
- II) It has least refractive index among solids
- III) It has a 3-dimensional structure.

The correct combination is

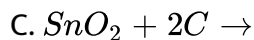
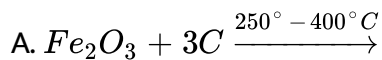
- A. all are correct
- B. I & III are correct
- C. I & II are correct
- D. II & III are correct

Answer: B



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4. The reaction that gives CO_2 as one of the products is



Answer: C



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5. Which of the following is used as black pigment in black ink ?

A. Coke

B. Carbon black

C. Germanium

D. Graphite

Answer: B



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6. Which one of the following is not an allotrope of carbon?

A. Graphite

B. Diamond

C. Carborundum

D. Coke

Answer: C



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7. In Buckminster fullerene, the number of six membered and five membered rings respectively are

A. 10 & 20

B. 30 & 30

C. 20 & 10

D. 12 & 20

Answer: D



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OBJECTIVE EXERCISE - 2 (SILICON AND SILICON DIOXIDE)

1. Which of the following is a crystalline form of silica ?

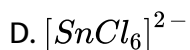
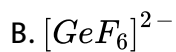
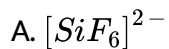
- A. Jaspar
- B. Cristobalite
- C. Agate
- D. Onyx

Answer: B



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2. Which does not exist ?

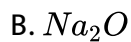
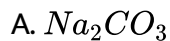


Answer: C



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3. SiO_2 reacts with which of the following to form water glass



D. All

Answer: D



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4. Regarding silica

I) Quartz is amorphous form of silica

II) Silica dissolves in NaOH

III) Silica dissolves in HF

The correct combination is

A. all are correct

B. II & III are correct

C. III are correct

D. I & III are correct

Answer: B



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OBJECTIVE EXERCISE - 2 (SIMILARITIES AND DISSIMILARITIES)

1. The high poisonous nature of CO is due to its

- A. Neutral nature
- B. Complex forming ability
- C. Reducing nature
- D. Oxidising nature

Answer: B



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2. Carboxy haemoglobin is _____ times more stable than oxyhaemoglobin

- A. 100
- B. 200
- C. 300

D. 400

Answer: C



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3. Which of the following statements is correct?

A) CO_2 is neither combustible nor supporter of combustion

B) CO is a combustible gas

C) CO burns with a blue flame

A. A, B

B. B, C

C. A, C

D. A, B, C

Answer: D



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4. A colourless gas which burns with blue flame and reduces CuO to Cu is

A. N_2

B. CO

C. CO_2

D. NO_2

Answer: D



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5. Maximum covalency exhibited by Carbon and Silicon respectively are

A. 4, 6

B. 4, 4

C. 6, 6

D. 4, 8

Answer: A



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6. Hybridisation of carbon atom in carbon dioxide is

A. sp^2

B. sp^3

C. sp

D. dsp^2

Answer: C



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7. Which of the following acts as a reducing agent ?

A. CO

B. CO_2

C. C_3O_2

D. All

Answer: A



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8. The $C - O$ bond order in CO and CO_2 respectively

A. 2, 3

B. 2, 2

C. 3, 3

D. 3, 2

Answer: D



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OBJECTIVE EXERCISE - 2 (SILICONES, SILICATES AND ZEOLITES)

1. Silicones contain silicon strongly bonded to _ and __atoms.

A. C, O

B. C, H

C. H, O

D. H, Cl

Answer: A



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2. The hybridisation of silicon in SiO_4^{4-} is

A. sp^2

B. sp

C. sp^3

D. sp^3d

Answer: C



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3. The empirical formula of silicones is analogous to

A. Alcohols

B. Aldehydes

C. Ketones

D. Ethers

Answer: C



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4. Which zeolite catalyst is used to convert alcohols directly into gasoline ?

A. ZSM - 5

B. $Zn_2(SiO_4)$

C. $LiAl(SiO_3)$

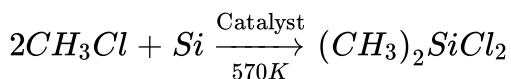
D. $Be_3Al_2[Si_6O_{18}]$

Answer: A



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5. What is the catalyst used in the following reaction?



A. Nickel powder

B. Copper powder

C. Zinc powder

D. Platinum

Answer: A



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PRACTICE EXERCISE

1. Which of the following is a semi conductor ?

A. C

B. Si

C. Ge

D. both Si and Ge

Answer: D



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2. Which has the highest melting point ?

A. Si

B. Pb

C. Sn

D. C

Answer: D



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3. Which of the following is a reducing agent and undergoes hydrolysis ?

A. CH_4

B. C_2H_6

C. C_3H_8

D. SiH_4

Answer: D



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4. The hybridisation of silicon in SiF_6^{2-} is

A. sp^3d^2

B. sp^3d

C. sp^3

D. sp^3d^3

Answer: A



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5. The element of IVA group that has no catenation ability

A. C

B. Si

C. Ge

D. Pb

Answer: D



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6. All atoms are sp^3 hybridised in the following substance

A. Methane

B. Ethane

C. Diamond

D. Graphite

Answer: D



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7. The allotrope of Carbon not used in the making of electrodes is

- A. Gas Carbon
- B. Petroleum Coke
- C. Graphite
- D. Diamond

Answer: D



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8. Synthesis gas is a mixture of

- A. $CO + H_2$
- B. $CO + N_2$
- C. $CO + N_2 + H_2$
- D. $CO + CH_4 + N_2$

Answer: A



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9. CO can be used as a fuel but not CO_2 because

- A. CO is a combustible gas
- B. CO is neutral oxide
- C. CO can be oxidized but not CO_2
- D. CO_2 can be oxidized but not CO

Answer: A



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10. Silica has the following structure

- A. Linear

B. Planar

C. Angular

D. Polymeric

Answer: D



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LIST-I

LIST - II

A) Diamond

1) Metal electrode

B) Graphite

2) sp hybridised

C) Silica

3) Acheson's process

D) CO_2

4) Tridymite

5) Cutting of glass

11.

The correct match is

A. $\begin{matrix} \underline{A} & \underline{B} & \underline{C} & \underline{D} \\ 2 & 1 & 3 & 4 \end{matrix}$

B. $\begin{matrix} \underline{A} & \underline{B} & \underline{C} & \underline{D} \\ 5 & 1 & 2 & 3 \end{matrix}$

C. $\begin{matrix} \underline{A} & \underline{B} & \underline{C} & \underline{D} \\ 5 & 3 & 4 & 2 \end{matrix}$

D. $\begin{matrix} \underline{A} & \underline{B} & \underline{C} & \underline{D} \\ 1 & 4 & 2 & 3 \end{matrix}$

Answer: C



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12. Silicon is ignited in highly electro-negative element to give a tetrahedral molecule. This tetrahedral molecule reacts with HF and gives

- A. Orthosilicic acid
- B. Metasilicic acid
- C. Pyrosilicic acid
- D. Hydrofluoro silicic acid

Answer: D



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13. Silica is high melting solid, because

- A. It exists as discrete molecules
- B. It has many resonance structures
- C. It has gaint network structure
- D. Each Si atom is surrounded by 4 Si atoms

Answer: C



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14. The oxide which exists as solid at room temperature is

- A. CO
- B. CO_2
- C. SiO_2
- D. SO_2

Answer: C



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15. Hybridisation of Carbon atoms in CO and CO_2 are respectively

A. sp , sp^2

B. sp , sp

C. sp^2 , sp^3

D. sp^2 , sp

Answer: B



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16. Which of the following shows bonds in silicones?

A. $Si - Si - Si - Si$

B. $Si - C - Si - O - Si$

C. $Si - C - Si - C - Si$

D. $-Si - O - Si - O - Si$

Answer: D



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17. The number of membered rings 20 and ... membered rings 12 are in the 'Buckminster fullerene' respectively

A. 6, 5

B. 5, 6

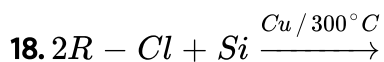
C. 5, 4

D. 4, 5

Answer: A



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- A. Organo silanes
- B. Silicon tetrachloride
- C. Silanes
- D. Silone polymer

Answer: A



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19. A and B are the compounds of carbon. A on passing over red hot coke is converted to B. A and B respectively are

- A. CO and CO_2
- B. CH_4 and C_2H_6
- C. CO_2 and CO

D. CCl_4 and $CHCl_3$

Answer: C



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20. $[SiF_6]^{2-}$ is known where as $[SiCl_6]^{2-}$ does not exist because

- I) Six large chloride ions cannot be accommodated around Si^{4+}
- II) Interaction between lone pair of chloride ion and Si^{4+} is not very strong
- III) Silicon is less electronegative than chlorine
- IV) Si^{4+} and Cl^- ions have same size

A. I and II are correct

B. III and IV are correct

C. II and III are correct

D. I and IV are correct

Answer: A



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21. Buckminster fullerene is

- A. Amorphous form of carbon
- B. Crystalline form of silicon
- C. Crystalline form of carbon
- D. Amorphous form of silicon

Answer: C



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22. Carbon monoxide is not obtained in which of the following ?

- A. Oxidation of carbon in limited supply of oxygen or air
- B. Dehydration of formic acid with conc. H_2SO_4 at 373 K
- C. Action of dil.HCl on calcium carbonate

D. Passage of steam over hot coke

Answer: C



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23. Which of the following decomposes steam to form dioxide and dihydrogen gas ?

A. Carbon

B. Silicon

C. Tin

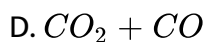
D. Germanium

Answer: C



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24. Which of the following is used for radiocarbon dating ?



Answer: B



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25. Wrong statement regarding the C_{60} molecule is?

A. It contains twenty six membered rings and twelve five membered rings

B. It has shape like soccer ball

C. All carbons are sp^2 hybridised

D. A six membered ring is always fused with only five membered rings

Answer: D



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26. C_{60} molecule contains

A. Only single bonds with $C - C$ distance 154 pm

B. Only double bonds with $C - C$ distance 134 pm

C. Both single and double bonds with $C - C$ distances of 143.5 pm and 138 pm

D. Both six and seven membered rings

Answer: C



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27. Some statements are given regarding uses of carbon

- A) Crucibles made from graphite are inert to dilute acids and alkalies
- B) Activated charcoal is used in absorbing poisonous gases
- C) Coke is used in metallurgy as a reducing agent
- D) Carbon black is used to prepare electrodes in batteries

A. A,B,D are correct

B. A,B,C are correct

C. B,C,D are correct

D. A,B,C,D are correct

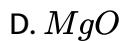
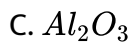
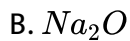
Answer: B



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28. Carbon monoxide can reduce

A. ZnO



Answer: A



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29. Catenation is not a property of element with

A. valency 1

B. valency 2

C. valency 3

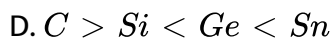
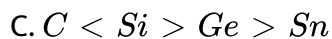
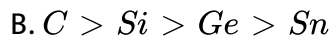
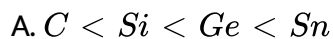
D. valency 4

Answer: D



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30. Correct order of catenation of group IV A elements is



Answer: C



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31. Which one of the following elements reduces NaOH to Na?



Answer: C



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32. How many comers of SiO_4 units are shared in the formation of three dimensional silicates?

A. 3

B. 2

C. 4

D. 1

Answer: D



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33. Which one of the following elements reacts with steam?

A. C

B. Ge

C. Si

D. Sn

Answer: B



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LECTURE SHEET (STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. The valency shell configuration of IV A element is

A. ns^2np^1

B. ns^2np^2

C. ns^2np^3

D. ns^2np^4

Answer: B



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2. Silicon has diagonal relationship with

A. Sulphur

B. Boron

C. Phosphorous

D. Carbon

Answer: B



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3. + 2 oxidation state of lead is more stable than + 4, because of

A. penetration power

- B. octet configuration
- C. inert pair effect
- D. presence of vacant orbitals

Answer: C



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4. The following bond has highest bond energy

- A. Si - Si
- B. C - C
- C. Sn - Sn
- D. Pb - Pb

Answer: B



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5. The IV A element with highest and lowest first ionization potential values

A. C, Pb

B. C, Sn

C. C, Si

D. Si, Pb

Answer: B



Watch Video Solution

6. Among the following element is metalloid.

A. C

B. S

C. Ge

D. Pb

Answer: C



Watch Video Solution

7. Carbon has the highest catenation character because

- A. C is more electronegative
- B. C has higher ionisation potential value
- C. C has only one stable isotope
- D. C - C bond is strong

Answer: D



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8. Which of the IVA group element does not exhibit allotropy ?

- A. C

B. Si

C. Sn

D. Pb

Answer: D



Watch Video Solution

9. Which has the highest melting point ?

A. Si

B. Pb

C. Sn

D. C

Answer: D



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10. $C - C$ bond length in Diamond is

A. 1.33 \AA

B. 1.54 \AA

C. 1.20 \AA

D. 1.8 \AA

Answer: B



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11. The percentage of lead in lead pencils is

A. 0

B. 100

C. 80

D. 50

Answer: A



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12. Thermodynamically most stable allotrope of carbon is

A. Diamond

B. Graphite

C. Coal

D. Coke

Answer: B



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13. In graphite, hybridization of carbon is

A. sp

B. Sp^2

C. Sp^3d

D. Sp^3

Answer: B



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14. The following are some statements about graphite

(I) C-C bond length is 1.42\AA (II) distance between two layers is 3.35\AA

(III) bond angle is 60°

The correct combination is

A. all are correct

B. only I and II are correct

C. only II is correct

D. only I is correct

Answer: B



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15. Covalency of carbon in diamond is

A. 4

B. 3

C. 2

D. 1

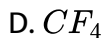
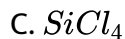
Answer: A



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LECTURE SHEET (MORE THAN ONE CORRECT ANSWER TYPE QUESTIONS)

1. Compounds which readily undergo hydrolysis are



Answer: B::C



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2. The non-existence of PbI_4 is due to

A. highly oxidising nature of Pb^{4+}

B. highly reducing nature of Pb^{4+}

C. sufficiently large covalent character

D. highly reducing nature of II^- ions

Answer: A::D



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3. Which are not correct ?

