परीक्षेचा दिनांक - ३ जे, २०१४

A

2014 CODE : W

प्रश्नपुस्तिका क्रमांक
BOOKLET NO.

प्रश्नपुस्तिका
चाळणी परीक्षा

एकूण प्रश्न : 80

वेळ : 3 (तीन) तास

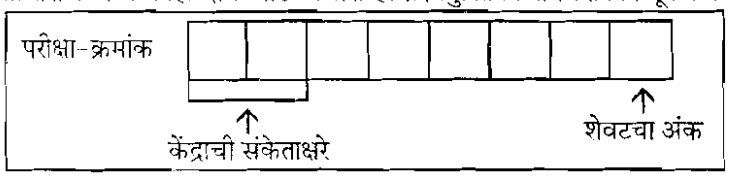
रसायन शास्त्र

एकूण गुण : 200

सूचना

(1) सदर प्रश्नपुस्तिकेत 80 अनिवार्य प्रश्न आहेत. उमेदवारांनी प्रश्नांची उत्तरे लिहिण्यास सुरुवात करण्यापूर्वी या प्रश्नपुस्तिकेत सर्व प्रश्न आहेत किंवा नाहीत याची खात्री करून घ्यावी. असा तसेच अन्य काही दोष आढळल्यास ही प्रश्नपुस्तिका समवेक्षकांकडून लगेच बदलून घ्यावी.

(2) आपला परीक्षा-क्रमांक ह्या चौकोनांत **न विसरता बॉलपेनने** लिहावा.



(3) वर छापलेला प्रश्नपुस्तिका क्रमांक तुमच्या उत्तरपत्रिकेवर विशिष्ट जागी उत्तरपत्रिकेवरील सूचनेप्रमाणे **न विसरता नमूद करावा.**

(4) या प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाला 4 पर्यायी उत्तरे सुचविली असून त्यांना 1, 2, 3 आणि 4 असे क्रमांक दिलेले आहेत. त्या चार उत्तरांपैकी सर्वात योग्य उत्तराचा क्रमांक उत्तरपत्रिकेवरील सूचनेप्रमाणे तुमच्या उत्तरपत्रिकेवर नमूद करावा. अशा प्रकारे उत्तरपत्रिकेवर उत्तरक्रमांक नमूद करताना तो संबंधित प्रश्नक्रमांकासमोर छायांकित करून दर्शविला जाईल याची काळजी घ्यावी. **ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.**

(5) सर्व प्रश्नांना समान गुण आहेत. यास्तव सर्व प्रश्नांची उत्तरे द्यावीत. घाईमुळे चुका होणार नाहीत याची दक्षता घेऊनच शक्य तितक्या वेगाने प्रश्न सोडवावेत. क्रमाने प्रश्न सोडविणे श्रेयस्कर आहे पण **एखादा प्रश्न कठीण वाटल्यास त्यावर वेळ न घालविता पुढील प्रश्नाकडे वळावे.** अशा प्रकारे शेवटच्या प्रश्नापर्यंत पोहोचल्यानंतर वेळ शिल्लक राहिल्यास कठीण म्हणून वगळलेल्या प्रश्नांकडे परतणे सोईस्कर ठरेल.

(6) उत्तरपत्रिकेत एकदा नमूद केलेले उत्तर खोडता येणार नाही. नमूद केलेले उत्तर खोडून नव्याने उत्तर दिल्यास ते तपासले जाणार नाही.

(7) **प्रस्तुत परीक्षेच्या उत्तरपत्रिकांचे मूल्यांकन करताना उमेदवाराच्या उत्तरपत्रिकेतील योग्य उत्तरांनाच गुण दिले जातील. तसेच "उमेदवाराने वस्तुनिष्ठ बहुपर्यायी स्वरूपाच्या प्रश्नांची दिलेल्या चार पर्यायांपैकी सर्वात योग्य उत्तरेच उत्तरपत्रिकेत नमूद करावीत. अन्यथा त्यांच्या उत्तरपत्रिकेत सोडविलेल्या प्रत्येक चार चुकीच्या उत्तरांसाठी एका प्रश्नाचे गुण वजा करण्यात येतील".**

