



CHEMISTRY

BOOKS - CHHAYA CHEMISTRY (BENGALI ENGLISH)

PREVIOUS YEARS QUESTION PAPER 2016

Wbchse 2016

1. Two solutions are isotonic , what is meant by the

statement?

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2. When a little amount of common salt is dissolved in

water, the boiling point increases. Explain why .



3. Write two differences between physisorption and chemisorption.



4. Explain why the solid catalyst is used in a finely divided

from in case of heterogneous catalysis.



5. First ionisation enthalpies of group-15 elements are, in general , greater than those of group-16 elements-explain.

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6. State with balanced chemical equation what happens when sulphur trioxide gas is passed through conc. Sulphuric acid.

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7. An aqueous solution of a complex compound of formula $Co(NH_3)_5Br(SO_4)$ reacts readily with aqueous $AgNO_3$ to give a yellowish white precipitate . Write down the structural formula of the complex and mention the reaction involved.



8. Identify the two monomers in the following polymer:

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9. Silver crystallises in face centered cubic lattice. If edge length of the unit cell is 4.07×10^{-8} cm and density of silver is $10.48gcm^{-3}$, determine the relative atomic mass of silver.



10. What is Schottky defect ? Find out the packing effciency in a simple cubic lattice ?



11. What is meant by the molarity of a solution ? What

would be the osmotic pressure of a 0.02 molar aqueous

solution of urea at $27^\circ C$? (R

 $0.082L. atm. K^{-1}. Mol^{-1}$



of the KCl solution.



13. Determine ΔG° and the value of the equilibrium constant for the following reaction occuring in an electrochemical cell at $25^{\circ}C$: $Cu_{(s)} + 2Ag^+(aq) \rightarrow Cu^{2+}(aq) + 2Ag(s)$ Given that , $E^0_{Cu^{2+}/Cu} = 0.34V\&E^0_{Ag^+|Ag} = 0.80V$.

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14. What is Malachite ? Write down its formula .

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15. State what happens when a solid mixture of KCl and $K_2Cr_2O_7$ is heated with conc. Sulphuric acid. Give balanced chemical equation.



16. Write the number of unpaired electron(s) present in

 $Na_2[FeO_4]$. [Atomic number of Fe is 26]



17. Explain the cause of chemical similarity between the

compounds of Nb and Ta.



18. What will happen when bromomethane reacts with an aqueous solution of sodium hydroxide ? Write the mechanism of the reaction.



20. Give examples of the following reactions:

(m) Gattermann-Koch reaction

- (n) Koble-Schmidt reaction.
- (o) Wolff-Kishner reduction





23. Which one is the SI unit of molar conductivity?

A. $S. m^2. Mol^{-1}$ B. $s. m^{-1}$ C. $S. cm^2. mol^{-1}$

D. S. cm. mol^{-1}

Answer: A

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24. Which of the following gases has odour but no colour ?

A. NO_2

 $\mathsf{B.}\,SO_2$

 $\mathsf{C}.\,N_2$

D. Cl_2

Answer: B

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25. What is the state of hybridisation of Fe in $\left[FeF_6
ight]^{3-}$

ion?

A. $d^2 s p^3$

 $\mathsf{B.}\,dsp^3$

 $\mathsf{C.}\, sp^3d^2$

D. sp^3d

Answer: C

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26. Which of the following compounds will respond to iodoform test ?

A. $CH_3CH_2CH_2OH$

B. $CH_3 C HCH_3$ | OH

 $\mathsf{C.}\,CH_3OCH_2CH_3$

D. CH_3OH



D. 📄

Answer: C



28. Which of the following is a neutral polymer ?

A. Polyethylene

B. Nylon

C. Protein

D. Terylene

Answer: C

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29. Which of the following is a constitutent of soap?

A. Sodium sterate

B. Sodium salicylate

C. Sodium butyrate

D. Sodium benzenesulphonate

Answer: A

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30. What is the total number of atoms per unit cell in a

face centred cubic (fcc) structure ?