- A. $Ge(OH)_2$ is amphoteric
- B. $SnCl_4$ is more stable than $SnCl_2$
- C. Trisilylamine is pyramidal
- D. $GeCl_4$ in HCl forms $H_2[GeCl_6]$

Answer: B::C



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4. Carbon differs from the rest of the family members because of

- A. Number of unpaired electrons in valence shell
- B. Small size
- C. Non-availability of vacant orbitals in valence shell

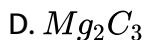
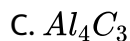
D. Non-availability of d-orbitals in valence shell

Answer: B::D



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5. Which of the following carbides on treatment with water give methane?

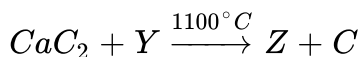
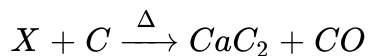


Answer: B::C



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1. Carbides are three types, ionic, covalent and interstitial CaC_2 is one of the commercially important ionic carbide



'Z' is an important nitrogenous fertiliser

Y and Z respectively are

A. CaO

B. $CaCO_3$

C. $Ca(OH)_2$

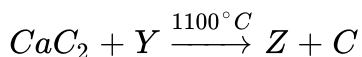
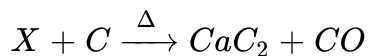
D. $CaCl_2$

Answer: A



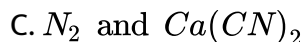
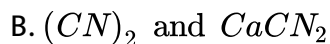
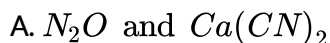
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2. Carbides are three types, ionic, covalent and interstitial CaC_2 is one of the commercially important ionic carbide



'Z' is an important nitrogenous fertiliser

Y and Z respectively are

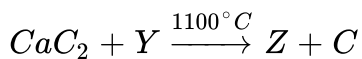
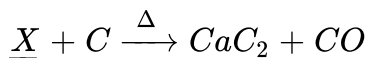


Answer: D



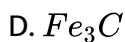
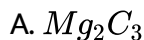
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3. Carbides are three types, ionic, covalent and interstitial CaC_2 is one of the commercially important ionic carbide



'Z' is an important nitrogenous fertiliser

Y and Z respectively are



Answer: B



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4. CO is an unsaturated compound because all the valencies of carbon are not satisfied and forms addition compounds e.g It forms carbonyl sulphide (COS) with sulphur, carbonyl chloride (phosgene $COCl_2$) with chlorine, sodium formate with NaOH, methyl alcohol with H_2 , in the presence of ZnO / Cr_2O as catalyst)

The dehydration of malonic acid $CH_2(COOH)_2$ with P_4O_{10} and heat give

- A. Carbon monoxide
- B. Carbon sub oxide
- C. Carbon dioxide
- D. All three

Answer: B



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5. CO is an unsaturated compound because all the valencies of carbon are not satisfied and forms addition compounds e.g It forms carbonyl sulphide (COS) with sulphur, carbonyl chloride (phosgene $COCl_2$) with chlorine, sodium formate with NaOH, methyl alcohol with H_2 , in the presence of ZnO / Cr_2O as catalyst)

$A \xrightarrow{\text{Red hot coke}} CO \xrightarrow{Cl_2} C \xrightarrow{H_2O} 2HCl + A$. The compounds A and C are

A. $CO_2, COCl_2$

B. $CO, COCl_2$

C. C, CO_2

D. CO_2, CO

Answer: A



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1. Carbogen is a mixture of O_2 and CO_2 . It is used for artificial respiration. What is the percentage of CO_2 , in this mixture?



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2. What is the bond order in carbon monoxide ?



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3. In the structure of silica, each silicon atom is bonded to how many oxygen atoms ?



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4. Pb_3O_4 is regarded as a compound oxide of PbO and PbO_2 . How many parts of PbO_2 , are present in it?



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5. How many moles of methane are obtained by the hydrolysis of one mole of aluminium carbide?



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PRACTICE SHEET (LEVEL - I STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. In Buckminster fullerene, the number of six membered and five membered rings respectively are

A. 20, 12

B. 12, 20

C. 6, 12

D. 12, 6

Answer: A



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2. In buckminster fullerene, each carbon atom is

- A. sp - Hybridised
- B. sp^2 - hybridised
- C. sp^3 - hybridised
- D. pure p - orbitals involved

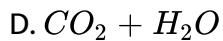
Answer: B



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3. Water gas is a mixture of

- A. $CO_2 + H_2$
- B. $CO + H_2$
- C. $CO + N_2$

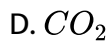


Answer: B



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4. Major component present in producer gas



Answer: B



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5. Diamonds are used in ornaments because of it's high

- A. density
- B. refractive index
- C. hardness
- D. density and hardness

Answer: B



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6. Which one of the following is not an allotrope of carbon?

- A. Graphite
- B. Diamond
- C. Carborundum
- D. Coke

Answer: C



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7. Layer structure is present in

A. Graphite

B. Coal

C. Diamond

D. Coke

Answer: A



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8. Hybridisation of carbon atom in carbon dioxide is

A. sp^2

B. sp^3

C. sp

D. dsp^2

Answer: C



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9. The covalency of silicon and oxygen in SiO_2 respectively

A. 2, 4

B. 4, 4

C. 4, 2

D. 4, 6

Answer: C



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10. Bonds that are absent in silicone

A. Si-O-Si

B. C-O-Si

C. O-Si-R

D. R-Si-R

Answer: B



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11. The repeating unit of silicones

A. RSiO

B. $R_2\text{SiO}$

C. RSiO_2

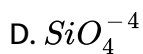
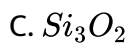
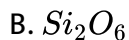
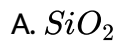
D. $R_2\text{SiO}_2$

Answer: B



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12. The basic structural unit in silicates is



Answer: D



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13. Silicones are the polymers formed by hydrolysis of

A. Silicondioxide

B. Silanes

C. Silicates

D. Chlorosilanes

Answer: D



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14. SiO_2 reacts with ____ to form water glass

A. Na_2CO_3

B. Na_2O

C. NaOH

D. All

Answer: D



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15. The empirical formula of silicones is analogous to

- A. Alcohols
- B. Aldehydes
- C. Ketones
- D. Ethers

Answer: C



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PRACTICE SHEET (LEVEL - II STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. Pick out among the following, the form of silica different from the rest

- A. Quartz
- B. Jasper
- C. Cristobalite
- D. Tridymite

Answer: B



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2. Halides of Si, Ge and Sn form complexes, while carbon halides do not form complexes, because

A. Carbon atom has a small size

B. All the four valence electrons of the carbon atom are involved in bonding

C. Carbon forms tetrahedral bonds

D. The valence shell of carbon has no (vacant) d-orbitals

Answer: D



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3. Gallium acts as reducing agent because

- A. Ga^{3+} state is less stable than Ga^{+1}
- B. Ga^{3+} state is more stable than Ga^{+1}
- C. Ga^{3+} covalent to Ga^{+1} reducing
- D. None of the above

Answer: B



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4. A reducing agent is

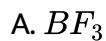
- A. SnO
- B. SnO_2
- C. $SnCl_2$
- D. $SnCl_4$

Answer: C



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5. Which one of the following is a gas



D. All of these

Answer: A



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6. The unsaturated element among the following is

A. C

B. Pb

C. Ge

D. Si

Answer: B



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7. Tin plague is

- A. Conversion of stannous salt into stannic salt
- B. Conversion of white tin into grey tin
- C. Tin plating
- D. Emission of sound while bending a tin plate

Answer: D



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8. The density of

A. Graphite = diamond

B. Graphite $>$ diamond

C. Graphite $<$ diamond

D. Graphite \geq diamond

Answer: C



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9. In the extraction of silicon by reduction of sand (silica), an excess of sand is always used to prevent the formation of

A. Silicon oxide

B. Silicon carbonate

C. Silicon carbide

D. Silicon peroxide

Answer: C

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10. On strong heating lead nitrate gives

- A. PbO , NO , O_2
- B. PbO , NO , NO_2
- C. PbO_2 , PbO , NO_2
- D. PbO , NO_2 , O_2

Answer: D

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11. Which of the following statements is/are correct

- A. Silicon can form long chains like carbon
- B. Si - O bonds are weaker than Si - Si or Si - H bonds
- C. Silicon can expand its octet unlike carbon

D. Silicon can form multiple bonds like carbon

Answer: C



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12. Tin reacts with

A. Hot con. HCl

B. conc. HNO_3

C. $HgCl_2$ on heating

D. All

Answer: D



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13. Sesquioxide of lead is

A. PbO

B. PbO_2

C. Pb_2O

D. Pb_2O_3

Answer: D



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14. Carbon and silicon have

A. Same physical properties

B. Different physical properties

C. Many a same physical and different chemical properties

D. Different chemical and physical properties

Answer: C



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15. Which of the following statement about IV group elements (C to Pb) is not correct

- A. The thermal stability of hydrides decreases from CH_4 to PbH_4 as bond enthalpy for M - H bond decreases
- B. All form tetra fluorides, tetra chlorides, tetra bromides
- C. Only Sn and Pb form dichlorides
- D. All form tetra iodides

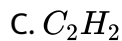
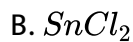
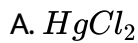
Answer: D



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PRACTICE SHEET (LEVEL - II MORE THAN ONE CORRECT ANSWER TYPE QUESTIONS)

1. Carbondioxide is isostructural with

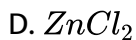
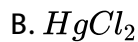
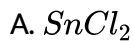


Answer: A::C



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2. CO is isostructural with



Answer: B::D



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3. Which of the following is/are amphoteric ?

A. BeO

B. Ag_2O

C. CO_2

D. SnO_2

Answer: A::D



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4. Decomposition of oxalic acid in the presence of conc. H_2SO_4 gives

A. CO

B. CO_2

C. Formic acid

D. H_2O

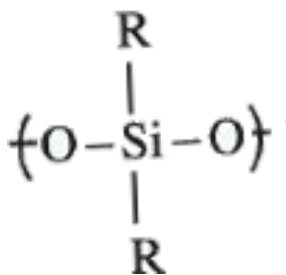
Answer: A::B::D



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5. Which of the following is/are true about silicones ?

A. They are formed by hydrolysis of R_2SiCl_2



B. They are polymer, made up to units

C. They are made up of SiO_4^{4-} units

D. They are macromolecules

Answer: A::B::D



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1. Allotropy is the occurrence of same element in two or more different physical forms having more or less similar chemical properties but different physical properties. The different forms of the element are called allotropes. Allotropy is due to the difference in the arrangement of atoms in solid state. Allotropes may be crystalline or amorphous

In which of the following all the atoms are not sp^3 hybridization

- A. Diamond
- B. Carborundum
- C. Crystalline silicon
- D. Quartz

Answer: C



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2. Allotropy is the occurrence of same element in two or more different physical forms having more or less similar chemical properties but different physical properties. The different forms of the element are called allotropes. Allotropy is due to the difference in the arrangement of atoms in solid state. Allotropes may be crystalline or amorphous

Among the following statements are incorrect statement(s) is / are

- A. Of all the elements carbon exhibit maximum catenation power
- B. Silanes are less stable than hydrocarbon because σ - I effect of hydrogen, decreases the electron density of Si - Si bond
- C. Silicon exhibit more catenation power in halides than in hydrides due to $p\pi - p\pi$ nature
- D. CS_2 is a volatile liquid while SiS_2 is high melting solid due to polymeric structure

Answer: C



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3. Allotropy is the occurrence of same element in two or more different physical forms having more or less similar chemical properties but different physical properties. The different forms of the element are called allotropes. Allotropy is due to the difference in the arrangement of atoms in solid state. Allotropes may be crystalline or amorphous

Which among the following statements are correct ?

A. Aquadag and oilag are made up of graphite

B. Graphite reacts with conc. HNO_3 to form mellitic acid



C. C_3O_2 is also toxic like CO

D. COO is non poisonous gas

Answer: A



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4. Carbon has large number of allotropes of which crystalline forms are diamond, graphite and fullerenes. Amorphous forms are coal, coke wood charcoal animal charcoal, lamp black, gas carbon, petroleum coke, sugar charcoal (Atomic radius of C = 0.77\AA)

The inter layer distance in graphite is

- A. Very small, the layers being tightly packed
- B. Ten times greater than the covalent radius of carbon
- C. Approximately 4.5 times the covalent radius of carbon
- D. The same as the covalent radius of carbon

Answer: C



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5. Carbon has large number of allotropes of which crystalline forms are diamond, graphite and fullerenes. Amorphous forms are coal, coke wood charcoal animal charcoal, lamp black, gas carbon, petroleum coke, sugar

charcoal (Atomic radius of C = 0.77\AA)

In graphite which have several fused hexagonal ring of benzene the hybridization state of each carbon atom and the bond order of each carbon-carbon bond are respectively

A. sp , 1.5

B. sp^2 , 1.5

C. sp^2 , 1.33

D. sp^3 , 1.5

Answer: C



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PRACTICE SHEET (LEVEL - II MATRIX MATCHING TYPE QUESTIONS)

1. Match the following

Column - I

- A) CO
- B) PbO₂
- C) GeO
- D) SnO

Column - II

- P) Neutral
- Q) Amphoteric
- R) Reducing agent
- S) Oxidizing agent



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2. Match the following columns

Column - I

- A) $(\text{SiO}_3)_n^{2n-}$
- B) Silicone
- C) $\text{Si}_2\text{O}_7^{6-}$
- D) $(\text{Si}_4\text{O}_{11})_n^{6n-}$

Column - II

- P) Cyclic silicate
- Q) Chain silicate
- R) Contain Si-O-Si bond
- S) Pyrosilicate



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ADDITIONAL PRACTICE EXERCISE (LEVEL - I) (Main) (STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. The zeolite used to convert alcohols directly into gasoline is

A. ZSM - 5

B. $Zn_2(SiO_4)$

C. $LiAl(SiO_3)$

D. $Be_3Al_2[Si_6O_{18}]$

Answer: A



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2. Silicones contain silicon strongly bonded to _ and __atoms.