पर्यवेक्षकांच्या सूचनेविना हे सील उघडू नये

SEAL

ताकीद

ह्या प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपेपर्यंत ही प्रश्नपुस्तिका आयोगाची मालमत्ता असून ती परीक्षाकक्षात उमेदवाराला परीक्षेसाठी वापरण्यास देण्यात येत आहे. ही वेळ संपेपर्यंत सदर प्रश्नपुस्तिकेची प्रत/प्रती, किंवा सदर प्रश्नपुस्तिकेतील काही आशय कोणत्याही स्वरूपात प्रत्यक्ष वा अप्रत्यक्षपणे कोणत्याही व्यक्तीस पुरविणे, तसेच प्रसिद्ध करणे हा गुन्हा असून अशी कृती करणाऱ्या व्यक्तीवर शासनाने जारी केलेल्या "परीक्षांमध्ये होणाऱ्या गैरप्रकारांना प्रतिबंध करण्याबाबतचा अधिनियम-82" यातील तरतुदीनुसार तसेच प्रचलित कायद्याच्या तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एक वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.

तसेच ह्या प्रश्नपत्रिकेसाठी विहित केलेली वेळ संपण्याआधी ही प्रश्नपुस्तिका अनधिकृतपणे बाळगणे हा सुद्धा गुन्हा असून तसे करणारी व्यक्ती आयोगाच्या कर्मचारीवृंदापैकी, तसेच परीक्षेच्या पर्यवेक्षकीयवृंदापैकी असली तरीही अशा व्यक्तीविरूद्ध उक्त अधिनियमानुसार कारवाई करण्यात येईल व दोषी व्यक्ती शिक्षेस पात्र होईल.

पुढील सूचना प्रश्नपुस्तिकेच्या अंतिम पृष्ठावर पहा

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

1. When a solution of colloidal particles is placed in an electric field, the colloidal particles w
   (1) show increased zigzag motion (2) migrate
   (3) not migrate (4) dissolve

2. Shape of PCl_5 is :
   (1) square planar (2) square pyramidal
   (3) trigonal bipyramidal (4) distorted octahedral

3. What is the mass (in grams) of 1 atom of carbon ?
   (1) 1×10^{-2} g atom^{-1} (2) 1.99×10^{-23} g atom^{-1}
   (3) 1.99×10^{-24} g atom^{-1} (4) 1.99×10^{-27} g atom^{-1}

4. Most of the transitional elements are coloured in solution or crystal form while Zn^{+2} solution is not coloured because :
   (1) There is no vacant d orbital in Zn
   (2) Zinc has higher atomic number
   (3) Zinc has higher atomic weight
   (4) Zinc has less electrode potential

5. Boranes are :
   (1) oxides of borane (2) hydrides of borane
   (3) oxyacids of borane (4) halides of boron

6. What will be the major product when ethyl propyl amine is reacted with excess of methyl iodide and moist Ag_2O and the product thus formed is heated strongly ?
   (1) Ethane (2) Ethene (3) Propane (4) Propene

7. Which of the following ions can be tested with dimethyl glyoxime ?
   (1) Mn^{+2} (2) Co^{+2} (3) Ni^{+2} (4) Mg^{+2}

8. Which of the following conditions would predict a process that is always spontaneous ?
   (1) $\Delta H = +$, $\Delta S = +$ (2) $\Delta H = +$, $\Delta S = -$
   (3) $\Delta H = -$, $\Delta S = +$ (4) $\Delta H = -$, $\Delta S = -$

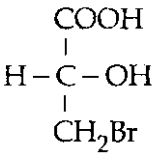
9. Peroxymonosulphuric acid or Caro's acid has the formula :
   (1) H_2SO_5 (2) $H_2S_2O_8$ (3) $H_2S_2O_7$ (4) $H_2S_2O_6$

10. A neutral atom of an element E has 15 electrons. Its approx. atomic weight ; atomic number ; total number of s electrons and the empirical formula of the binary compound it forms with sodium is :
   (1) 30 amu; 15; 6; Na_3E (2) 20 amu; 10; 5; NaE_2
   (3) 40 amu; 20; 6; NaE_3 (4) None of the above

SPACE FOR ROUGH WORK

P.T.O.

