

# CHEMISTRY

# **BOOKS - CHHAYA CHEMISTRY (BENGALI ENGLISH)**

# **PREVIOUS YEAR QUESTION PAPER 2018**

Wbchse 2018 Section I

**1.** Which of the following is the ground state electronic configuration of Cr?(Atomic number of Cr is 24)

A.  $1s^22s^22p^63s^23p^63d^44s^2$ 

B.  $1s^22s^22p^63s^23p^63d^54s^1$ 

 $\mathsf{C}.\,1s^22s^22p^63s^23p^63d^6$ 

D.  $1s^22s^22p^63s^23p^63d^34s^24p^1$ 



**2.** The state of hybridisation of the central atom of which of the following is  $sp^3d^2$ ?

- A.  $SF_4$
- B.  $PCl_5$
- C.  $SF_6$
- D.  $SO_4^{2\,-}$

#### Answer:

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**3.** Which of the following is the correct order of repulsive interaction of lone pair(lp) and bond pair (bp) of electrons?

A. 
$$lp - lp > lp - bp > bp - bp$$
  
B.  $lp - bp > lp - lp > bp - bp$   
C.  $bp - bp > lp - lp > lp - bp$   
D.  $lp - lp > bp - bp > lp - bp$ 

#### Answer:

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4. The cause of spherical shape of water drops is-

A. viscosity

B. surface tension

C. hydrogen bond

D. high critical temperature of  $H_2O$  vapour

#### Answer:

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**5.** An amount of work w is done by a system and q amount of heat is supplied to the system . By which of the following relations the change in internal energy of the system can be expressed ?

A. 
$$\Delta H = q - w$$

- B.  $\Delta U = q + w$
- $\mathsf{C}.\,\Delta U=q$

D.  $\Delta U = w - q$ 

#### Answer:

6. Which one of the following indicates a spontameous process?-

A.  $\Delta G=0$ 

- B.  $\Delta H = T \Delta S$
- $\mathsf{C}.\,\Delta G>0$
- D.  $\Delta G < 0$

#### Answer:

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7. The relation between  $K_p$  and  $K_c$  for the following reaction :  $2SO_2(g) + O_2(g) \Leftrightarrow 2SO_3$  (g) is -

A. 
$$K_p = K_c$$
  
B.  $K_p = K_c (RT)^{-1}$   
C.  $K_p = K_c imes RT$   
D.  $K_p = K_c (RT)^2$ 

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8. Which one of the following elemants shows diagonal relation-

ship with magnesium?-

A. Na

B. Li

C. Be

D. Ca

Answer:				
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<b>9.</b> Sodium is preserved in which of the following liquids?-				
A. Water				
B. Ethanol				
C. Kerosene oil				
D. Methanol				
Answer:				
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**10.** Which of the following is a carbanion ?

A.  $CH_3P^{\,\Theta}$ 

B.  $CH_3CH_2^{\Theta}$ 

 $\mathsf{C.}\,CH_3COO^{\,\Theta}$ 

 $\mathrm{D.}\, C_6 H_5 O^{\,\Theta}$ 

Answer:



**11.** In the Lassaigne test for the detec-tion of nitrogen in an organic compound, with which of the following metals the organic compound is fusde?-

A. Li

B. Mg

C. Na



**12.** Which of the following compounds does not produce a white precipitate on treatment with ammonicacal silver nitrate solution?-

A. Acetylene

B. Methyl acetylene

C. Ethyl acetylene

D. Dimethyl acetylene

#### Answer:



**13.** In which of the following reaction the product is not formed according to Markownikonikoff' rule?-

 $\begin{array}{l} \mathsf{A}.\,CH_3CH = CH_2 + HCl_2 \rightarrow \\\\ \mathsf{B}.\,CH_3CH = CH_2 + HCl \overset{\mathrm{Peroxide}}{\longrightarrow} \\\\ \mathsf{C}.\,CH_3CH = CH_2 + HBr \rightarrow \\\\\\ \mathsf{D}.\,CH_3CH = CH_2 + HBr \overset{\mathrm{Peroxide}}{\longrightarrow} \end{array}$ 

#### Answer:

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**14.** Which of the following gases emitted by motor vehicles is responsible for the formation of photochemical smog ?