A. C, O

B. C, H

C. H, O

D. H, Cl

Answer: A



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3. Zeolites are used as

- 1) ion exchangers
- 2) molecular sieves
- 3) water softener

The correct uses are

A. 1, 2 only

B. 2, 3 only

C. 1, 3 only

D. 1, 2, 3

Answer: D



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4. Regarding silica

I) Quartz is amorphous form of silica

II) Silica dissolves in NaOH

III) Silica dissolves in HF

The correct combination is

A. all are correct

B. II & III are correct

C. III are correct

D. I & III are correct

Answer: B



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5. Cardice is

A. C_3O_2

B. Solid CO_2

C. CCl_4

D. Mixture of CO and CO_2

Answer: B



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6. CO is heating with sulphur gives

A. SO_2

B. SO_3

C. COS

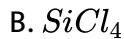
D. CO_2

Answer: C



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7. Which of the following cannot act as Lewis acid ?



D. All the above

Answer: A



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8. Carboxy haemoglobin is ____ times more stable than oxyhaemoglobin

A. 100

B. 200

C. 300

D. 400

Answer: A



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9. What is the formula of carbon suboxide ?

A. CO

B. CO_2

C. C_3O_2

D. All

Answer: C



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10. The high poisonous nature of CO is due to its

A. Neutral nature

B. Complex forming ability

C. Reducing nature

D. Oxidising nature

Answer: D



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11. In the sale of diamond the unit of mass is carat. One carat is equal to

A. 100 mg

B. 300 mg

C. 400 mg

D. 200 mg

Answer: D



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12. Graphite is better lubricant in

- A. presence of O_2
- B. absence of O_2
- C. same of both conditions
- D. presence of H_2O

Answer: A



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13. Which of the following structure is similar to graphite ?

- A. BN
- B. B
- C. B_4C
- D. B_4H_6

Answer: A



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14. Which form of carbon is used in making boot polish, printing ink, paint and black varnish

A. Bone black

B. Graphite

C. Gas carbon

D. Lamp black

Answer: D



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15. Which can be directly converted into solid state from gaseous state

A. CO

B. CO_2

C. PH_3

D. $\text{CO} + \text{H}_2$

Answer: B



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16. Which of the following is more stable

A. Pb^{4+}

B. Sn^{4+}

C. Ge^{4+}

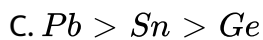
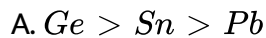
D. Ge^{2+}

Answer: C



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17. The reducing power of divalent species decreases in the order

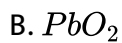


Answer: A



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18. Which is does not exist



D. $PbCl_4$

Answer: C



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19. The purest form of carbon is

A. bituminous coal

B. Coal-tar

C. coal gas

D. diamond

Answer: D



Watch Video Solution

20. Hot and Con. HNO_3 reacts with carbon to form

A. CO_2

B. CO

C. C_6H_5COOH

D. $NO_2 + CO_2$

Answer: D



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21. Which is not used as a refrigerant

A. NH_3

B. CO_2

C. CCl_2F_2

D. COCO

Answer: D



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22. CO forms a volatile compound with

- A. Nickel
- B. Copper
- C. Sodium
- D. Aluminium

Answer: A



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23. The fuel gas having volume composition equal to $44\% CH_4 + 48\% H_2 + 5\% N_2 + 3\% CO$ is

- A. oil gas
- B. water gas
- C. coal gas

D. petrol gas

Answer: C



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24. The greatest percentage of CO is in

A. coal gas

B. producer gas

C. water gas

D. oil gas

Answer: C



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25. Silicones are used as water proof materials because they have

A. hydrophobic alkyl groups

B. hydrophilic alkyl groups

C. strong Si - O bonds

D. Weak Si - O bonds

Answer: A



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26. The structure and hybridisation of $Si(CH_3)_4$ is ,

A. bent, sp

B. trigonal sp^2

C. octahedral sp^3d

D. tetrahedral sp^3

Answer: D



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27. Silicon carbide is used as

- A. dehydrating agent
- B. abrasive
- C. solvent
- D. catalyst

Answer: B



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28. The acid used for etching the glass is

- A. sulphuric acid
- B. perchloric acid
- C. hydrofluoric acid

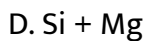
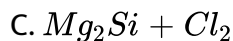
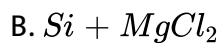
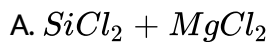
D. aqua-regia

Answer: C



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29. Which is formed when $SiCl_4$ vapours are passed over hot Mg



Answer: B



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30. The anhydride of carbonic acid is

A. CO

B. CO_2

C. C_3O_2

D. C_2O

Answer: B



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**ADDITIONAL PRACTICE EXERCISE (LEVEL - II LECTURE SHEET MORE THAN ONE
CORRECT ANSWER TYPE QUESTIONS)**

1. Which of the following halides are stable

A. $SiCl_4$

B. CF_4

C. CCl_4

D. PbI_4

Answer: A::B::C



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2. Which of the following are the ores of lead ?

A. Galena

B. Cassiterite

C. Anglesite

D. Cerussite

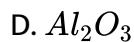
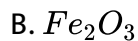
Answer: A::C::D



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3. Which of the following metal oxides are reduced by CO ?

A. ZnO



Answer: A::B



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4. In its compounds, tin exhibits the oxidation numbers



Answer: A::B



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5. Coal gas

- A. burns with a smoky flame
- B. burns with non-smoky flame
- C. is a good fuel
- D. is not used for lighting purpose

Answer: B::D



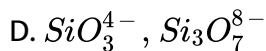
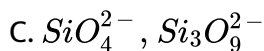
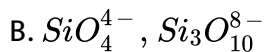
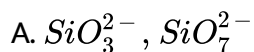
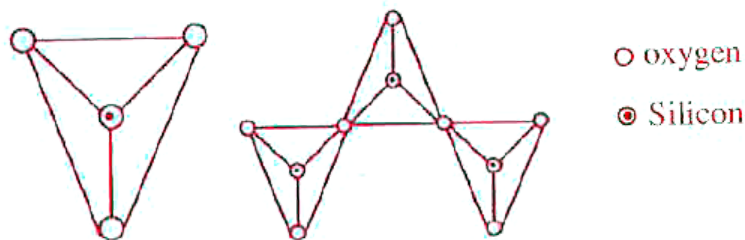
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ADDITIONAL PRACTICE EXERCISE (LEVEL - II LECTURE SHEET LINKED COMPREHENSION TYPE QUESTIONS)

1. Read the following message passage and answer the followed by is silicates are a group of minerals which have general formula SiO_2 the most common of which is quartz. Quartz is a frame work silicate with SiO_4 tetrahedra arranged in spirals. The spirals can turn in clockwise or

anticlockwise direction a feature that result in there being two mirror images optically active varieties of quartz

The following represents various silicate anions . Their formulae are respectively



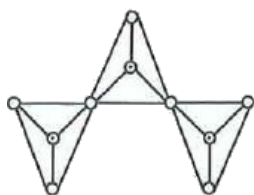
Answer: B



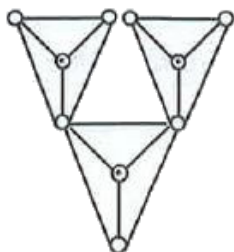
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2. Read the following message passage and answer the followed by is silicates are a group of minerals which have general formula SiO_2 the most common of which is quartz. Quartz is a frame work silicate with SiO_4 tetrahedra arranged in spirals. The spirals can turn in clockwise or anticlockwise direction a feature that result in there being two mirror images optically active varieties of quartz

$Si_3O_{10}^{8-}$ (having three tetrahedral units) is represented as



A.



B.

C. Both

D. None

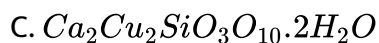
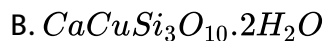
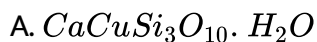
Answer: C

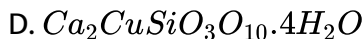


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3. Read the following passage and answer the questions followed by is silicates are a group of minerals which have the general formula SiO_2 , the most common of which is quartz. Quartz is a frame work silicate with SiO_4 tetrahedra arranged in spirals. The spirals can turn in clockwise or anticlock wise direction a feature that results in there being two mirror images optically active varieties of quartz.

The silicate anion in the mineral kinoite is a chain of three SiO_4 tetrahedra that share corners with adjacent tetrahedra. The mineral also contain Ca^{2+} , Cu^{2+} ions and water molecules in 1 : 1 : 1 ratio. The mineral is represented as





Answer: C



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4. Elemental carbon appears in many structural forms or allotropes. Three of these forms are crystalline - diamond, graphite and the recently discovered fullerene (bucky ball) - while more than 40 others including coke and carbon black are amorphous. Now there seems to be a fourth crystalline allotrope of carbon, reported in 1995 by Rich and Lagow at the University of Texas

Newly discovered allotrope of carbon has the form

A. Polyene

B. fullerene

C. bucky ball

D. none of these

Answer: A



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5. Elemental carbon appears in many structural forms or allotropes. Three of these forms are crystalline - diamond, graphite and the recently discovered fullerene (bucky ball) - while more than 40 others including coke and carbon black are amorphous. Now there seems to be a fourth crystalline allotrope of carbon, reported in 1995 by Rich and Lagow at the University of Texas

Structures of different allotropes of carbon have been compared. Which represents incorrect comparison ?

- A. allotrope discovered in 1995 sp -hybridised carbon
- B. bucky ball sp -hybridised carbon
- C. graphite sp^2 - hybridised carbon
- D. diamond sp^3 – hybridised carbon

Answer: B



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ADDITIONAL PRACTICE EXERCISE (LEVEL - II PRACTICE SHEET MORE THAN ONE CORRECT ANSWER TYPE QUESTIONS)

1. Select the correct statement(s) from the following

- A. Graphite is thermodynamically more unstable form of carbon
- B. Graphite can be converted into diamond
- C. Graphite is used as a moderator in nuclear reactors
- D. Graphite is less reactive than diamond

Answer: B::C



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2. Which of the following statements regarding IV A group elements is/are correct

- A. They all form tetrahalides
- B. All tetrahalides are not covalent
- C. All tetrahalides are tetrahedral
- D. SiF_4 is readily hydrolysed by alkali

Answer: A::B::D



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3. Which of the following statements is/are correct for CO

- A. CO is an important fuel
- B. CO is poisonous gas and a neutral oxide
- C. It can be prepared by dehydrating formic acid with conc. H_2SO_4
- D. CO is acidic in nature

Answer: A::B::C



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4. Which of the following statements is/are correct

- A. Catenation is the property of self linking of identical atoms among themselves giving rise to chains and rings
- B. Carbon and silicon have the remarkable property of catenation
- C. Catenation power of carbon is more than that of silicon
- D. Catenation power of carbon is less than that of silicon

Answer: A::B::C



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5. Which of the following statements is/are correct

A. GeO , SnO and PbO are basic and ionic than the corresponding

GeO_2 , SnO_2 and PbO_2

B. GeO is acidic while SnO and PbO are amphoteric

C. Ge^{2+} and Sn^{2+} are strong oxidising agents

D. The mixed oxide Pb_3O_4 contains Pb^{2+} and Pb^{4+} ions

Answer: B::D



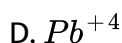
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ADDITIONAL PRACTICE EXERCISE (LEVEL - II PRACTICE SHEET LINKED COMPREHENSION TYPE QUESTIONS)

1. Tin contains only 5 - 10 % of tin as SnO_2 , the rest being Siliceous matter, wolfram and pyrites of iron copper and arsenic. It is not attacked by water. Only molten tin reacts with steam liberating hydrogen. In stannous oxide, tin is +2 oxidising state. So stannous oxide is also

described as tin (II) oxide

Which of the following ionic species is more stable



Answer: A



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2. Tin contains only 5 - 10 % of tin as SnO_2 , the rest being Siliceous matter, wolfram and pyrites of iron copper and arsenic. It is not attached by water. Only molten tin reacts with steam liberating hydrogen. In stannous oxide, tin is +2 oxidising state. So stannous oxide is also described as tin (II) oxide

Tin is attacked by

- A. Hot KOH
- B. Hot HCl
- C. Conc. HNO_3
- D. All of these

Answer: D



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3. Tin contains only 5 - 10 % of tin as SnO_2 , the rest being Siliceous matter, wolfram and pyrites of iron copper and arsenic. It is not attached by water. Only molten tin reacts with steam liberating hydrogen. In stannous oxide, tin is +2 oxidising state. So stannous oxide is also described as tin (II) oxide

Tin (Ti) chloride is used

- A. As a modrant in dyeing
- B. As a reducing agent

C. In the preparation of colloidal gold

D. All of these

Answer: D



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4. Carbon shows allotropy. The various allotropic forms of carbon can be broadly classified into 2 classes

a) Crystalline form

b) Amorphous form

Diamond and Graphite are the 2 crystalline forms of carbon. In diamond, the carbon atoms are arranged tetrahedrally while in graphite, the carbon atoms are arranged in regular hexagons in flat parallel layers

In (CO_3^{2-}) , carbon atom shows

A. sp^2 hybridisation

B. sp^3 hybridisation

C. sp hybridisation

D. sp^3d hybridisation

Answer: A



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a) Crystalline form

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Diamond and Graphite are the 2 crystalline forms of carbon. In diamond, the carbon atoms are arranged tetrahedrally while in graphite, the carbon atoms are arranged in regular hexagons in flat parallel layers

When diamond is heated at 1800 to $2000^\circ C$ in vacuo. It is converted into

A. Coke

B. Fullerene

C. Graphite

D. Lamp black

Answer: C



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ADDITIONAL PRACTICE EXERCISE (LEVEL - II PRACTICE SHEET INTEGER TYPE QUESTIONS)

1. How many moles of $PbCO_3$ are present in 1 mole of white lead



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2. What is the percentage of lead in lead pencil



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3. How many of the following oxides are acidic.