11. Give the absolute configuration of :



(1) L (2) D (3) R (4) S

12. When an α-particle is emitted, the daughter element gets displaced by _____ group/ groups _____ in periodic table.

(1) one, left (2) two, right (3) two, left (4) four, left

13. In the gas phase reaction :

$F_2 + Cl_2 \rightarrow 2FCl$

rate of reaction is double when the conc. of Cl_2 is double and rate of the reaction becomes four times when conc. of Cl_2 and F_2 is doubled.

What is the order of the reaction ?

(1) 1 (2) 2 (3) 3 (4) 4

14. We have oxygen contained in a container. M is the total mass of gas and is equal to 1 gm molecule. R is 0.8315×10^8 ergs. Velocity of gas in terms of absolute temperature (T) will be :

(1) $v = 1.58\sqrt{\frac{T}{M}} \times 10^4$ cms/sec.

(2) $v = 0.8315\sqrt{\frac{T}{M}} \times 10^4$ cms/sec.

(3) $v = 1.58 \times \sqrt{\frac{T}{M}}$ cms/sec.

(4) $v = \frac{1.58}{0.8315} \times \sqrt{\frac{T}{M}} \times 10^4$ cms/sec.

15. The decrease in energy or increase in wavelength of X-rays after scattering from the surface of an object is known as :

(1) Compton effect (2) Photoelectric effect

(3) Zeeman effect (4) None of these

16. The possible dipole moment of CH_4 is :

(1) 0 D (2) 1.0 D (3) 0.86 D (4) 1.86 D

SPACE FOR ROUGH WORK

17. The degree of hydrolysis of sodium acetate is 2×10^{-4} in 0.01 M solution. The hydroly constant of acetate ions is :
(1) 2×10^{-6} (2) 2×10^{-2} (3) 2×10^{-10} (4) 4×10^{-10}

18. A liquid boils at 325°A and 1.0 atm pressure. Calculate :
(i) Change in free energy, ΔG
(ii) ΔS, entropy change.
Latent heat of evapouration = 11200 cal/mole.
(1) $\Delta G = 0$; $\Delta S = 34.46$ cal/degree
(2) $\Delta G = 11{,}200$ cal ; $\Delta S = 0$
(3) $\Delta G = 34.46$ cal ; $\Delta S = 11{,}200$ cal
(4) $\Delta G = 0$; $\Delta S = 385.952$ cal/degree

19. Passing of an α – particle straight through an atom indicates that :
(1) Atom has nucleus
(2) Atom has electrons
(3) Atom has protons
(4) Atom is extraordinarily hollow having a lot of empty space inside.

20. Radius of the Bohr orbit is given by :

(1) $r = \frac{nh}{4\pi^2 me^2}$ (2) $r^2 = \frac{n^2h^2}{4\pi^2 me^2}$

(3) $r = \frac{n^2h^2}{4\pi^2 me^2}$ (4) $r = \frac{nh}{4\pi me}$

21. An example of tridentate ligand is :
(1) Amino (2) Oxalate
(3) Ethylene diamine (4) Tartaremetic

22. The following reaction.
$C_6H_5Br + 2Na + BrC_2H_5 \longrightarrow C_6H_5C_2H_5 + 2\ NaBr$ is known as :
(1) Friedel Crafts reaction (2) Wurtz-fittig reaction
(3) Dakin's reaction (4) Etard reaction

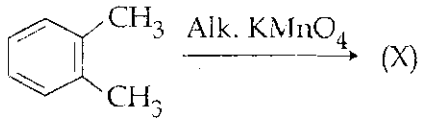
23. Acidity wise the order is :
(1) RCOOH > HOH > ROH > CH ≡ CH > NH_3 > RH.
(2) RCOOH > ROH > CH ≡ CH > HOH > NH_3 > RH.
(3) ROH > RCOOH > HOH > CH ≡ CH > NH_3 > RH.
(4) RCOOH > CH ≡ CH > ROH > NH_3 > HOH > RH.

SPACE FOR ROUGH WORK

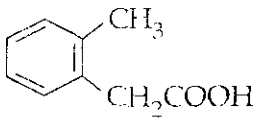
P.T.O.