A.  $SO_2$ 

 $\mathsf{B.}\,CO$ 

 $\mathsf{C}.\,NO$ 

 $\mathsf{D.}\,CO_2$ 

Answer:

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Wbchse 2018 Section Ii

**1.** The empirical formula of an organic compound is  $CH_2O$  and its moleclar weight is 180. What is the molecular formula of the compound? (H = 1, C = 12, O = 16) 2. Arrange the following elements in the increasing order of their

first ionisation enthalpy : Li, Be, Na, Mg.



5. Write the SI unit of entropy.



6. What reagent can be used for the following conversation ?

 $HC = CH \rightarrow H_2C = CH_2.$ 

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7. How many neutrons are present in  $5 imes 10^{-1}$  moles of `^14\_6C?

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8. Determine the mass percentage composition of water (H=1.

o=16).

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9. State Heisenberg uncertainty principle . What is the shape of s

orbital ?

Watch Video Solution **10.** Explain why  $SiCl_4$  undergoes hydrolysis readily Watch Video Solution 11. Why is the aqueos solution of borax alkaline? Watch Video Solution 12. Which reagent is called anmelectrophile in organic reation?

write with an example.



**15.** How does the increase in the amount of  $CO_2$  in the

atmosphere lead to global warming ?

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**16.** Write with an example the condition for two atoms to be considered as isobars .



18. What are the quantum numbers by which an electron in an

atom can be designed?



19. What is the maximum number of quantum numbers that may

be the same for two electrons of an atom ?

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**20.** The outermost electrons configuration of the atom of an elements is  $3s^23p^3$ . Mention the position of the elements in the long periodic table.



21. Why is the electron gain enthalpy of oxygen is less than that

of sulphur?





**25.** State Gay Lussac's law related to pressure and temperature of a gas. 3.2g of sulphur when vaproised the sulphur vapour occupies a volume of 280.2 mL at STP . Determine the molecular formula of sulphur vapour under this condition . (S = 32)



 $\Delta H$  = 300 kj mol(-1) and  $\Delta S$  = 0.2 kj  $K^{-1}$ mol^(-1) At what

tempreature will the reaction become spontaneous considering

 $\Delta H$  and `DeltaS to be constnt over the temperature range?



method :

$$Cr_2O_7^{2-} + Fe^{2+} + H^+ o Cr^{3+} + Fe^{3+} + H_2O$$

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**31.** Balance the following chemical equation by ion by oxidation number of method : NaNO \_ 3 + Zn + NaOH  $\rightarrow$  NH \_ 3+ Na

$$_2ZNO_2$$
+ H  $_2O$ .



**32.** What is the oxidation number of S in  $S_8$ ?

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<b>33.</b> What is heavy water ?
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**34.** With balanced chemichal equation , give an example of reducing property of H  $\_~2O_2.$ 



**35.** Show two canonicals of benzene by drawing . Benzene is stored in a bottle . Is there existence of the two canonicals in benzene of the bottle ? Answer with reason.

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**36.** Between  $\left(CH_3
ight)_3 - C - Cl$ and  $CH_3 - Cl$  which compound

undegoes heterolystic fission readily in water? Why?

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**37.** State law of mass action.

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38. What is buffer solutio? Give one example of acidic buffer. In

which case of acidic buffer pH = pKa.



**39.** If the concentration of ammonia and ammonium chloride in a buffer solution of ammonia-ammonium chloride are 0.2 M and 0.3 M respectively , determine the pH of the buffer solution.

(Given :  $K_p(NH_3) = 1.76 \times 10^{-5}$ )

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**40.** Determine the pH of 0.1 M acetic acid solution . ( $pK_a$  of acetic acid is 4.75) Is there any  $OH^-$  ion present in this solution of acetic acid ? Answer with reason .

**41.** Why does dissociation rate  $H_2S$  is decreased in presence of

HCL in aqueous solutio?

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**42.** CO is more toxic than  $CO_2$  because



**43.** Write with balanced chemical equation . what happens when aluminium is heated with concentrated aquous solution of cautstic potash.



