

## CHEMISTRY

### BOOKS - CHHAYA CHEMISTRY (BENGALI ENGLISH)

### PREVIOUS YEAR QUESTION PAPER 2019

#### Wbchse 2019 Section I

1. If radius of hydrogen atom is  $0.53 \text{ \AA}$ , then radius of  ${}_3\text{Li}^{2+}$  ion will be approximately -

A.  $0.99 \text{ \AA}$

B.  $0.17 \text{ \AA}$

C.  $1.27 \text{ \AA}$

D.  $0.53 \text{ \AA}$

**Answer:**



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2. In the compound  $CH_3 - CH = C = CH - CH_3$ ,

hybridization of  $C_2$  and  $C_3$  carbons respectively are -

A.  $sp^2 sp^2$

B.  $sp, sp^3$

C.  $sp, sp$

D.  $sp^2$ ,  $sp$

**Answer:**



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3. At which temperature surface tension of a liquid becomes zero ?

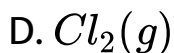
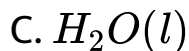
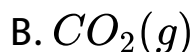
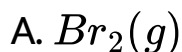
- A. At critical temperature
- B. At absolute zero temperature
- C. Above critical temperature
- D. Above absolute zero temperature

**Answer:**



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4. In which of the following standard enthalpy of formation  $(\Delta H_f^0)$  is zero ?

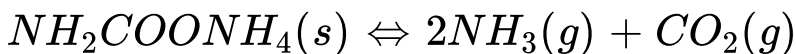


**Answer:**



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5. For the following reaction :

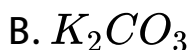
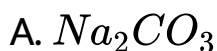


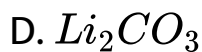
If the total pressure of the system at equilibrium is 3 atm , then the value of  $K_p$  will be -



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6. Thermal stability of which of the following carbonate compounds is the lowest ?



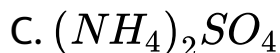


**Answer:**



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7. In the first step Kjeldahl method for estimation of nitrogen in organic compounds , nitrogen is converted into -



D.  $\text{NO}_2$

**Answer:**



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8. Which of the following alkanes when mixed with chlorine in 1:1 ratio and then reacted with ultraviolet radiation , produces only one chlorine - substituted compound ?

A. Propane

B. Pentane

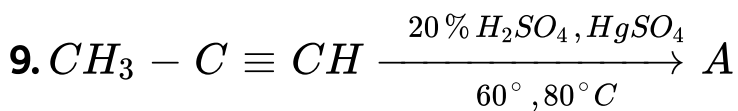
C. Isopentane

D. Neopentane

Answer:



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The compound A produced in the above reaction is

A. propanol

B. propanone

C. propanal

D. propan-2-ol



**Answer:**



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**10.** Which of the following elements , present in the ink of newspaper is harmful for human body ?

A. Hg

B. Pb

C. Ca

D. Ni

**Answer:**



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## Wbchse 2019 Section II

1. How many hydrogen atoms are present in 32 amu of methane ?



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2. What is the equivalent weight of sulphate radical ?



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3. Arrange in the ascending order of first ionisation potential : Na , Mg , Al , Si



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4. Write down the general electronic configuration of transition elements .



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5. Give examples of two such processes where change in entropy is zero .



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6. What happens when methane is heat at  $1000^{\circ}C$  ?



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7. Equivalent weights of two metals A and B are same , but atomic mass of A is 1.5 times of that of B . How can you explain this ?



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8. If the ratio of masses of  $CH_4$  and  $N_2$  in a gaseous mixture is 1:4 then what will be the ratio of number

of molecules of them in the mixture ?



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9. Find out the wavelength of the second Balmer line of  $He^+$  ion .



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10. How can straight chain silicone be produced from dimethyl silicon chloride ? Write with reaction involved .



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11. Although borane always exists as a dimer but the dimer is also a compound with a typical structure . Explain .



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12. Why the compound  $CH_3CN$  can act both as nucleophile and electrophile ?



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13. Which one is more acidic between acetic acid and monochloroacetic and why ?



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14. What do you mean by biodegradation ?



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15. How do detergents pollute water ?



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16. Establish the mathematical expression of de Broglie wavelength about dual nature of electrons .



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17. What is the number of nodes in 3d orbitals ?



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18. Prove with help of postulate of Bohr's theory that the velocity of an electron revolving in the first orbit of a hydrogen- like atom or ion is double of that revolving in the second orbit .