PbO , SnO , CO , CO_2 , SiO_2 , PbO_2 , SnO_2 , GeO



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4. How many resonance structures possible for CO_3^{2-}



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5. How many bridged carbonyl groups (CO) present in $Fe_2(CO)_9$



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ADDITIONAL QUESTIONS

1. The soldiers of Napoleon army while at Alps during freezing winter suffered a serious problem as regards to the tin buttons of their

uniforms. White metallic tin buttons get converted to grey powder, This transformation is related to

- A. an interaction with water vapour contained in humid air
- B. a change in crystalline structure of tin
- C. a change in the partial pressure of O_2 in air
- D. an interaction with N_2 of air at low temperature

Answer: B



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2. Pb and Sn are extracted from their chief ore by

- A. carbon reduction and self reduction
- B. self reduction and carbon reduction
- C. electrolysis and self reduction
- D. self reduction and electrolysis

Answer: B



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3. When PbO_2 reacts with conc. HNO_3 , the gas evolved is

A. NO_2

B. O_2

C. N_2

D. Na_2O

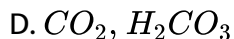
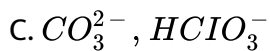
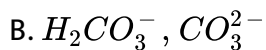
Answer: B



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4. The species present in solution when CO_2 is dissolved in water are:

A. CO_2 , H_2CO_3 , HCO_3^- , CO_3^{2-}

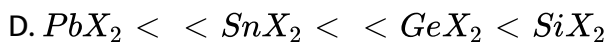
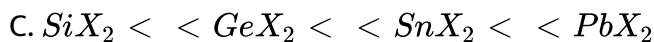
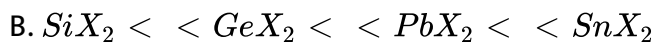
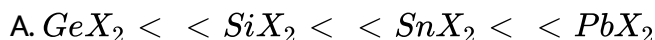


Answer: A



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5. The stability of dihalides of Si, Ge, Sn and Pb increases steadily in the sequence,

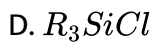
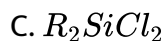
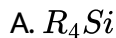


Answer: C



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6. Among the following substituted silanes the one which will give rise to cross linked silicone polymer on hydrolysis is

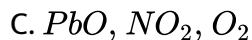
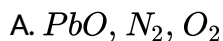


Answer: B



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7. Product formed on heating $Pb(NO_3)_2$ are



D. Pb , N_2 , O_2

Answer: C



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8. Quartz is an example of

A. chain silicate

B. sheet silicate

C. cyclic silicate

D. three dimensional network silicate

Answer: D



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9. The products of the following reaction are, $SiO_2 + C \xrightarrow{\Delta}$

A. SiC and CO_2

B. SiO and CO

C. SiC and CO

D. Si and CO_2

Answer: C



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10. Which of the following is not hydrolysed easily

A. CCl_4

B. $SiCl_4$

C. $GeCl_4$

D. $SnCl_4$

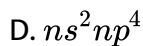
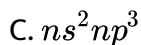
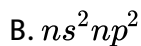
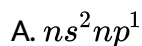
Answer: A



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LECTURE SHEET (EXERCISE-1(LEVEL-1(MAIN)))STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. The valency shell configuration of IVA element is



Answer: B



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2. Si has digonal relationship with

A. Sulphur

B. Boron

C. Phosphorous

D. Carbon

Answer: B



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3. + 2 oxidation state of lead is more stable than + 4, because of

A. penetration power

B. octet configuration

C. inert pair effect

D. presence of vacant orbitals

Answer: C



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4. The following bond has highest bond energy?

- A. Si-Si
- B. C-C
- C. Sn-Sn
- D. Pb-Pb

Answer: B



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5. The IVA element with highest and lowest first ionisation potential values

- A. C,Pb
- B. C,Sn
- C. C,Si
- D. Si,Pb

Answer: B



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6. $C - C$ bond length in Diamond is

A. 1.33 \AA

B. 1.54 \AA

C. 1.20 \AA

D. 1.8 \AA

Answer: B



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7. Thermodynamically most stable allotrope of carbon is

A. Diamond

B. Graphite

C. Coal

D. Coke

Answer: B



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8. In graphite, hybridization of carbon is

A. sp

B. sp^2

C. sp^3d

D. sp^3

Answer: B



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9. The following are some statements about graphite

(I) C-C bond length is 1.42\AA (II) distance between two layers is 3.35\AA

(III) bond angle is 60°

The correct combination is

A. all are correct

B. only I and II are correct

C. only II is correct

D. only I is correct

Answer: B



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10. Covalency of carbon in diamond is

A. 4

B. 3

C. 2

D. 1

Answer: A



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LECTURE SHEET (EXERCISE-1 (LEVEL-II(ADVANCED))STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. Among the following element is metalloit.

A. C,Pb

B. S

C. Ge

D. Pb-Pb

Answer: C



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2. Carbon has the highest catenation character because

- A. C is more electronegative
- B. C has higher ionisation potential value
- C. C has only one stable isotope
- D. C-C bond is strong

Answer: D



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3. Which of the IVA group element does not exhibit allotropy ?

- A. C
- B. Si
- C. Sn

D. Pb

Answer: D



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4. Which has the highest melting point ?

A. Si

B. Pb

C. Sn

D. C

Answer: D



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5. The percentage of lead in lead pencils is

A. 0

B. 100

C. 80

D. 50

Answer: A



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6. In Buckminster fullerene, the number of six membered and five membered rings respectively are

A. 20,12

B. 12,20

C. 6,12

D. 12,6

Answer: A



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7. In buckminster fullerene, each carbon atom is

- A. sp - Hybridised
- B. sp^2 -hybridised
- C. sp^3 -hybridised
- D. pure p-orbitals involved

Answer: B



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8. Diamonds are used in ornaments because of it's high

- A. density
- B. refraction index
- C. hardness

D. density and hardness

Answer: B



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9. Which is not an allotrope of carbon ?

A. Graphite

B. Diamond

C. Carborundum

D. Coke

Answer: C



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10. Layer structure is present in

A. Graphite

B. Coal

C. Diamond

D. Coke

Answer: A



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LECTURE SHEET (EXERCISE-1(LEVEL-II(ADVANCED)))MORE THAN ONE CORRECT ANSWER TYPE QUESTIONS)

1. Compounds which readily undergo hydrolysis are

A. CCl_4

B. BCl_3

C. $SiCl_4$

D. CF_4

Answer: B::C



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2. The non-existence of PbI_4 is due to

- A. highly oxidising nature of Pb^{4+}
- B. highly reducing nature of Pb^{4+}
- C. sufficiently large covalent character
- D. highly reducing nature of I_4^- ions

Answer: A::D



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3. Which are not correct ?

- A. $Ge(OH)_2$ is amphoteric

B. SnCl_4 is more stable

C. Trisilylamine is pyramidal

D. GeCl_4 in HCl forms $\text{H}_2[\text{GeCl}_6]$

Answer: B::C



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4. Carbon differs from the rest of the family members because of

A. Number of unpaired electrons in valence shell

B. Small size

C. Non-availability of vacant orbitals in valence shell

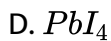
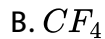
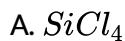
D. Non-availability of d-orbitals in valence shell

Answer: B::D



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5. Which of the following halides are stable



Answer: A::B::C



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6. Coal gas

A. burns with a smoky flame

B. burns with non-smoky flame

C. is a good fuel

D. is not used for lighting purpose

Answer: B::D



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**LECTURE SHEET (EXERCISE-1(LEVEL-II(ADVANCED)))LINKED COMPREHENSION
TYPE QUESTIONS)**

1. Which of the following statements is/are correct for CO

- A. CO is an important fuel
- B. CO is poisonous gas and a neutral oxide
- C. It can be prepared by dehydrating formic acid with conc. H_2SO_4
- D. CO is acidic in nature

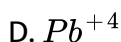
Answer: A::B::C



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2. Tin contains only 5 - 10 % of tin as SnO_2 , the rest being Siliceous matter, wolfram and pyrites of iron copper and arsenic. It is not attached by water. Only molten tin reacts with steam liberating hydrogen. In stannous oxide, tin is +2 oxidising state. So stannous oxide is also described as tin (II) oxide

Which of the following ionic species is more stable



Answer: A



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by water. Only molten tin reacts with steam liberating hydrogen. In stannous oxide, tin is +2 oxidising state. So stannous oxide is also described as tin (II) oxide

Tin is attacked by

- A. Hot KOH
- B. Hot HCl
- C. Conc. HNO_3
- D. All of these

Answer: D



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Tin (Ti) chloride is used

- A. As a modrant in dyeing
- B. As a reducing agent
- C. In the preparation of colloidal gold
- D. All of these

Answer: D

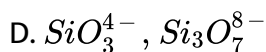
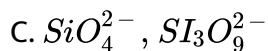
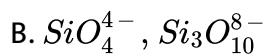
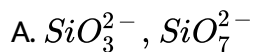
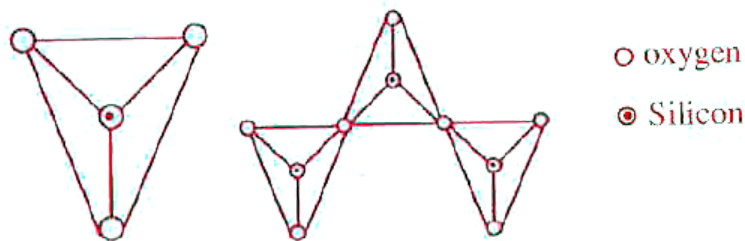


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The following represents various silicate anions . Their formulae are

respectively



Answer: B

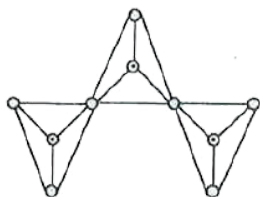


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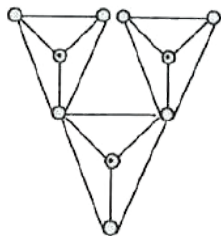
6. Read the following message passage and answer the followed by is silicates are a group of minerals which have general formula SiO_2 the most common of which is quartz. Quartz is a frame work silicate with

SiO_4 tetrahedra arranged in spirals. The spirals can turn in clockwise or anticlockwise direction a feature that result in there being two mirror images optically active varieties of quartz

$\text{Si}_3\text{O}_{10}^{8-}$ (having three tetrahedral units) is represented as



A.



B.

C. Both

D. None

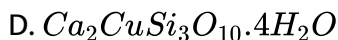
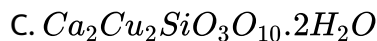
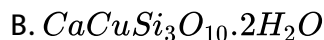
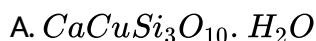
Answer: C



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7. Read the following passage and answer the questions followed by is
silicates are a group of minerals which have the general formula SiO_2 ,
the most common of which is quartz. Quartz is a frame work silicate with
 SiO_4 tetrahedra arranged in spirals. The spirals can turn in clockwise or
anticlock wise direction a feature that results in there being two mirror
images optically active varieties of quartz.

The silicate anion in the mineral kinoite is a chain of three SiO_4 ,
tetrahedra that share corners with adjacent tetrahedra. The mineral also
contain Ca^{2+} , Cu^{2+} ions and water molecules in 1 : 1 : 1 ratio. The
mineral is represented as



Answer: C



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LECTURE SHEET (EXERCISE-1(LEVEL-II(ADVANCED)))MATRIX MATCHING TYPE QUESTIONS)

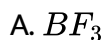
- | | Column-I | Column-II |
|----|------------|--------------------|
| | A) Co | P) Neutral |
| 1. | B) PbO_2 | Q) Amphoteric |
| | C) GeO | R) Reducing agent |
| | D) SnO | S) Oxidizing agent |



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LECTURE SHEET (EXERCISE-II)(LEVEL-1(MAIN))(STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. Which one of the following is a gas



D. All of these

Answer: A



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2. The unsaturated element among the following is

A. C

B. Pb

C. Ge

D. Si

Answer: B



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3. Tin plague is

- A. Conversion of stannous salt into stannic salt
- B. Conversion of white tin into grey tin
- C. Tin plating
- D. Emission of sound while bending a tin plate

Answer: D



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4. On strong heating lead nitrate gives

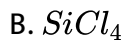
- A. PbO , NO , O_2
- B. PbO , NO , NO_2
- C. PbO_2 , PbO , NO_2
- D. PbO , NO_2 , O_2

Answer: D



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5. Which of the following cannot act as Lewis acid ?



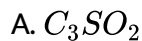
D. All of these

Answer: A



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6. Cardice is



D. Mixture of CO and CO_2

Answer: B



Watch Video Solution

7. CO is heating with sulphur gives

A. SO_2

B. SO_3

C. COS

D. CO_2

Answer: C



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8. Carboxy haemoglobin is ____ times more stable than oxyhaemoglobin

A. 100

B. 200

C. 300

D. 400

Answer: A



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9. What is the formula of carbon suboxide ?