A. 1

B. 2

C. 3

D. 4

Answer: D

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31. Which of the following colloidal systems does correctly represent fog ?

A. Gas dispersed in a liquid

B. Gas dispersed in a gas

C. Solid dispersed in a gas

D. Liquid dispersed in a gas

Answer: D



32. Which of the following free gaseous ions of 3d elements has the highest paramagnetic moment ? (The atomic numbers of Mn ,Fe, Ni, and Cu are 25, 26 ,28 and 29 respectively)

A. Ni^{2+}

B. Mn^{2+}

C. Fe^{2+}

D. Cu^{2+}



34. Which of the following compounds is obtained when

calcium acetate is dry distilled ?

A. Formic acid

B. Formandehyde

C. Acetone

D. Butanone

Answer: C

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35. Which of the following bases is not present in DNA?

A. Uracil

B. Thymine

C. Guanine

D. Cytosine

Answer: A

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36. Which of the following is an antibiotic ?

A. Aspirin

B. Chloramphenicol

C. Veronal

D. Foristal

Answer: B



37. Between Eu and Ce which one exhibits +2 oxidation

state?

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38. Namea transition metal which is used as catalyst.



39. Write down the relation between the emf of a galvanic cell and the Gibbs energy change for the chemical reaction occuring in the cell.

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40. By what type of reaction do the common antacids

destroy the excess acid of the stomach?

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1. Galvanisation is applying a coating of -

A. Zn

B. Pb

C. Cr

D. Cu

Answer: A

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2. Which one of the following complexes shows optical

isomerism-

(en = ethylenediamine)

A. $[Co(NH_3)Cl_2]Cl$

 $\mathsf{B.}\left[Co(NH_3)_3Cl_3\right]$

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\mathrm{C.\,cis}\big[Co(en)_2 Cl_2\big]Cl
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D. trans \left[ Co(en)_2 Cl_2 \right] Cl
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Answer: C



3. Decomposition of H_2O_2 follows a first order reaction. In fifty minutes the concentration of H_2O_2 decreases from 0.5 to 0.125 M in one such decomposition . When the concentration of H_2O_2 reaches 0.05M , the rate of formation of O_2 will be-

A. $1.34 \times 10^{-2} mol. \min^{-1}$

B. $6.93 \times 10^{-2} mol. \min^{-1}$

 $\mathsf{C.6.93}\times 10^{-4} \textit{mol.} ~~ \min^{-1}$

D. 2.66L. min⁻¹ at STP

Answer: C

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4. The pair having the same magnetic moment is -

[At. No. :Cr =24 , Mn =25 , Fe= 26, Co =27]

A.
$$[CoCl_4]^{2-}$$
 and $[Fe(H_2O_6)]^{2+}$

B. $[Cr(H_2O_6)]^{2+}$ and $[CoCl_4)^{2-}$

C. $[Cr(H_2O)]^{2+}$ and $[Fe(H_2O_6)]^{2+}$

D. $\left[Mn(H_2O_6) \right]^{2+}$ and $\left[Cr(H_2O)_6 \right]^{2+}$

Answer: C



- 5. Thiol group is present in -
 - A. Methionine
 - B. Cytosine
 - C. Crstine
 - D. Cysteine

Answer: D





6. The pair in which phosphorus atoms have a formal oxidation state of +3 is-

A. Pyrophosphorus and pyrophosphoric acids

B. Orthophosphorous and pyrophosphorous acids

C. Pyrophosphorous and hypophosphoric acids

D. Orthophosphorous and hypophosphoric acids

Answer: B



7. Which one of the following ores is best concentrated

bu froth floatation method /

A. Malachite

B. Magnetic

C. Siderite

D. Galena

Answer: D



8. In the Hofmann bromamide degradation reaction, the number of moles of NaOH and Br_2 used for mole of

amine produced are-

A. Four moles of NaOH and one mole of Br_2

B. One mole of NaOH and one mole of Br_2

C. Four moles of NaOH and two moles of Br_2

D. Two moles of NaOH and two moles of Br_2

Answer: A



9. Which of the following compounds is metallic and ferromagnetic ?

A. MnO_2

B. TiO_2

 $C. CrO_2$

 $\mathsf{D.}\,VO_2$

Answer: C

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10. Which of the following statements about low density

polythene is FALSE /

A. It is used in the manufacture of buckets , dust-bins etc.

B. Its synthesis requires high pressure

C. It is a poor conductor of electricity

D. Its synthesis requires dioxygen or a peroxide

initiator as a catalyst.