44. Write the mechanisum of the following reaction :

 $CH_4+Cl_2 \ {Diffused \over Sunlight} \ CH_3Cl+HCl$ 

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1. Total number of lone pair of electrons in  $I_3^{\,-}$  ion is -

A. 9

- B. 12
- C. 3
- D. 6

#### Answer:



**2.** Which of the following salts is the most basic in aqueous solution ?

A.  $FeCl_3$ 

B.  $Pb(CH_3COO)_2$ 

 $\mathsf{C}. Al(CN)_3$ 

D.  $CH_3COOK$ 

#### Answer:

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**3.** An alkali is titrated against an acid with methyl orange as indicator, which of the following is a correct combination ?

A.	Base	Acid	End point
	Weak	Strong	Yellow to pinkish red
B.	Base	Acid	End point
	Strong	Strong	Pink to colourless
C.	Base	Acid	End point
	Weak	Strong	Colourless to pink
D.	Base	Acid	End point
	Strong	Strong	Pinkish red to yellow



**4.** The ratio of mass percent of C and H of an organic compound  $(C_X H_Y O_Z)$  is 6 : 1. If one molecule of the above compound  $(C_X H_Y O_Z)$  contains half as much oxygen as required to burn one molecule of compound  $C_X H_Y$  completely to  $CO_2$  and  $H_2O$ . The empirical formula of compound  $C_X H_Y O_Z$  is -

A.  $C_3H_4O_2$ 

 $\mathsf{B.}\, C_2 H_4 O_3$ 

 $\mathsf{C.}\,C_3H_6O_3$ 

D.  $C_2H_4O$ 

#### Answer:



5. Hydrogen peroxide oxidises  $[Fe(CN)_6]^{4-}$  to  $[Fe(CN)_6]^{3-}$ in acidic medium but reduces  $[Fe(CN)_6]^{3-}$  to  $[Fe(CN)_6]^{4-}$  in alkaline medium. The other products formed are, respectively -

A. 
$$H_2O$$
 and  $(H_2O+O_2)$ 

B. 
$$H_2O$$
 and  $ig(H_2O+OH^{\,-}ig)$ 

C.  $(H_2O+O_2)$  and  $H_2O$ 

D.  $(H_2O+O_2)$  and  $\left(H_2O+OH^{\,-}
ight)$ 

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**6.** An aqueous solution contains an unknown concentration of  $Ba^{2+}$ . When 50 mL of 1 M solution of  $Na_2SO_4$  is added,  $BaSO_4$  just begins to precipitate. The final volume is 500 mL. The solubility product of  $BaSO_4$  is  $1 \times 10^{-10}$ . what is the original concentration of  $Ba^{2+}$ ?

A. 
$$1.1 imes 10^{-9}M$$

 $\mathsf{B}.\, 1.0 \times 10^{-10} M$ 

 ${\sf C}.\,5 imes 10^{-9}M$ 

D.  $2 imes 10^{-9}$  M

Answer:



**7.** Which of the following compounds will be suitable for Kjedahl's method of nitrogen estimation-



#### Answer:



**8.** When metal 'M' is treated with NaOH , a white gelatinous precipitate 'X' is obtained , which is soluble in excess of NaOH .

Compound 'X' when heated strongly gives an oxide which is used in chromatography as an adsorbent . The metal 'M' is -

B. Fe

A. Al

C. Zn

D. Ca

#### Answer:

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**9.** An aqueous solution contains  $0.10MH_2S$  and 0.20MHCl. If the equilibrium constants for the formation of  $HS^-$  from  $H_2S$  is  $1.0 \times 10^{-7}$  and that of  $S^{2-}$  from  $HS^-$  ions is  $1.2 \times 10^{-13}$  then the concentration of  $S^{2-}$  ions in aqueous solution is - A.  $6 imes 10^{-21}$ B.  $5 imes 10^{-19}$ C.  $5 imes 10^{-8}$ 

D.  $3 imes 10^{-20}$ 

Answer:

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10. The oxidation states of Cr in  $[Cr(H_2O)_6]Cl_3$ ,  $[Cr(C_6H_6)_2]$ and  $K_2[Cr(CN)_2(O)_2(O_2)(NH_3)]$  respectively are -