A. CO

B. CO_2

C. C_3O_2

D. All

Answer: C



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10. The high poisonous nature of CO is due to its

- A. Neutral nature
- B. Complex forming ability
- C. Reducing nature
- D. Oxidising nature

Answer: B

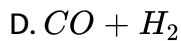


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LECTURE SHEET (EXERCISE-II)(LEVEL-II(ADVANCED)(STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. Which can be directly converted into solid state from gaseous state

- A. CO

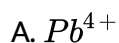


Answer: B



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2. Which of the following is more stable

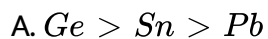


Answer: C



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3. The reducing power of divalent species decreases in the order

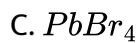
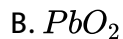


Answer: A



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4. Which is does not exist



Answer: C



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5. Tin reacts with

A. Hot con. HCl

B. conc. HNO_3

C. $HgCl_2$ on heating

D. All of these

Answer: D



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6. If the three interaxial angles defining the unit cell are all equal in magnitude, the crystal cannot belong to the

- A. 100mg
- B. 300 mg
- C. 400mg
- D. 200mg

Answer: D



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7. Graphite is better lubricant in

- A. presence of O_2
- B. absence of O_2
- C. same of both conditions
- D. presence of H_2O

Answer: A



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8. Which of the following has structure similar to graphite

A. BN

B. B

C. B_4C

D. B_4H_6

Answer: A



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9. Which form of carbon is used in making boot polish, printing ink, paint and black varnish

A. Bone black

B. Graphite

C. Gas carbon

D. Lamp black

Answer: D



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10. The purest form of carbon is

A. bituminous coal

B. Coal-tar

C. Coal gas

D. diamond

Answer: D



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1. Which of the following are the ores of lead ?

- A. Galena
- B. Cassiterite
- C. Anglesite
- D. Cerussite

Answer: A::C::D



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2. Which of the following statements is / are correct

- A. Catenation is the property of self linking of identical atoms among themselves giving rise to chains and rings
- B. Carbon and silicon have the remarkable property of catenation
- C. Catenation power of carbon is more than that of silicon

D. Catenation power of carbon is less than of silicon

Answer: A::B::C



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3. Which of the following statements is / are correct

A. GeO , SnO and PbO are basic and ionic than the corresponding

GeO_2 , SnO_2 and PbO_2

B. GeO is acidic while SnO and PbO are amphoteric

C. Ge^{2+} and Sn^{2+} are strong oxidising agents

D. The mixed oxide PbO_4 contains Pb^{2+} and Pb^{4+} ions

Answer: B::D



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1. CO is an unsaturated compound because all the valencies of carbon are not satisfied and forms addition compounds e.g It forms carbonyl sulphide (COS) with sulphur, carbonyl chloride (phosgene $COCl_2$) with chlorine, sodium formate with NaOH, methyl alcohol with H_2 , in the presence of ZnO / Cr_2O as catalyst)

The dehydration of malonic acid $CH_2(COOH)_2$ with P_4O_{10} and heat give

- A. Carbon monoxide
- B. Carbon sub oxide
- C. Carbon dioxide
- D. All three

Answer: B



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2. CO is an unsaturated compound because all the valencies of carbon are not satisfied and forms addition compounds e.g. It forms carbonyl sulphide (COS) with sulphur, carbonyl chloride (phosgene $COCl_2$) with chlorine, sodium formate with NaOH , methyl alcohol with H_2 in the presence of $Zn\frac{\emptyset}{C}r_2O$ as catalyst)

$A \xrightarrow{\text{Red hot coke}} CO \xrightarrow{Cl_2} C \xrightarrow{H_2O} 2HCl + A$. The compounds A and C are

A. CO_2 , $COCl_2$

B. CO , $COCl_2$

C. C , CO_2

D. CO_2 , CO

Answer: A



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1.

Column-I

Column-II

- | | |
|--------------------------|---|
| A) Cyclick silicates | P) Tetrahedral hybridization |
| B) single chain silicate | Q) Si-O bonds are 50% ionic and 50% covalent |
| C) Pyro silicates | R) General formula is $(SiO_3)_n^{2n-}$ |
| D) Sheet silicates | S) Two oxygen atoms per (two dimensional tetrahedral sheet) |



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LECTURE SHEET (EXERCISE-III)(MISCELLANEOUS)(LEVEL-I(MAIN)(STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. Halides of Si, Ge and Sn form complexes, while carbon halides do not form complexes, because

- A. Carbon atom has a small size
- B. All the four valence electrons of the carbon atom are involved in bonding
- C. Carbon forms tetrahedral bonds
- D. The valence shell of carbon has no (vacant) d-orbitals

Answer: D



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2. Gallium acts as reducing agent because

- A. Ga^{3+} state is less stable than Ga^{+1}
- B. Ga^{3+} state is more stable than Ga^{+1}
- C. Ga^{3+} covalence to Ga^{+1} reducing
- D. None of the above

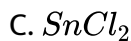
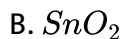
Answer: B



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3. A reducing agent is

- A. SnO



Answer: C



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4. Carbon and silicon have

A. Same physical properties

B. Different physical properties

C. Many a same physical and different chemical properties

D. Different chemical and physical properties

Answer: C



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5. Which of the following statement about IV group elements (C to Pb) is not correct

- A. The thermal stability of hydrides decreases from CH_4 to PbH_4 as bond enthalpy for M-H bond decreases
- B. All form tetra fluorides, tetrachlorides, tetra bromides
- C. Only Sn and Pb form dichlorides
- D. All form tetra iodides

Answer: D



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6. Hybridisation of carbon atom in carbon dioxide is

- A. sp^2
- B. sp^3
- C. sp

D. dsp^2

Answer: C



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7. The density of

A. Graphite = diamond

B. Graphite > diamond

C. Graphite < diamond

D. Graphite \geq diamond

Answer: C



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8. The anhydride of carbonic acid is

A. CO

B. CO_2

C. C_3IO_2

D. C_2O

Answer: B



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9. Minimum number of physical forms that an element should exist to show allotropy.

A. 0

B. 1

C. 2

D. 3

Answer: C



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LECTURE SHEET (EXERCISE-III)(MISCELLANEOUS) (LEVEL-II(ADVANCED))
(STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. Which property is common in diamond and graphite ?

- A. Electrical conductivity
- B. Relative atomic weight
- C. crystal structure
- D. Density

Answer: B



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2. Sesquioxide of lead is

A. PbO

B. PbO_2

C. Pb_2O

D. Pb_2O_3

Answer: D



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3. On strong heating lead nitrate gives

A. PbO , NO , O_2

B. PbO , NO , NO_2

C. PbO_2 , PbO , NO_2

D. PbO , NO_2 , O_2

Answer: D



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4. When PbO_2 reacts with conc. HNO_3 , the gas evolved is

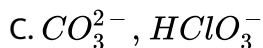
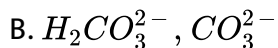
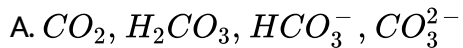


Answer: B



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5. The species present in solution when CO_2 is dissolved in water are :



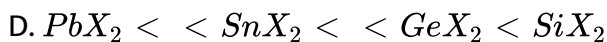
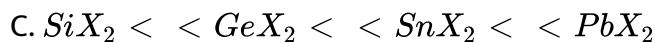
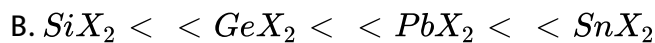
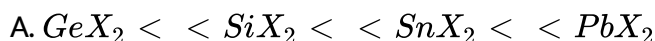
D. CO_2 , H_2CO_3

Answer: A



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6. The stability of dihalides of Si, Ge, Sn and Pb increases steadily in the sequence,

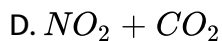
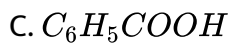
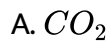


Answer: C



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7. Hot and Con. HNO_3 reacts with carbon to form



Answer: D



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8. Which is not used as a refrigerant



Answer: D



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9. CO forms a volatile compound with

- A. Nickel
- B. Copper
- C. Sodium
- D. Aluminium

Answer: A



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10. Dry ice is effective in seeding clouds because

- A. CO_2 and H_2O have similar crystal structure

- B. It increases water content of the cloud
- C. CO_2 molecules offer nucleus for condensation
- D. Upon sublimation, it lowers the temperature of water

Answer: D



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11. Black lead is

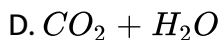
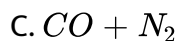
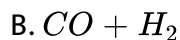
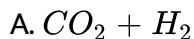
- A. Diamond
- B. Graphite
- C. Gas carbon
- D. None

Answer: B



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1. Water gas is a mixture of



Answer: B



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2. Major component present in producer gas



C. CO

D. CO_2

Answer: B



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3. The covalency of silicon and oxygen in SiO_2 respectively

A. 2,4

B. 4,4

C. 4,2

D. 4,6

Answer: C



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4. Bonds that are absent in silicone

A. Si-O-Si

B. C-O-Si

C. O-Si-R

D. R-Si-R

Answer: B



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5. The repeating unit of silicones

A. R_2SiO

B. R_2SiO

C. RSiO_2

D. $\text{R}_2\text{SiO}_2\text{R}_2\text{Si}$

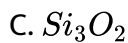
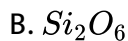
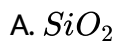
Answer: B



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PRACTICE SHEET (EXERCISE-I) (LEVEL-II(ADVANCED))(STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. The basic structural unit in silicates is



Answer: D



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2. Silicones are the polymers formed by hydrolysis of

A. Silicondioxide

B. Silanes

C. Silicates

D. Chlorosilanes

Answer: D



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3. SiO_2 reacts with _____ to form water glass

A. Na_2CO_3

B. Na_2O

C. $NaOH$

D. All

Answer: D



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4. The empirical formula of silicones is analogous to

- A. Alcohols
- B. Aldehydes
- C. Ketones
- D. Ethers

Answer: C



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5. Pick out among the following, the form of silica different from the rest

- A. Quartz

B. Jasper

C. Crystobalite

D. Tridymite

Answer: B



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6. Carbondioxide is isostructural with

A. $HgCl_2$

B. $SnCl_2$

C. C_2H_2

D. NO_2

Answer: A::C::D



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7. Which of the following is/are amphoteric ?

A. BeO

B. Ag_2O

C. CO_2 molecules offer nucleus for condensation

D. SnO_2

Answer: A::D



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8. Decomposition of oxalic acid in the presence of conc. H_2SO_4 gives

A. CO

B. CO_2

C. Formic acid

D. H_2O

Answer: A::B::C



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PRACTICE SHEET (EXERCISE-I) (LEVEL-II(ADVANCED))(LINKED COMPREHENSION
TYPE QUESTIONS)

1. Which of the following metal oxides are reduced by CO ?

A. ZnO

B. Fe_2O_3

C. CaO

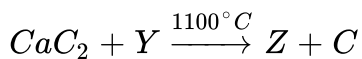
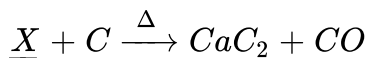
D. Al_2O_3

Answer: A::B::C



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2. Carbides are three types, ionic, covalent and interstitial CaC_2 is one of the commercially important ionic carbide



'Z' is an important nitrogenous fertiliser

Y and Z respectively are

A. CaO

B. $CaCO_3$

C. $Ca(OH)_2$

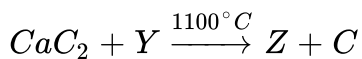
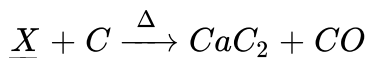
D. $CaCl_2$

Answer: A



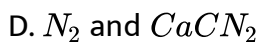
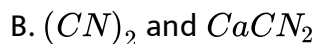
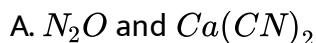
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3. Carbides are three types, ionic, covalent and interstitial CaC_2 is one of the commercially important ionic carbide



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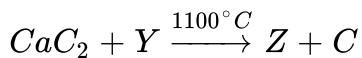
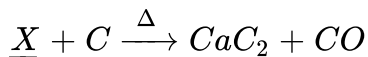


Answer: D



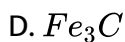
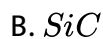
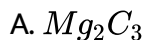
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4. Carbides are three types, ionic, covalent and interstitial CaC_2 is one of the commercially important ionic carbide



'Z' is an important nitrogenous fertiliser

Y and Z respectively are



Answer: B



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- | | Column-I | Column-II |
|----|---------------------------|--------------------|
| 5. | A) $(SiO_3)_n^{2n-}$ | P) Cyclic silicate |
| | B) Silicone | Q) Chain silicate |
| | D) $(Si_4O_{11})_n^{6n-}$ | S) Pyrosilicate |



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PRACTICE SHEET (EXERCISE-II) (LEVEL-1(MAIN) STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. The fuel gas having volume composition equal to $44\% CH_4 + 48\% H_2 + 5\% N_2 + 3\% CO$ is

- A. oil gas
- B. water gas
- C. coal gas
- D. petrol gas

Answer: C



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2. The greatest percentage of CO is in

- A. coal gas
- B. producer gas
- C. water gas
- D. oil gas

Answer: C



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3. Regarding silica

- I) Quartz is amorphous form of silica
- II) Silica dissolves in NaOH
- III) Silica dissolves in HF

The correct combination is

- A. all are correct
- B. II & III are correct
- C. III are correct
- D. I & III are correct

Answer: B



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4. Silicones are used as water proof materials because they have

- A. hydrophobic alkyl groups
- B. hydrophilic alkyl groups
- C. strong Si-O bonds
- D. Weak Si-O bonds

Answer: A



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5. The structure and hybridisation of $Si(CH_3)_4$ is ,

A. bent, sp

B. trigonal sp^2

C. octahedral sp^3d

D. tetrahedral sp^3

Answer: D



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PRACTICE SHEET (EXERCISE-II)(LEVEL-II)(ADVANCED) STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. Silicon carbide is used as

A. dehydrating agent

B. abrasive

C. solvent

D. catalyst

Answer: B



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2. The acid used for etching the glass is

A. sulphuric acid

B. perchloric acid

C. hydrofluoric acid

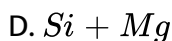
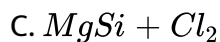
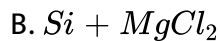
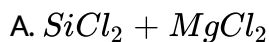
D. aqua-regia

Answer: C



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3. Which is formed when $SiCl_4$ vapours are passed over hot Mg

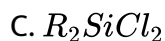
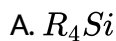


Answer: B



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4. Among the following substituted silanes the one which will give rise to cross linked silicone polymer on hydrolysis is



Answer: B



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5. Quartz is an example of

A. chain silicate

B. sheet silicate

C. cyclic silicate

D. three dimensional network silicate

Answer: D



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PRACTICE SHEET (EXERCISE-II)(LEVEL-II)(MORE THAN ONE CORRECT ANSWERTYPE QUESTIONS)

1. Select the correct statement(s) from the following

- A. Graphite is thermodynamically more unstable form of carbon
- B. Graphite can be converted into diamond
- C. Graphite is used as a moderator in nuclear reactors
- D. Graphite is less reactive than diamond

Answer: B::C



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2. Mark the correct answer. Air which contains.... CO_2 does not support combustion.