Answer: A



11. 18g glucose ($C_6H_{12}O_6$) is added to 178.2g water. The vapour pressure of water (in torr) for this aqueous solution is -

A. 759

B. 7.6

C. 76

D. 752.4

Answer: D

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12. The reaction of zinc with dilute and concentrated nitric acid, respectively produces -

A. NO_2 and N_2O

 $B. N_2O$ and NO_2

 $\mathsf{C}.NO_2$ and NO

D. NO and N_2O



Answer: C



14. The reaction of propene with $HOCl(Cl_2 + H_2O)$ proceeds through the intermediate-

A.
$$CH_3 - CHCl - CH_2^+$$

- $\mathsf{B.}\,CH_3-CH^{\,+}-CH_2-OH$
- C. $CH_3 CH^+ CH_2 Cl$
- $\mathsf{D}.\,CH_3-CH(OH)-CH_2^{\,+}$

Answer: C

15. For a linear plot of $\log\left(\frac{x}{m}\right)$ versus logp in a Freundlich adsorption isotherm, which of the following

statements is correct ? (K and n are constants)-

A.
$$\log\left(\frac{1}{n}\right)$$
 appears as the intercept
B. Both K and $\frac{1}{n}$ appear in the slope term
C. $\frac{1}{n}$ appears as the intercept
D. only $\frac{1}{n}$ appears as the shape

Answer: D

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16. The absolute configuration of -

A. (2R, 3R)

B. (2R, 3S)


1. Among the following , the correct order of acidity is -

A. $HClO_3 < HClO_4 < HClO_2 < HClO_1$

B. $HCIO < HCIO_2 < HCIO_3 < HCIO_4$

 $C. HCIO_2 < HCIO < HCIO_3 < HCIO_4$

$\mathsf{D}.\,HCIO_4 < HCIO_2 < HCIO_3$

Answer: C

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2. The rate of a first order reaction is 0 04 mol $L^{-1}s^{-1}$ at 10 seconds and 003 mol $L^{-1}s^{-1}$ at 20 seconds after initiation of the reaction. The half life period of the reaction is

A. 24.1 s

B. 34.1 s

C. 44.1 s

D. 54.1 s

Answer: A



3. Which one of the following characteristics is associated with adsorption ?

A. ΔG is negative but $\Delta H \mathrm{and} \Delta S$ are positive

B. ΔG , ΔH and ΔS all are negative

C. $\Delta G \mathrm{and} \Delta H$ are negative but ΔS is positive

D. $\Delta G \mathrm{and} \Delta S$ are negative but ΔH is positive

Answer: B



4. In a protein molecule various amino acids are linked together by-

A. α -glycosidic bond

B. β - glycosidic acid

C. peptide bond

D. dative bond

Answer: C

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5. Natural rubber has -

A. All cis-configuration

B. All trans- configuration

C. Alternate cis- and trans- configuration

D. Random cis- and trans-configuration

Answer: A

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6. Which one of the following statements is correct when

 SO_2 is passed through acidified $K_2Cr_2O_7$ solution ?

A. The solution turns blue

B. The solution is decolourised

C. SO_2 is reduced

D. Green $Cr_2(SO_4)_3$ is formed

Answer: D

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7. When copper is heated with conc. HNO_3 , it produces-

A. $Cu(NO_3)_2$ and NO_2

B. $Cu(NO_3)_2$ and NO

C. $Cu(NO_3)_2$, NO and NO_2

D. $Cu(NO_3)_2$ and N_2O

Answer: A

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8. Which of the following reagents would distinguish cis-

cyclopenta-1, 2, -diol from the trans-isomer?