 $\mathsf{A}.+3$  , 0 and +6

 $\mathsf{B.}+3, \ \mathsf{0} \ \mathsf{and}+4$ 

 $\mathsf{C.}+3,\ +4 \text{ and }+6$ 

 $\mathsf{D.}+3,\ +2 \, \mathsf{and}+4$ 

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11. The combustion of benzene (I) gives  $CO_2(g)$  and  $H_2O(l)$ . Given that heat of combustion of benzene at constant volume is  $-3263.9kJ \cdot mol^{-1}$  at  $25^{\circ}C$ , heat of combustion ( in  $kJ \cdot mol^{-1}$ ) of benzene at constant pressure will be - $(R = 8.314J \cdot K^{-1} \cdot mol^{-1})$ 

A. 3260

B. - 3267.6

C.4152.6

 $\mathsf{D.}-452.46$ 

Answer:



12. Which of the following are Lewis acids ?

A.  $PH_3$  and  $SiCl_4$ 

B.  $BCl_3$  and  $AlCl_3$ 

C.  $PH_3$  and  $BCl_3$ 

D.  $AlCl_3$  and  $SiCl_4$ 

#### Answer:

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**13.** Which of the following compounds contain (s) no covalent bond (s) ? KCl,  $PH_3$ ,  $O_2$ ,  $B_2H_6$ ,  $H_2SO_4$ 

B. KCl,  $B_2H_6$ 

 $\mathsf{C}.\,KCl,\,B_2H_6,\,PH_3$ 

D. KCl,  $H_2SO_4$ 

#### Answer:



**14.** According to molecular orbital theory , which of the following will not be a viable molecule ?

A.  $H_2^-$ B.  $H_2^{2-}$ C.  $He_2^{2+}$ 

D.  $He_2^+$ 

Answer:
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<b>1.</b> Which one of the following elements is unable to form $MF_6^{3-}$ ion ?
А. В
B. Al
C. Ga
D. In

**2.** A mixture of 2.3 g formic acid and 4.5 g oxalic acid is treated with conc.  $H_2SO_4$ . The evolved gaseous mixture is passed through KOH pellets. Weight (in g) of the remaining product at STP will be -

A. 2.8

B. 3.0

C. 1.4

 $\mathsf{D.}\,4.4$ 

Answer:



3. Which of the following oxides is most acidic in nature ?

A. BaO

B. BeO

C. MgO

D. CaO

Answer:

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**4.** Which of the following molecules represents the order of hybridisation  $sp^2$ ,  $sp^2$ , sp, sp from left to right atoms ?

A.  $CH_2 = CH - CH = CH_2$ 

 $\mathsf{B.}\,CH_2=CH-C\equiv CH$ 

 $\mathsf{C}.\,HC\equiv C-C\equiv CH$ 

 $\mathsf{D}.\,CH_3-CH=CH-CH_3$ 



5. Which of the following is correct with respect to -1 effect of the substituents ? (R = alkyl)

A. 
$$-NH_2 > -OR > -F$$

$$\mathsf{B}.-NR_2 < -OR < -F$$

$${\sf C.}-NH_2<\ -OR<\ -F$$

D. 
$$-NR_2 > -OR > -F$$

#### Answer:

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6. In which case is the number of molecules of water maximum ?

A. 0.00224 L of water vapours at 1 atm and 273 K

B. 0.18 g of water

C. 18 mL of water

D.  $10^{-3}$  mol of water

#### Answer:



7. Give van der Waals constant for  $NH_3$ ,  $H_2$ ,  $O_2$  and  $CO_2$  are respectively 4.17, 0.244, 1.36 and 3.59, which one of the following gases is most easily liquefied ?

 $\mathsf{B}.\,H_2$ 

 $\mathsf{C}.NH_3$ 

D.  $CO_2$ 

#### Answer:



8. The solubility of  $BaSO_4$  in water is  $2.42 \times 10^{-3}g \cdot L^{-1}$  at 298 K. The value of its solubility product  $(K_{sp})$  will be (Given molar mass of  $BaSO_4 = 233g \cdot mol^{-1}$ )

A. 
$$1.08 imes 10^{-14} mol^2 \cdot L^{-2}$$
  
B.  $1.08 imes 10^{-12} mol^2 \cdot L^{-2}$   
C.  $1.08 imes 10^{-10} mol^2 \cdot L^{-2}$   
D.  $1.08 imes 10^{-8} mol^2 \cdot L^{-2}$ 



9. Following solutions were prepared by mixing different volumes

of NaOH and HCl of different concentrations :

(i) 60 mL (M/10 HCl) + 40 mL (M/10) NaOH

(ii) 55mL (M /10 ) HCl + 45 mL ( M/10) NaOH

(iii) 75 mL (M/5) HCl + 25 mL (M/5) NaOH

(iv) 100 mL (M/10) HCl + 100 mL (M/10) NaOH

pH of which one of them will be equal to 1?