- A. 15 %
- B. 2 %
- C. 50 %
- D. 75 %

Answer: A::C::D



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3. Carbogen is :

- A. mixture of $O_2 + 5 - 10 \% CO_2$
- B. used by pneumonia patients for respiration
- C. used by victims of CO for respiration
- D. none of these

Answer: A::B::C



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PRACTICE SHEET (EXERCISE-III)(MISCELLANEOUS)(LEVEL-I)(MAIN)(STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. In the extraction of silicon by reduction of sand (silica), an excess of sand is always used to prevent the formation of

- A. Silicon oxide
- B. Silicon carbonate
- C. Silicon carbide
- D. Silicon peroxide

Answer: C



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2. Which of the following statements is / are correct

- A. Silicon can form long chains like carbon
- B. Si-O bonds are weaker than Si-Si or Si-H bonds
- C. Silicon can expand its octet unlike carbon
- D. Silicon can form multiple bonds like carbon

Answer: C



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3. The zeolite used to convert alcohols directly into gasoline is

A. ZSM -5

B. $Zn_2(SiO_4)$

C. $LiAl(SiO_3)$

D. $Be_3Al_2[Si_6O_{18}]$

Answer: A



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4. Silicones contain silicon strongly bonded to _ and __atoms.

A. C,O

B. C,H

C. H,O

D. H,Cl

Answer: A



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5. Zeolites are used as

- 1) ion exchangers
- 2) molecular sieves
- 3) water softener

The correct uses are

A. 1,2 only

B. 2,3 only

C. 1,3 only

D. 1,2,3

Answer: D



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PRACTICE SHEET (EXERCISE-III)(MISCELLANEOUS) (LEVEL-II)(ADVANCED)
(STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. The products of the following reaction are, $SiO_2 + C \xrightarrow{\Delta}$

A. Si, C and CO_2

B. Si, O and CO

C. Si, C and CO

D. Si and CO_2

Answer: C



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2. Which of the following is water repellent ?

A. Silicone

B. Polythene

C. Teflon

D. Bakelite

Answer: A

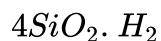


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3. A silicate used in talcum powder

A. Consists of chain which are very long

B. is known as talc and is a pure magnesium silicate of the form 3MgO



C. is a three dimensional silicate

D. is a sheet silicate

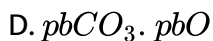
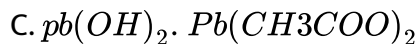
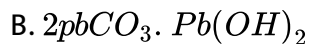
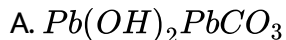
Answer: B



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ADDITIONAL PRACTICE EXERCISE(LEVEL-I (MAIN)STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. The Formula of white lead is



Answer: B



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2. The number and type of bonds between two carbon atoms in CaC_2 are

- A. one σ and one π bond
- B. one σ and two σ bonds
- C. one σ bond
- D. one π bond

Answer: B



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3. The material used in solar cells contains

- A. Si
- B. Sn
- C. Ti
- D. Cs

Answer: A



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4. Red lead is

A. pbo

B. PbO_2

C. Pb_3O_4

D. Pb_2O_3

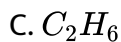
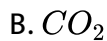
Answer: D



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5. Marsh gas contains.

A. CH_4

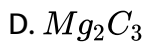
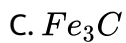
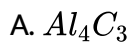


Answer: B



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6. The carbide which gives propyne on hydrolysis



Answer: D



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7. Biogas and producer gas are made up of

- A. Biogas contains CO_2 but producer gas does not
- B. Producer gas contains CO but not CO_2
- C. both biogas and producer gas have N_2
- D. all the three above

Answer: D



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8. A fuel will have a larger fuel value if one gram of it on burning gives more of

- A. CO_2
- B. H_2O
- C. ash
- D. Calories

Answer: D



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9. Destructive distillation of coal does not give

- A. coke
- B. gas carbon
- C. carbides
- D. ammonia

Answer: C



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10. $\text{SnCl}_2 + \text{HCl} + \text{I}_2 \rightarrow \text{A} + \text{B}$. The compounds (A) and (B) are

- A. $\text{SnI}_2, \text{Cl}_2$

B. H_2SnCl_4 , HI

C. $SnCl_4$, HI

D. $HSnCl_3$, HI

Answer: C



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**ADDITIONAL PRACTICE EXERCISE(LEVEL-II (LECTURE SHEET ADVANCED))
(STRAIGHT OBJECTIVE TYPE QUESTIONS)**

1. Which silicon compound is used as lubricant

A. Asbestos

B. Silicone

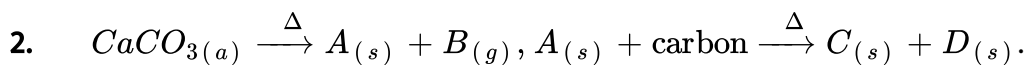
C. Zeolite

D. Mica

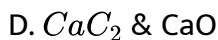
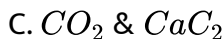
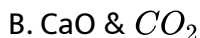
Answer: B



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The compounds A and C.



Answer: A



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3. The number of p atomic orbitals involved in the formation of a benzene molecule

A. 2

B. 1

C. 3

D. 4

Answer: B



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4. $\Delta H I^{\circ}$ of diamond is

A. 0 kJ mol^{-1}

B. 1.90 kJ mol^{-1}

C. 38.1 kJ mol^{-1}

D. 20 kJ mol^{-1}

Answer: B



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5. Which of the following is used in the extraction of gold

A. CO_2

B. SO_2

C. HCl

D. CO

Answer: A



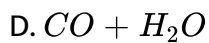
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6. Incomplete combustion of petrol in automobile engines can be detected by testing the fuel gases for the presence of

A. NO_2

B. CO

C. CO_2

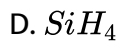
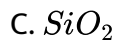


Answer: B



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7. Which of the following has an optical isomer ?

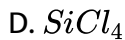
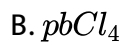


Answer: C



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8. The ionic chloride is



Answer: A



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9. Which of the following exists as covalent crystals in the solid state :

A. Iodine

B. Phosphorous

C. Silicon

D. Sulphur

Answer: C



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ADDITIONAL PRACTICE SHEET(ADVANCED)(STRAIGHT OBJECTIVE TYPE QUESTIONS)

1. The minerals having silicate chains are collectively called

- A. Olivine
- B. Zircon
- C. Pyroxene
- D. Natrolite

Answer: C



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2. (i) Silanes are good reducing agent (ii) SiO_2 is a giant tetrahedral polymer (iii) $SnCl_4$ acts as bronsted base

A. I and III are true

B. I and II are true

C. only c is true

D. all are true

Answer: D



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3. Decreasing order of "p" orbital character in the following

(i) SiO_2 (ii) CO_2 (iii) Graphite

A. $I > II > III$

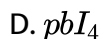
B. $II > I > III$

C. $II > III > I$

D. $I > III > II$

Answer: D

4. Which of the following halides is least stable and has doubtful existence ?



Answer: D

5. $SiO_2 + A \rightarrow x + y$. In this reaction 'Y' is one of the global warming gases.'A' is the water soluble alkali metal carbonate . Whose molecular weight is 106.The common name of 'x' is

- A. flint glass
- B. water glass
- C. Baking soda
- D. wasing soda

Answer: B



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6. During day time plants, absorb

- A. CO
- B. N_2
- C. CO_2
- D. O_2

Answer: C



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ADDITIONAL PRACTICE SHEET(ADVANCED)(MORE THAN ONE CORRECT ANSWER TYPE QUESTIONS)

1. In its compounds, tin exhibits the oxidation numbers

A. +2

B. +4

C. +6

D. +3

Answer: A::B::C



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2. Which of the following statements regarding IV A group elements is / are correct.

- A. They all form tetrahalides
- B. All tetrahalides are not covalent
- C. All tetrahalides are tetrahedral
- D. SiF_4 is readily hydrolysed by alkali

Answer: A::B::D



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3. CO is isostructural with

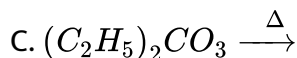
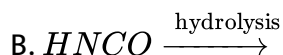
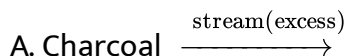
- A. $SnCl_2$
- B. $HgCl_2$
- C. SCl_2
- D. $ZnCl_2$

Answer: B::D



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4. Which of the following reactions will evolve $CO_2(g)$ as product ?



Answer: A::B::D



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SUBJECTIVE EXERCISE 1 (LONG ANSWER TYPE QUESTIONS)

1. Name the group IVA elements in the order, Write note on the following.

a) Electronic configuration b) Occurrence c) Variation of oxidation states.



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2. How does the first element of group 14 differ from other elements of the group?



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3. Are BCl_3 and $SiCl_4$ electron deficient compounds explain.



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4. What is allotropy? Name the crystalline allotropes of Carbon. What are their uses?



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SUBJECTIVE EXERCISE 1 (SHORT ANSWER TYPE QUESTIONS)

1. Explain irregularity in IE of group 14 elements.



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2. Why does EN value remain constant in Si , Ge , Sn and Pb ?



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3. Why is CCl_4 not effected by H_2O while $SiCl_4$ is readily changed?



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4. Mention a method to synthesize carbon disulphide? How is it useful?



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5. SiO_2 is solid while CO_2 is a gas at ordinary temperature. Explain.



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6. Explain the properties of graphite in terms of its structure. Mention the uses of graphite.



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7. What happens when the following are heated?

a) $CaCO_3$ alone b) $CaCO_3$ and Silica together



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SUBJECTIVE EXERCISE 1 (VERY SHORT ANSWER TYPE QUESTIONS)

1. Mention one dissimilarity between C and Si .



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2. Write the electronic configurations of group IVA elements.





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3. What is catenation? Give an example.



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4. Explain why diamond is very hard.



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5. Name an allotrope of carbon that has lowest energy.



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6. Name the crystalline allotropes of carbon and mention any hybridization involved in them



[Watch Video Solution](#)

7. How does graphite function as a lubricant ?



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8. Graphite is a good conductor. Explain.



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9. Why is CO gas poisonous.



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10. What synthetic gas.



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11. What is producer gas.



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12. Give one use of dry ice.



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SUBJECTIVE EXERCISE 2 (LONG ANSWER TYPE QUESTIONS)

1. Give an account of the following

i) silicones ii) Zeolites iii) SiCl_4 .



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2. How does SiO_2 react with a) NaOH b) HF . Explain its structure.



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SUBJECTIVE EXERCISE 2 (SHORT ANSWER TYPE QUESTIONS)

1. Write the structure of the product formed, when the starting material for the manufacture of silicones is $RSiCl_3$



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2. Write a brief note on Zeolites & silicates



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3. Why SiO_2 does not dissolve in water.



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4. What are silicones ? How are they obtained?



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SUBJECTIVE EXERCISE 2 (VERY SHORT ANSWER TYPE QUESTIONS)

1. Name any two man-made silicates.



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2. How is silicones useful ?



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3. Draw the structure of silica neatly.



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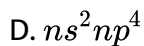
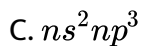
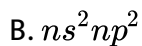
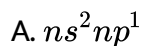
4. Write the use of ZSM-5.



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OBJECTIVE EXERCISE - 1

1. The valency shell configuration of IVA element is



Answer: B



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2. Element with different electronegativity among the following



B. Ge

C. Si

D. C

Answer: D



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3. Among group 14 elements, most acidic oxide is formed by

A. Pb

B. C

C. Si

D. Ge

Answer: B



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4. Silicon has diagonal relationship with

A. Sulphur

B. Boron

C. Phosphorus

D. Carbon

Answer: B



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5. Common oxidation state of IVA group elements is

A. $+IV$

B. $+I$

C. $+III$

D. II

Answer: A



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6. + 2 oxidation state of lead is more stable than + 4, because of

- A. penetration power
- B. octet configuration
- C. inert pair effect
- D. presence of vacant orbitals

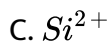
Answer: C



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7. Which of the following is most stable ?