A. Acetone

B. Ozone

 $\mathsf{C}. MnO_2$

D. Aluminium isopropoxide

Answer: A



9. Lithium has a bcc structure. Its density is $530kg. m^{-3}$ and its atomic mass is $6.94g. mol^{-1}$. Calculate the edge length of a unit cell of Lithium metal. $(N_A = 6.02 \times 10^{23} mol^{-1}) -$

A. 154 pm

B. 352 pm

C. 527 pm

D. 264 pm

Answer: B

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10. Which one of the following orders is correct for the bond dissociation enthalpy of halogen molecules ?

A.
$$I_2 > Br_2 > Cl_2 > F_2$$

B.
$$Cl_2>Br_2>F_2>I_2$$

C. $Br_2>I_2>F_2>Cl_2$

D. $F_2 > Cl_2 > Br_2 > I_2$

Answer: C



11. Which of the following is an analgesic ?

A. Novalgin

B. Penicillin

C. Streptomycin

D. Chloromycetin

Answer: A

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12. Consider the nitration of benzene using mixed conc. H_2SO_4 and HNO_3 . If a large amount of $KHSO_4$ is

added to the mixture, the rate of nitration will be -

A. faster

B. slower

C. unchanged

D. doubled

Answer: B



13. Consider the following liquid -vapour equilibrium.

 $Liquid \Leftrightarrow Vapour$

Which of the following relations is correct ?

A.
$$\frac{dInG}{dT^2} = \frac{\Delta H_v}{RT^2}$$

B.
$$\frac{dInP}{dT} = \frac{-\Delta H_v}{RT}$$

C.
$$\frac{dInP}{dT} = \frac{-\Delta H_v}{T^2}$$

D.
$$\frac{dInP}{dT} = \frac{\Delta H_v}{RT^2}$$

Answer: D

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14. The pressure of H_2 required to make the potential of

 H_2- electrode zero in pure water at 298K-

A. $10^{-14} atm$

B. 10^{-12} atm

C. 10^{-10} atm

D. 10^{-4} atm

Answer: A

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15. Which of the following has longest C-O bond length ? (Free C-O bond length in CO is 1.128Å)-

A. $Ni(CO)_4$

- $\mathbf{B}.\left[Co(CO)_{4}\right] ^{\varTheta }$
- $\mathsf{C.}\left[Fe(CO)_4\right]^{2-}$
- D. $\left[Mn(CO)_6
 ight]^+$



16. The addition of a catalyst during a chemical reaction alters which of the following quantities ?

A. Entropy

B. Internal energy

C. Enthalpy

D. Activation energy

Answer: D



17. Which is the correct statement for the given acids ?

A. Phosphinic acid is a diprotic acid while phosphonic

acid is a monoprotic acid

B. Phosphonic acid is a monoprotic acid while

phosphinic acid a dprotic acid

C. Both are triprotic acids

D. Both are diprotic acids

Answer: B



18. Fog is colloidal solution of -

A. Liquid in gas

B. Gas in liquid

C. Solid in gas

D. Gas in gas

Answer: A



19. The ionic radii of A^+ and B^- ions are $0.98 imes 10^{-10}$ m and $1.81 imes 10^{-10} m$. The coordination number of each ion in AB is -

A. 6

B.4

C. 8

D. 2

Answer: A

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20. Which of the following statements about the composition of the vapour over an ideal 1:1 molar mixture of benzene and toluene is correct ? Assume that the temperature is constant at $25^{\circ}C$. (Given : Vapour

Pressure Data at $25^{\circ}C$, benzene = 12.8 kPa, Toluene = 3.85kPa)-

A. The vapour will contain a higher percentage of

benzene

- B. The vapour will contain a higher percentage of toluene
- C. The vapour will contain equal amounts of benzene

and toluene

D. Not enough information is given to make a

prediction

Answer: A

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21. The product formed by the reaction of an aldehyde with a primary amine is -

A. Schiff base

B. Ketone

C. Carboxylic acid

D. Aromatic acid

Answer: A

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22. Which of the following biphenysis is optically active ?