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19. What is number of unpaired electrons in  $V^{3+}$  ion ?



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20. What is the cause of Lanthanide contraction.



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21. Why is Cu a transition element but Zn is not although both of them are d-block elements ?



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22. Why does  $He_2$  molecule never form ?



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23. Why does ice float on water ?



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24. Which one has greater bond angle between  $Cl_2O$  and  $F_2O$  and why ?



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25. Why difference in dipole moment is found in cis- and trans- isomers of 1, 2- dichloroethene ?



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26. Find out the ratio of rate of diffusion of  $H_2$  and  $SO_2$  . (S = 32)



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27. Write down the van der Waals' equation for n moles of real gas .



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**28.** For a reaction at constant temperature derive the relation between heat of reaction at constant pressure ( $\Delta H$ ) and heat of reaction at constant volume ( $\Delta U$ ) [considering ideal gas] .



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**29.** At STP if latent heat of fusion of ice is  $6kJ \cdot mol^{-1}$  , then find out the entropy change of fusion of ice .



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**30.** Discuss the conditions for spontaneity of a process .



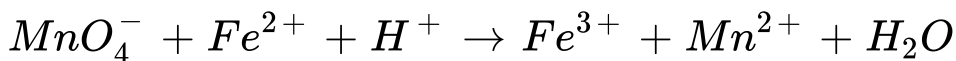
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**31.** Show by an example that the ratio of two extensive property is always an intensive property .



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**32.** Balance by ion- electron method :



If atomic masses of K and Mn are 39 and 55

respectively , then according to the above reaction what will be equivalent weight of  $KMnO_4$  ?



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33. Indicate the oxidation numbers of two N atoms of  $NH_4NO_3$  .



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34. Why paste of  $BaO_2$  is used in laboratory preparation of  $H_2O_2$  ?



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**35.** What do you mean by interstitial hydride ?



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**36.** Which hydroxide of an alkaline earth metal is present in bordeaux mixture ?




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**37.** Among the alkali metals why all other metals except Li and Na can form super oxides ?



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38. Which one between  $CH_2 = CH - \overset{+}{C}H_2$  and  ions is more stable and why ?



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39. What do you mean by resonance energy ?



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40. Discuss the reaction mechanisms with differences in them when  $CH_3Cl$  and  $(CH_3)_3CCl$  are separately reacted with aqueous  $NaOH$  .



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41.  $PCl_5(g) \rightleftharpoons PCl_3(g) + Cl_2(g)$  - What effects on equilibrium of the reaction will be observed when (a) chlorine gas and (b) nitrogen gas are added separately at constant pressure and constant volume at equilibrium at a constant temperature ?



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42. During preparation of table salt , HCl gas is passed through sea water after evaporation to a particular concentration . Explain the phenomenon .



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**43.** State Ostwald's dilution law and establish its mathematical expression .



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**44.** Write down the relation between  $K_p$  and  $K_c$  of the reaction  $H_2(g) + I_2(g) \rightleftharpoons 2HI(g)$



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**45.** What will be the acidic or alkaline nature of aqueous solution of sodium acetate ?



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**46.** Why is borax swelled like a puff when heated



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**47.** How can you identify a copper salt by borax bead test ? Explain the related reactions with chemical equations.



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**48.** Why is it difficult to limit Friedel-Crafts alkylation reaction of benzene to monoalkylation step ?



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**49.** How can you convert ? Chloroform  $\rightarrow$  acetylene



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**50.** How can you convert ? Ethylene  $\rightarrow$  Ethanol



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51. How can you convert ? Benzene  $\rightarrow$  Ethyl benzene



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1. In the equilibrium  $H_2 + I_2 \rightleftharpoons 2HI$  , if at a given temperature the concentration of the reactants are increased , the value of equilibrium constant ,  $K_c$ , will be -

A. Increase

B. Decrease

C. Remain the same

D. Cannot be predicted with certainty

**Answer: C**



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2. Which one of the following electronic arrangement is absurd ?