- A. Sn^{2+}

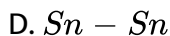
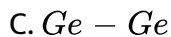
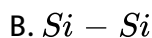
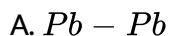


Answer: D



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8. Which of the following has least bond enthalpy ?

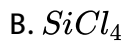


Answer: A



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9. An unstable compound is

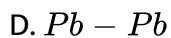
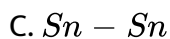
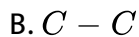
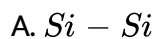


Answer: D



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10. The following bond has highest bond energy



Answer: B



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11. Inert pair effect is exhibited by

A. *Pb*

B. *B*

C. *Si*

D. *Al*

Answer: A



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12. (A): C - C bond energy is less than that of H - H bond energy, but carbon exhibit catenation, where as Hydrogen does not

(R): Hydrogen is monovalent where as carbon is tetra valent.

- A. Both A and R are true and R is the correct explanation of A.
- B. Both A and R are true and R is not the correct explanation of A.
- C. A is true but R is false
- D. A is false but R is true.

Answer: A



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13. The reactivity of IVA group element is highest with

- A. F_2
- B. Cl_2
- C. Br_2
- D. I_2

Answer: A



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14. (A): Pb^{+2} is more stable than Pb^{+4}

(R) : Pb^{+2} has stable half-filled configuration

- A. Both A and R are true and R is the correct explanation of A.
- B. Both A and R are true and R is not the correct explanation of A.
- C. A is true but R is false
- D. A is false but R is true.

Answer: C



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15. Lewis acids among the following are

a) Cl_4

b) $SiCl_4$

c) GeF_4

A. a and b

B. b and c

C. a and c

D. a, b and c

Answer: B



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16. Which of the following oxidation states are the inost characteristic for lead and tin respectively?

A. +2, + 4

B. +4, + 4

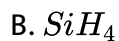
C. +2, + 2

D. +4, + 2

Answer: A

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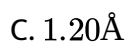
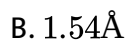
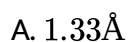
17. Which of the following is most volatile?



Answer: A

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18. $C - C$ bond length in Diamond is



D. 1.8\AA

Answer: B



Watch Video Solution

19. The percentage of lead in lead pencils is

A. 0

B. 100

C. 80

D. 50

Answer: A



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20. Thermodynamically most stable allotrope of carbon is

A. Diamond

B. Graphite

C. Coal

D. Coke

Answer: B



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21. In graphite, hybridization of carbon is

A. sp

B. sp^2

C. sp^3d

D. sp^3

Answer: B



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22. Diamonds are used in ornaments because of it's high

- A. density
- B. refractive index
- C. hardness
- D. density and hardness

Answer: B



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23. The following are some statements about graphite

- I) Used as a lubricant
- II) Used in lead pencils
- III) It has sp hybridised carbons

The correct combination is

- A. all are correct
- B. only I and II are correct
- C. only II is correct
- D. only II and III are correct

Answer: B



Watch Video Solution

24. Covalency of carbon in diamond is

- A. 4
- B. 3
- C. 2
- D. 1

Answer: A



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25. The following are some statements about graphite

- I) $C - C$ bond length is 1.42\AA
- II) distance between two layers is 3.35\AA
- III) bond angle is 60°

The correct combination is

- A. all are correct
- B. only I and II are correct
- C. only II is correct
- D. all are incorrect

Answer: B



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26. Diamond is used in glass cutting due to its

- A. Hard nature
- B. High m.p.
- C. High refractive index
- D. High metallic bonding

Answer: A



Watch Video Solution

27. The geometry of 'C' in diamond is

- A. Planar
- B. Linear
- C. Tetrahedral
- D. Octahedral

Answer: C



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28. (A): Diamond is an insulator and graphite is a conductor.

(R): Diamond is used as abrasive and graphite as lubricant.

A. Both A and R are true, R properly explains A.

B. Both A and R are true, R does not explain A.

C. A is true, but R is false.

D. A is false, but R is true.

Answer: B



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29. In buckminster fullerene, each carbon atom is

A. sp -Hybridised

B. sp^2 – Hybridised

C. sp^3 – Hybridised

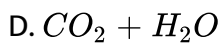
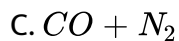
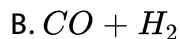
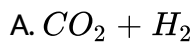
D. pure p-orbitals involved

Answer: B



Watch Video Solution

30. Water gas is a mixture of



Answer: B



Watch Video Solution

31. Major component present in producer gas

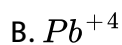
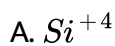


Answer: B



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32. Ionic radius is highest for



Answer: B



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33. In Buckminster fullerene, the number of six membered and five membered rings respectively are

A. 20, 12

B. 12, 20

C. 6, 12

D. 12, 6

Answer: D



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34. Graphite is good conductor of electricity but diamond is non-conductor because

A. diamond is hard and graphite is soft

B. graphite and diamond have different atomic configuration

C. graphite is composed of positively charged carbon ions

D. graphite has hexagonal layer structure with mobile π — electrons

while diamond has continuous tetrahedral covalent structure with

no free electrons

Answer: D



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35. Thermodynamically most stable allotrope of carbon is

A. diamond

B. coke

C. charcoal

D. graphite

Answer: D



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36. Man dies in an atmosphere of carbon monoxide, because it

- A. combine with the O_2 present in the body to form CO_2
- B. reduces of the organic matter of tissues
- C. combines with haemoglobin of blood, making it incapable of binding O_2
- D. dries up the blood

Answer: C



View Text Solution

37. Select the correct statement with respect to carbon monoxide.

- A. It combines with water to give carbonic acid
- B. It reacts with haemoglobin irreversibly

- C. It is a powerful oxidizing agent
- D. It is used to prepare aerated drinks

Answer: B



View Text Solution

38. Which statement is false ?

- A. Water gas is a mixture of hydrogen and carbon monoxide
- B. Producer gas is a mixture of carbon monoxide and nitrogen
- C. Water gas is a mixture of water vapour and hydrogen
- D. Natural gas consists of methane, ethane and gaseous hydrocarbons

Answer: C



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39. The phenomenon by which activated charcoal removes colouring matter from pure substances is

- A. Adsorption
- B. Bleaching
- C. Reduction
- D. Oxidation

Answer: A



View Text Solution

40. The order of stability of dihalides of Ge, Pb and Sn is

- A. $GeCl_2 > SnCl_2 > PbCl_2$
- B. $SnCl_2 > GeCl_2 > PbCl_2$
- C. $PbCl_2 > GeCl_2 > SnCl_2$
- D. $PbCl_2 > SnCl_2 > GeCl_2$

Answer: D



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41. Which of the following statements is not correct?

A. a. The tendency to exhibit +2 oxidation state for *Ge*, *Sn* and *Pb* is

in the order: $Ge < Sn < Pb$

B. b. Carbon and silicon mostly exhibit +4 oxidation state in their compounds

C. c. Lead in +4 oxidation state acts as an oxidising agent

D. d. Tin in +4 oxidation state acts as a good reducing agent.

Answer: D



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42. (A): The hardness of silica is less than that of diamond .

(R): In silica, each silicon atom is surrounded by two oxygen atoms whereas in diamond each carbon atom is surrounded by 4 carbon atoms

- A. a. Both A and R are true, and R is correct explanation of A
- B. b. Both A and R are true, and R is not the correct explanation of A
- C. c. A is true but R is false
- D. d. A is false but R is true

Answer: C



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43. Quartz is a crystalline variety of

- A. Si
- B. SiO_2
- C. Na_2SiO_3

D. SiC

Answer: B



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44. Which of the following is used as piezoelectric material ?

A. Quartz

B. Dry ice

C. CO_2

D. Silicones

Answer: A



View Text Solution

45. Which of the following reacts with silica ?

A. HF

B. HCl

C. HBr

D. HI

Answer: A



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46. In SiO_2 , each silicon atom is surrounded by

A. 4 oxygen atoms in a square planar manner

B. 4 oxygen atoms in a tetrahedral manner

C. 6 oxygen atoms in a octahedral manner

D. 3 oxygen atoms in a planar fashion

Answer: B



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47. SiO_2 does not react with

A. HF

B. H_2SO_4

C. Na_2CO_3 (fused)

D. $NaOH$

Answer: B



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48. The covalency of silicon and oxygen in SiO_2 respectively

A. 2,4

B. 4,4

C. 4,2

D. 4,6

Answer: C



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49. Rock crystal is chemically

A. SiO_2

B. Si

C. SiC

D. Na_2SiO_3

Answer: A



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50. (A): CCl_2 does not undergo hydrolysis where as $SiCl_4$ is readily hydrolysed.

(R) : Carbon has no d-orbitals in its valence shell, but silicon has vacant d-orbitals in its valence shell.

- A. a. Both A and R are true, and R is correct explanation of A
- B. b. Both A and R are true, and R is not correct explanation of A
- C. c. A is true, but R is false
- D. d. A is false, but R is true

Answer: A



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51. Nature of CO_2 and SiO_2 are respectively

- A. Acidic, Basic
- B. Basic, Basic

C. Acidic, Acidic

D. Basic, Acidic

Answer: C



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52. The anhydride of carbonic acid is

A. CO

B. CO_2

C. C_3O_2

D. C_2O

Answer: B



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53. True statement among the following about silicone

- A. Silicon is bonded to another silicon
- B. Silicon is bonded through carbon to another silicon
- C. Silicon is bonded to oxygen and carbon
- D. Carbon is bonded to silicon and oxygen

Answer: C



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54. Which of the following is an amphoteric oxide ?

- A. CO_2
- B. SiO_2
- C. SnO_2
- D. CaO

Answer: C



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55. Which of the following cannot form complex compounds ?

A. *C*

B. *Si*

C. *Ge*

D. *Al*

Answer: A



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56. Which of the following is true

- A. Carbon dioxide is composed of discrete covalent CO_2 molecules whereas silica has continuous tetrahedral structure
- B. CO_2 molecules are lighter than SiO_2 molecules
- C. CO_2 is more acidic than SiO_2
- D. Melting point of silica is very high

Answer: A



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57. Solid CO_2 is used as

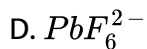
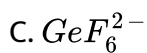
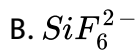
- A. Poison
- B. Anaesthesia
- C. Refrigerant
- D. Artificial respirant

Answer: C



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58. Which of the following does not exist ?

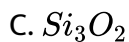
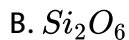
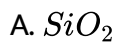


Answer: A



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59. The basic structural unit in silicates is



D. SiO_4^{-4}

Answer: D



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60. Silicones are the polymers formed by hydrolysis of

A. Silicondioxide

B. Silanes

C. Silicates

D. Chlorosilanes

Answer: D



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61. The starting materials for the formation of silicone polymers are

A. Silicates

B. Chlorosilanes

C. Silanes

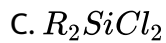
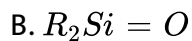
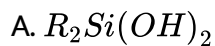
D. Silicon carbide

Answer: B



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62. Monomer in silicone is



Answer: A



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63. (A): Silicones are synthetic organosilicon compounds

(R) : Silicones contain $Si - O - Si$ linkages

- A. Both A and R are true, and R is correct explanation of A
- B. Both A and R are true, and R is not correct explanation of A
- C. A is true, but R is false
- D. A is false, but R is true

Answer: B



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64. Bonds that are absent in silicone

- A. $Si - O - Si$
- B. $C - O - Si$
- C. $O - Si - R$

D. $R - Si - R$

Answer: B



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65. The basic reaction involved in the synthesis of linear silicones is

- A. the hydrolysis of trimethyl chlorosilane
- B. the hydrolysis of dimethyl dichlorosilane
- C. the hydrolysis of ethyl chlorosilane
- D. the acid hydrolysis of dimethyl silane

Answer: B



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66. Mica is chemically

- A. Sheet silicate
- B. Chain silicate
- C. Ortho silicates
- D. Framework silicate

Answer: A



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67. A very important component of ceramics, glass and cement is

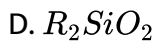
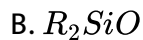
- A. *C*
- B. *Si*
- C. *Ge*
- D. *Pb*

Answer: B



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68. The repeating unit of silicones

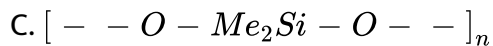
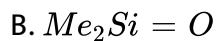
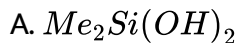


Answer: B



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69. Me_2SiCl_2 on hydrolysis will produce



D. $\text{Me}_2\text{SiCl}(\text{OH})$

Answer: A



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OBJECTIVE EXERCISE - 2

1. The IVA element with highest and lowest first ionisation potential values

A. C , Pb

B. C , Sn

C. C , Si

D. Si , Pb

Answer: B



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2. Among the following, amphoteric element is

A. C

B. S

C. Ge

D. Pb

Answer: D



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3. Carbon has the highest catenation character because

A. C is more electronegative

B. C has higher ionisation potential value

C. C has only one stable isotope

D. $C - C$ bond is strong

Answer: D



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4. The general trend in the properties of elements of carbon family shows that, with the rise in atomic number.

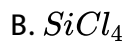
- A. The tendency towards catenation increases
- B. The tendency to show $+2$ oxidation state increases
- C. The metallic character decreases
- D. The tendency to form complexes with covalency higher than four decreases.

Answer: B



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5. Which of the following cannot act as Lewis acid ?



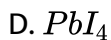
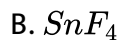
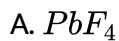
D. None

Answer: A



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6. Which of the following does not exist ?

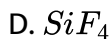
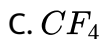
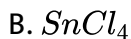
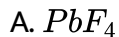


Answer: D



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7. Which of the following is ionic ?



Answer: A



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8. (A): GeF_4 and $SiCl_4$ act as Lewis bases.