Answer: B

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23. The correct statement regarding the basicity of arylamines is -

A. Arylamines are generally less basic than alkylamines because the nitrogen lone-pair

electrons are delocalized by interaction with the aromatic ring π electron system. B. Arylamines are generally more basic thatn alkylamines because the nitrogen lone-pair electrons are not delocalized by interaction with the aromatic ring π electron system C. Arylamines are generally more basic than alkylamines D. Arylamines are generally more basic than alkylamines, because the nitrogen atom in arylamines is sp-hybridized

Answer: A



24. The correct statement regarding RNA and DNA, respectively is -

A. The sugar component RNA is arabinose and the sugar components in DNA is 2' -deoxyribose.

B. The sugar component in RNA is ribose and the

sugar components in DNA is 2' -deoxyribose.

C. The sugar component is RNA is arabinose.

D. The sugar component in RNA is 2' -deoxyribose and

the sugar component in DNA is arabinose



25. At $100^{\circ}C$ the vapour pressure of a solution of 6.5 g of a solute in 100 g water is 732 mm. If $k_b = 0.5$, the boiling point of this solution will be -

A. $101^{\,\circ}\,C$

B. $100^{\circ}C$

C. $102^{\,\circ}\,C$

D. $103^{\,\circ}\,C$

Answer: A





26. Which one given below is a non-reducing sugar ?

A. Maltose

B. Lactose

C. Glucose

D. Sucrose

Answer: D



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1. A nitrogen -containing aromatic compound A reacts with Sn/HCl, followed by HNO_2 to give an unstable compound B. B on treatment with phenol, forms a beautiful coloured compound C with the molecular formula $C_{12}H_{10}N_2O$. The structure of compound A-









Answer: C



2. Consider the reaction

 $CH_3CH_2CH_2Br + NaCN
ightarrow CH_3CH_2CH_2CN + NaBr$

This reaction will be the fastest in -

A. water

B. ethanol

C. methanol

D. N,N'-dimethylformamide (DMF)

Answer: D



3. The molar conductivity of a $0.5mol/dm^3$ solution of $AgNO_3$ with electrolytic conductivity of $5.76 imes 10^{-3}S.\ cm^{-1}$ at 298K is -

A. 28.8 $S.\ cm^2/mol$

 $\texttt{B.}\ 2.88S.\ cm^2\,/\,mol$

C. 11.52 $S.\ cm^2 \,/\,mol$

D. $0.086S.\ cm^2/mol$

Answer: C



4. The decomposition of phosphine (PH_3) an tungsten

at low pressure is a first-order reaction. It is because the

A. rate of decomposition is very low

B. rate is proportional to the surface coverage

C. rate is inversely proportional to the surface

coverage

D. rate the independent of the surface coverage

Answer: B

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5. The coagulation values in millimoles per litre of the electrolytes used for the coagulation of As_2S_3 are given below :

I. (NCl) = 52 , II. ($BaCl_2$ = 0.69

III. $(MgSO_4)$ = 0.22

The correct order of their coagulating power is -

A. III > I > II

 $\mathsf{B.}\,I>II>III$

 $\mathsf{C}.\,II > I > III$

D. III > II > I

Answer: D

6. During the electrolysis of molten sodium chloride, the time required to produce 0.10 mol of chlorine gas using a current of 3 amperes is -

A. 330 minutes

B. 55 minutes

C. 110 minutes

D. 220 minutes

Answer: C

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7. The van't Hoff factor (i) for a dilute aqueous solution

of the strong electrolyte barium hydroxide is-

A. 3

B. 0

C. 1

D. 2

Answer: A



8. In calcium flouride, having the flourite structure, the coordination numbers for calcium ion $\left(Ca^{2+}
ight)$ and

flouride ion (F^{-}) are-

A. 4 and 8

B. 4 and 2

C. 6 and 6

D. 8 and 4

Answer: D



9. If the E_{cell}^0 for a given reaction has a negative value, which of the following gives the correct relationships for the values of ΔG^0 and K_{eq} ? A. $\Delta G^0 < K_{eq} < 1$

B.
$$\Delta G^0 > 0, K_{eq} < 1$$

C.
$$\Delta G^0 > 0, K_{eq} > 1$$

D.
$$\Delta G^0 < 0, K_{eq} > 1$$

Answer: B

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10. Which one of the following is incorrect for ideal solution ?