A.  $n = 3, l = 1, m = -1$

B.  $n = 3, l = 0, m = 0$

C.  $n = 2, l = 0, m = -1$

D.  $n = 2, l = 1, m = 0$

**Answer: C**



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3. The quantity  $h\nu / K_B$  corresponds to -

A. Wavelength

B. Velocity

C. Temperature

D. Angular momentum

**Answer: C**



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4. In the crystalline solid  $MSO_4 \cdot nH_2O$  of molar mass  $250 \text{ g} \cdot \text{mol}^{-1}$ , the percentage of anhydrous salt is 64 by weight. The value of  $n$  is -

A. 2

B. 3

C. 5

D. 7

**Answer: C**



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5. At S.T.P. the volume of 7.5 g of a gas is 5.6 L . The gas is -

A. NO

B.  $N_2O$

C. CO

D.  $CO_2$

**Answer: A**



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6. The second Ionisation Energy of the following elements follows the order -

A.  $Zn > Cd < Hg$

B.  $Zn > Cd > Hg$

C.  $Cd > Hg < Zn$

D.  $Zn < Cd < Hg$

**Answer: A**



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7. The melting points of (i)  $BeCl_2$  (ii)  $CaCl_2$  and (iii)  $HgCl_2$  follows the order -

A.  $i < ii < iii$

B.  $iii < i < ii$

C.  $i < iii < ii$

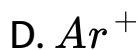
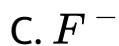
D.  $ii < i < iii$

**Answer: B**



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8. Which of these species will have non -zero magnetic moment ?



**Answer: D**



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9. The first electron affinity of C , N and O will be of the order -

A.  $C < N < O$

B.  $N < C < O$

C.  $C < O < N$

D.  $O < N < C$

**Answer: B**



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10. The H-N-H angle in ammonia is  $107.6^\circ$  , while the H-P-H angle in phosphine is  $93.5^\circ$  . Relative to phosphine , the p- character of the lone pair on ammonia is expected to be -

A. Less

B. More

C. Same

D. Cannot be predicted

**Answer: A**



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11. The conformations of n-butane , commonly known as eclipsed , gauche and anti-conformation can be interconverted by

- A. rotation around C - H bond of a methyl group
- B. rotation around C- H bond of a methylene group
- C. rotation around C1 - C2 linkage
- D. rotation around C2-C3 linkage

**Answer: D**



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12. The correct order of the addition reaction rates of halogen acids with ethylene is -

A. hydrogen chloride > hydrogen bromide > hydrogen iodide

B. hydrogen iodide > hydrogen bromide > hydrogen chloride

C. hydrogen bromide > hydrogen chloride > hydrogen iodide

D. hydrogen iodide > hydrogen chloride > hydrogen bromide

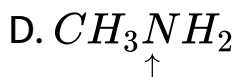
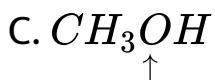
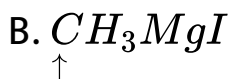
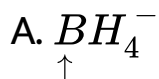
**Answer: B**





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13. The indicated atom is not a nucleophilic site in -

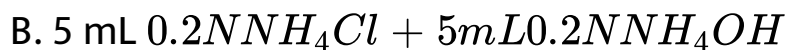


Answer: A

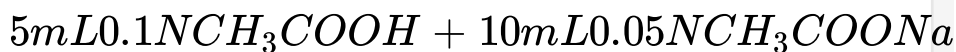


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14. Which of the following mixtures will have the lowest pH at 298 K ?



C.



Answer: C



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15. For the equilibrium  $H_2O(l) \rightleftharpoons H_2O(v)$  , which of the following is correct ?

A.  $\Delta G = 0, \Delta H < 0, \Delta S < 0$

B.  $\Delta G < 0, \Delta H > 0, \Delta S > 0$

C.  $\Delta G > 0, \Delta H = 0, \Delta S > 0$

D.  $\Delta G = 0, \Delta H > 0, \Delta S > 0$

**Answer: D**



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16. For a van der Waal's gas , the term  $\left( \frac{ab}{\sqrt{2}} \right)$  represents some -

- A. Pressure
- B. Energy
- C. Critical density
- D. Molar mass

**Answer: B**



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17. At constant pressure , the heat of formation of a compound is not dependent on temperature , when -

A.  $\Delta C_P = 0$

B.  $\Delta C_V = 0$

C.  $\Delta C_P > 0$

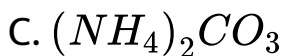
D.  $\Delta C_P < 0$

**Answer: A**



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18. Which of the following chemicals may be used to identify three unlabelled beakers containing conc. NaOH , conc.  $H_2SO_4$  and water ?



**Answer: A::C**



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