(R) : Ge and Si have d-orbitals to accept electrons

A. Both (A) and (R) are correct, (R) is not the correct explanation of (A)

B. (A) is correct but (R) is not correct

C. (A) is not correct but (R) is correct

D. Both (A) and (R) are correct, (R) is the correct explanation of (A)

Answer: C



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9. Even though carbon and silicon are non metals, they have higher melting points than others because

A. They exist as covalent solids in 3D networks

B. The bonds in their molecules are strong

C. They exhibit multiple bonding

D. They are highly electronegative

Answer: A



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10. In SiO_2 , each silicon atom is surrounded by

- A. 4 oxygen atoms in a square planar manner
- B. 4 oxygen atoms in a tetrahedral manner
- C. 6 oxygen atoms in a octahedral manner
- D. 3 oxygen atoms in a planar manner

Answer: B



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11. Some statements are given regarding IVA group elements

A) Order of Electronegativity :

$C > Si = Ge = Sn$ B) Order of Ionisation potential :

$C > Si > Ge > Pb > Sn$

C) Order of Melting point :

$C > Si > Ge > Pb > Sn$

Correct orders of the above

- A. A only
- B. A,B only
- C. B, C only
- D. A,B,C

Answer: D



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12. CO_2 is used for extinguishing fire because

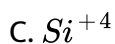
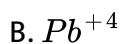
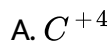
- A. It has relatively high critical temperature
- B. In solid state, it is called dry ice
- C. It is neither combustible nor a supporter of combustion
- D. It is colourless gas

Answer: D



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13. Strongest oxidant among the following is



Answer: C



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14. L_1 is the length between two adjacent carbon atoms in a layer and L_2 is the length in-between two layers of graphite. The approximate ratio between L_1 and L_2

A. 1 : 1

B. 2 : 5

C. 5:2

D. 1:5

Answer: C



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15. Which of the following decomposes steam to form dioxide and dihydrogen gas ?

A. Sn

B. C

C. Si

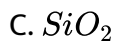
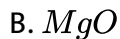
D. Ge

Answer: A



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16. An acidic flux among the following is



Answer: A



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17. Incorrect statement regarding CO_2 is

A. Cardice is the solid CO_2

B. Dry ice is used as refrigerant

C. CO_2 is used in making urea

D. CO_2 is insoluble in water.

Answer: C



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18. CO_2 and N_2 are non-supporters of combustion. However, for putting out fires CO_2 is preferred to N_2 because CO_2

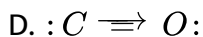
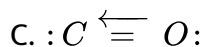
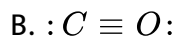
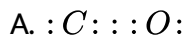
- A. Does not combine with oxygen
- B. Forms non-combustible products with burning substances
- C. Is denser than nitrogen
- D. Is more reactive gas

Answer: C



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19. Which of the following does not represent the correct resonance structure of carbon monoxide



Answer: A



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20. $PbCl_4$ exists, but $PbBr_4$ and PbI_4 do not. This is because of

A. Inability of bromine and iodine to oxidise $Pb^{2+} \rightarrow Pb^{4+}$

B. Bromide and iodide are bigger in size

C. More electropositive character of Br_2 and I_2

D. Chlorine is a gas, but bromine is a liquid and iodine is a solid.

Answer: D



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21. Which is not an allotrope of carbon ?

A. Graphite

B. Diamond

C. Carborundum

D. Coke

Answer: C



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22. Layer structure is present in

A. Graphite

B. Coal

C. Diamond

D. Coke

Answer: A



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23. Among group 14 elements, most acidic oxide is formed by

A. *Pb*

B. *C*

C. *Si*

D. *Sn*

Answer: B



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24. (A): Even though diamond is covalent, it has a high melting point

(R) : Diamond is a three dimensional gaint molecule. The $C - C$ in it are very strong.

A. Both A and R are true. R is the correct explanation for A.

B. Both A and R are true. R is not the correct explanation for A.

C. A is true, R is false.

D. A is false and R is true

Answer: A



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25. Which of the following is true about fullerenes?

A. It contain twelve six-membered rings and twenty five membered rings

- B. It contain twenty six membered rings and twelve five membered rings
- C. It contain only six membered rings
- D. It contain only five membered rings

Answer: B



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26. Identify the correct statement from the following

- I) Graphite is used as dry lubricant, as it posses slippary nature
- II) Diamond is thermodynamically more stable than graphite
- III) Carbon black, coke, charcoal are impure forms of graphite or fullerenes
- IV) Diamond is measured in carats and one carat is 200 gm.

A. I, III only

B. II, IV only

C. I, II, III

D. II, III, IV

Answer: A



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27. Regarding diamond

- I) $C - C$ bond length is 1.54\AA
- II) It has least refractive index among solids
- III) It has a 3-dimensional structure.

The correct combination is

- A. all are correct
- B. I & III are correct
- C. I & II are correct
- D. II & III are correct

Answer: B



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28. Which of the following is used as black pigment in black ink ?

- A. Coke
- B. Carbon black
- C. Germanium
- D. Graphite

Answer: B



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29. The correct statement regarding Graphite is

- A. Graphite is not a conductor because, it does not contain free electrons

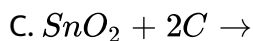
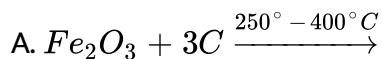
- B. Graphite is a three dimensional conductor because, the p-electrons are delocalised three dimensionally
- C. Graphite is a two dimensional conductor because p-electrons are delocalised two dimensionally
- D. In graphite all the carbon atoms undergo sp hybridization

Answer: B



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30. The reaction that gives CO_2 as one of the products is

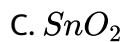
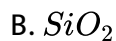


Answer: C



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31. Mark the oxide which is amphoteric in character



Answer: C



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32. Which one of the following elements reacts with steam?



D. Sn

Answer: B



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33. The hybrid orbitals with 33.33% s-character are involved in the bonding of one of the crystalline allotropes of carbon. The allotrope is

A. Carbon black

B. Graphite

C. Diamond

D. Gas carbon

Answer: B



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34. The number of Pentagons and Hexagons, respectively in Co-Fullerence are

- A. 10&20
- B. 30&30
- C. 20&10
- D. 12&20

Answer: D



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35. The hybridisation of C in diamond, graphite and ethyne is in the order

- A. sp^3 , sp , sp^2
- B. sp^3 , sp^2 , sp
- C. sp , sp^2 , sp^3
- D. sp^2 , sp^3 , sp

Answer: B



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36. Silica is insoluble

A. HF

B. $NaOH$

C. KOH

D. HNO_3

Answer: D



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37. SiO_2 is a solid while CO_2 is a gas - explain.

- A. SiO_2 contains weak vander Waal attraction while CO_2 contains strong covalent bonds
- B. Solid SiO_2 has a three dimensional net work structure whereas CO_2 contains discrete molecules.
- C. Both contain strong covalent bonds
- D. Both contain weak vander Waal attraction

Answer: B



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38. In hydrofluorosilicic acid the covalency of Si is

- A. 2
- B. 4
- C. 6
- D. 8

Answer: C



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39. Regarding silica

I) Quartz is amorphous form of silica

II) Silica dissolves in NaOH

III) Silica dissolves in HF

The correct combination is

A. all are correct

B. II & III are correct

C. III are correct

D. I & III are correct

Answer: C



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40. SiO_2 reacts with which of the following to form water glass

A. Na_2CO_3

B. Na_2O

C. NaOH

D. Na

Answer: D



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41. Which of the following is a crystalline form of silica ?

A. Jasper

B. Cristobalite

C. Agate

D. Onyx

Answer: C



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42. Hybridisation of carbon atom in carbon dioxide is

A. sp^2

B. sp^3

C. sp

D. dsp^2

Answer: C



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43. Which of the following acts as a reducing agent ?

A. CO

B. CO_2

C. C_3O_2

D. All

Answer: A



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44. The $C - O$ bond order in CO and CO_2 respectively

A. 2,3

B. 2,2

C. 3,3

D. 3,2

Answer: D



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45. The high poisonous nature of CO is due to its

- A. Neutral nature
- B. Complex forming ability
- C. Reducing nature
- D. Oxidising nature

Answer: B



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46. Carboxy haemoglobin is ____ times more stable than oxyhaemoglobin

- A. 100
- B. 200
- C. 300
- D. 400

Answer: C



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47. Which of the following statements is correct?

A. CO_2 is neither combustible nor supporter of combustion

B. CO is a combustible gas

C. CO burns with a blue flame

D. All and reduces CuO to Cu is

Answer: C



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48. A colourless gas which burns with blue flame and reduces CuO to Cu is

A. N_2

B. CO

C. CO_2

D. NO_2

Answer: B



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49. Maximum covalency exhibited by Carbon and Silicon respectively are

A. 4,6

B. 4,4

C. 6,6

D. 4, 8

Answer: B



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50. Two tetravalent elements A and B form dioxides. Both react with NaOH to form similar salts. $\angle OAO$ is 180° and $\angle OBO$ is $109^\circ 28'$. Both are acidic in nature. A and B are respectively

- A. C and S
- B. S and Si
- C. C and Si
- D. Si and C

Answer: C



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51. Correct statements regarding silicones are

- a) They are used in the preparation of water proof clothes.
- b) They are organo silicon compounds.

c) They are used in the preparation of grease and lubricants.

d) They are used in paints and enamels.

A. a, b, c only

B. b, c, d only

C. a, b, d only

D. a, b, c, d.

Answer: D



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52. Carbon can not expand its valency beyond 4, because

A. it has only 4 electrons

B. it has only 4 shell

C. it lacks valence p-orbitals

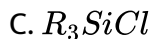
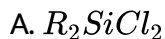
D. it lacks valence d-orbitals

Answer: C



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53. Among the following substituted silanes the one which will give rise to cross linked silicone polymer on hydrolysis is



Answer: B



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54. Silicones are used as water proof materials because they have

A. hydrophobic alkyl groups

B. hydrophilic alkyl groups

C. strong $Si - O$ bonds

D. Weak $Si - O$ bonds

Answer: A



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55. When some of Si^{+4} in frame work silicates are replaced by Al^{+3} and an additional metal ion, it results in the formation of

A. Zeolites

B. Silicones

C. Disilicates

D. Glass

Answer: A

56. The structure and hybridisation of $Si(CH_3)_4$ is ,

- A. bent, sp
- B. trigonal, sp^2
- C. octahedral, sp^3d
- D. tetrahedral, sp^3

Answer: D

57. How many comers of SiO_4 units are shared in the formation of three dimensional silicates?

- A. 1
- B. 2

C. 3

D. 4

Answer: D



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58. The zeolite used to convert alcohols directly into gasoline is

A. $ZSM - 5$

B. $Zn_2(SiO_4)$

C. $LiAl(SiO_3)$

D. $Be_3Al_2[Si_6O_{18}]$

Answer: A



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59. Silicones contain silicon strongly bonded to _ and __atoms.

A. C, O

B. C, H

C. H, O

D. H, Cl

Answer: A



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60. Silicones are used

A. as conductors

B. as insulators

C. as semiconductors

D. to prepare graphite

Answer: B



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61. Zeolites are used as

- 1) ion exchangers
- 2) molecular sieves
- 3) water softener

The correct uses are

- A. a and b only
- B. b and c only
- C. a and c only
- D. a, b and c

Answer: D



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62. The empirical formula of silicones is analogous to

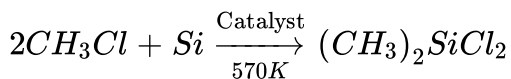
- A. Alcohols
- B. Aldehydes
- C. Ketones
- D. Ethers

Answer: C



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63. What is the catalyst used in the following reaction?



- A. Nickel powder
- B. Copper powder
- C. Zinc powder
- D. Platinum powder

Answer: B



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OBJECTIVE EXERCISE - 3 (Recent AIPMT/NEET Questions)

1. The correct order regarding the electronegativity of hybrid orbitals of carbon is

A. $sp > sp^2 < sp^3$

B. $sp > sp^2 < sp^3$

C. $sp > sp^2 > sp^3$

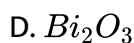
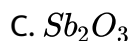
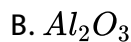
D. $sp < sp^2 > sp^3$

Answer: C



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2. Which of the following is the most basic oxide ?

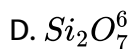
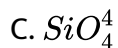
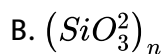
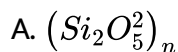


Answer: D



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3. Which of the following anions is present in the chain structure of silicates ?



Answer: B



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4. Which of the following oxidation states are the most characteristic for lead and tin. respectively ?

A. +2, +4

B. +4, +4

C. +2, +2

D. +4, +2

Answer: A



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5. The straight chain polymer is formed by

- A. hydrolysis of CH_3SiCl_3 followed by condensation polymerisation
- B. hydrolysis of $(CH_3)_4Si$ by addition polymerisation
- C. hydrolysis of $(CH_3)_2SiCl_2$ followed by condensation polymerisation
- D. Hydrolysis of $(CH_3)_3SiCl$ followed by condensation polymerisation

Answer: C



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6. Which one of the following molecular hydrides acts as a Lewis acid

- A. NH_3
- B. H_2O
- C. B_2H_6
- D. CH_4

Answer: C



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7. Name the two type of the structure of silicate in which one oxygen atom of $[SiO_4]^{4-}$ is shared?

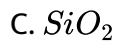
- A. Linear chain silicate
- B. Sheet silicate
- C. Pyrosilicate
- D. Three dimensional

Answer: C



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8. Which of the following oxide is amphoteric ?

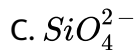


Answer: A



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9. The basic structural unit in silicates is

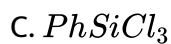
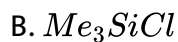
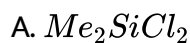


Answer: A



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10. Which of these is not a monomer for a high molecular mass silicon polymer ?



Answer: B



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