A.
$$\Delta G_{
m mix}=0$$

B.
$$\Delta H_{\rm mix} = 0$$

C.
$$\Delta U_{
m mix}=0$$

D.
$$\Delta P = P_{
m obs} - P_{
m calculated \ by \ Raoult's \ law} = 0$$

Answer: A



11. AIF_3 is soluble in HF only in presence of KF: It is due to the formation of -

A. $K_3[AIF_3H]$

 $\mathsf{B.}\,K_3[AIF_3H_3]$

 $\mathsf{C}.\,K_3[AIF_6]$

D. AIH_3

Answer: C

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12. Zinc can be coated on iron to produce galvanised iron but the reverse is not possible .It is because-

A. zinc has higher negative electrode potential than

iron

B. zinc is lighter than iron

C. zinc has lower melting point than iron

D. zinc has lower negative electrode potential than

iron

Answer: A



13. Hot concentrated sulphuric acid is a moderately strong oxidizing agent. Which of the following reactions does not show oxidizing behaviour ?

A.
$$CaF_2 + H_2SO_4
ightarrow CaSO_4 + 2HF$$

 $\texttt{B.} \ Cu + 2H_2SO_4 \rightarrow CuSO_4 + SO_2 + 2H_2O$

 $\mathsf{C.}\, 3S + 2H_2SO_4 \rightarrow 3SO_2 + 2H_2O$

D. $C+2H_2SO_4
ightarrow CO_2+2SO_2+2H_2O$

Answer: A




14. The correct geometry and hybridization for XeF_4 are-

A. sqaure planar, sp^3d^2

B. octahedral, sp^3d^2

C. trigonal bipyramidal, sp^3d

D. planar triangle, sp^3d^3

Answer: A

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15. The correct increasing order of trans-effect of the following species is -

A.
$$CN^{\,-}\,>Br^{\,-}\,>C_{6}H_{5}^{\,-}NH_{3}$$

B. $NH_3 > CN^- > Br^- > C_6H_5^-$

C. $CN^{\,-}\,> C_{6}H^{\,-}_{5}\,> Br^{\,-}\,> NH_{3}$

D. $Br^- > CN^- > NH_3 > C_6H_5^-$

Answer: C



16. Which one of the following statements related to

lanthanons is incorrect ?

A. Ce(+4) solutions are widely used as oxidizing agent

in voumetric analysis.

B. Europium shows +2 oxidation state.

C. The basicity decreases as the ionic radius

decreases from Pr to Lu.

D. All the lanthanons are much more reactive than

aluminium.

Answer: D



17. Which of the following can be used as the halide component for Friedel-Crafts reaction ?

A. Isopropyl chloride

B. Chlorobenzene

C. Bromobenzene

D. Chloroethene

Answer: A



18. Jahn-Teller effect is not observed in high spin complexes of -

A. d^9

 $\mathsf{B}.\,d^7$

 $\mathsf{C}.\,d^8$

D. d^4

Answer: C

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19. Which one of the following structures represents

nylon 6,6 polymer ?









Answer: A

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20. Which one of the following nitro-compounds does not react with nitrous acid ?









Answer: D

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21. The central dogma of molecular genetic states that the genetic information flows from -

A. DNA \rightarrow RNA \rightarrow Carbohydrates

B. Amino acids \rightarrow Proteins \rightarrow DNA

C. DNA \rightarrow Carbohydrates \rightarrow Proteins

D. DNA \rightarrow RNA \rightarrow Proteins

Answer: D