A. (iv)

B. (i)

C. (ii)

D. (iii)

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**10.** Which oxide of nitrogen is not a common pollutant introduced into the atmosphere both due to natural and human activity ?

- A.  $N_2O$
- $\mathsf{B.}\,NO_2$
- $\mathsf{C.}\,N_2O_5$
- $\mathsf{D}.\,NO$

### Answer:



11. Consider the following species  $:CN^{\,+}\,,\,CN^{\,-}\,,\,NO$  and CN

Which one of the these will have the highest bond order ?

A.  $CN^+$ 

B.  $CN^{-}$ 

 $\mathsf{C}.\,NO$ 

 $\mathsf{D.}\, CN$ 

#### Answer:



12. For the redox reaction the correct coefficients of the reactants

for the balanced equation are -

$$MnO_4^- + C_2O_4^{2-} + H^+ \to Mn^{2+} + CO_2 + H_2O_3$$

A. 
$${MnO_4^- \ \ C_2O_4^{2-} \ \ H^+ \over 2 \ \ 16 \ \ 5}$$

В.	$MnO_4^{-}$	$C_2 O_4^{2-}$	$H^{+}$
	2	5	16
c	$MnO_4^{-}$	$C_2 O_4^{2-}$	$H^{+}$
C.	16	5	2
D.	$MnO_4^{-}$	$C_2 O_4^{2-}$	$H^{+}$
	5	16	2



**13.** Which one of the following conditions will favour maximum formation of the product in the reaction ,

$$A_2(g)+B_2(g) \Leftrightarrow X_2(g), \Delta_r H=\ -\ xkJ?$$

A. High temperature and high pressure

B. Low temperature and low pressure

C. Low temperature and high pressure

D. High temperature and low pressure

### Answer: C



14. The bond dissociation energies of  $X_2, Y_2$  and XY are in the ratio of  $1: 0.5: 1 \cdot \Delta H$  for the formation of XY is  $-200kJ \cdot mol^{-1}$ . The bond dissociation energy of  $X_2$  is -

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A. 800kJ \cdot mol^{-1}
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B. 100  $kJ \cdot mol^{-1}$ 

C. 200  $kJ \cdot mol^{-1}$ 

D. 400  $kJ \cdot mol^{-1}$ 

Answer:



**15.** The correction factor 'a' to the ideal gas equation corresponds

to -

A. electric field present between the gas molecules

B. volume of the gas molecules

C. density of the gas molecules

D. forces of attraction between the gas molecules

#### Answer:



**16.** Magnesium reacts with an element (X) to form an ionic compound . If the ground state electronic configuration of (X) is  $1s^22s^22p^3$ , the simplest formula for this compound is -

A.  $Mg_2X$ 

B.  $MgX_2$ 

 $\mathsf{C}.\, Mg_2X_3$ 

D.  $Mg_3X_2$ 

#### Answer:



17. The correct order of atomic radii in group -13 elements is -

- A.  $B < Ga < Al < Tl < \ln$
- $\mathsf{B}.\,B < Al < Ga < \ln < Tl$
- $\mathsf{C}.\,B < Al < \ln < Ga < Tl$
- D.  $B < Ga < Al < \ln < Tl$

#### Answer:



18. Among  $CaH_2, BeH_2, BaH_2$  , order of ionic character is -

A.  $BeH_2 < BaH_2 < CaH_2$ 

 $\mathsf{B.}\, CaH_2 < BeH_2 < BaH_2$ 

C.  $BeH_2 < CaH_2 < BaH_2$ 

D.  $BaH_2 < BeH_2 < CaH_2$ 

#### Answer:

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