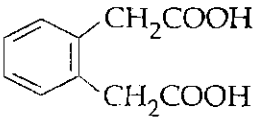
24. (−) Fructose is a 2 Ketohexose is shown by the fact that :
(1) It forms same osazone as D(+) Glucose.
(2) It forms α-methyl caproic acid with HCN hydrolysis and HI.
(3) It gives reaction of a Keto group.
(4) It does not reduce Tollens reagent.

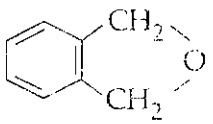
25. What will be the product ?

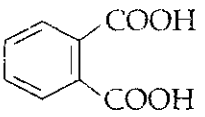


X = :

(1) 

(2) 

(3) 

(4) 

26. An organic compound C_3H_8O (A) gives on oxidation C_3H_6O (B) which on further oxidation with I_2 and caustic soda gives the salt of $C_2H_4O_2$ (C). (B) reacts with ethylmagnesium iodide to give $C_5H_{12}O$ (D). Identify the compound (D) :
(1) $(CH_3)_2CO(CH_3)_2$ (2) $(CH_3)_2COHC_2H_5$
(3) $CH_3(CH_2)_3CH_2OH$ (4) $(CH_3)_3CCH_2OH$

27. Consider a radioactive nuclide with a neutron-proton ratio that is higher than those for the stable isotopes of that element. What mode of decay would be expected to this nuclide ?
(1) $_2He^4$ (2) α − particles
(3) β − emission (4) γ − emission

28. During the electrolysis of $AgNO_3$ by using platinum electrodes, the concentration around the cathode as well as anode falls from 4 to 2. What will happen instead of platinum electrodes silver electrodes are used ?
(1) The fall of concentration around both the electrodes will remain unchanged.
(2) Concentration around the cathode will fall from 4 to 2 but around anode will increase from 4 to 6.
(3) Concentration around the cathode will increase from 4 to 6 but fall around anode from 4 to 2.
(4) Concentration around both the electrodes will increase from 4 to 6.

SPACE FOR ROUGH WORK

29. Decomposition of calcium carbonate ($CaCO_3 \rightleftharpoons CaO + CO_2$) is a three phase system and has three constituents. How many components does it have ?

(1) zero (2) one (3) two (4) three

30. What is the change in internal energy when pressure on 10 g of hydrogen is reduced from 20 to 1 atm at a constant temperature of 273 K. The gas behaves ideally :

(1) $\Delta E = -8180$ calories (2) $\Delta E = 0$

(3) $\Delta E = 8180$ calories (4) None of the above

31. Finely divided metals like Nickel and Platinum are so efficient catalysts because :

(1) These have greater absorbing power

(2) These can react with reactants easily

(3) Change on these is very large

(4) Number of free valencies is increased

32. Predict whether the equilibrium of the photosynthesis reaction,

$6CO_{2(g)} + 6H_2O_{(l)} \rightleftharpoons C_6H_{12}O_{6(s)} + 6O_{2(g)}$ $\Delta H^\circ = 669.62$ Kcal.

Would shift to which side if $[CO_2]$ was increased :

(1) Shift to the right side i.e; product side

(2) Shift to the left side i.e; reactant side

(3) Remain unchanged

(4) Insufficient data

33. In the chair conformation most stable structure is the one in which :

(1) All bulky groups are at axial position

(2) All bulky groups are at equatorial position

(3) Half bulky groups are at axial and half at equatorial position

(4) Most bulky groups should be at axial position

34. Electronegativity of an element generally _____ as we move along a period.

(1) increases (2) decreases

(3) varies irregularly (4) remains constant

35. What is the oxidation number of Cl in ClO_4^- ?

(1) 7 (2) 6 (3) 5 (4) 4

SPACE FOR ROUGH WORK

36. In the following reaction,

$$\begin{matrix}CH_2Cl \\ | \\ COOH\end{matrix} \xrightarrow[KCN]{H_2O} X$$

X = :

(1) $\begin{matrix}CH_2-COOH \\ | \\ CH_2-COOH\end{matrix}$
Succinic acid

(2) $\begin{matrix}CH_2-COOH \\ | \\ COOH\end{matrix}$
Malonic acid

(3) $\begin{matrix}Cl \\ | \\ CH_2 \\ | \\ CHO\end{matrix}$
α-chloro acetaldehyde

(4) Insufficient data

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37. What is the atomic number of the first element in the periodic table having incomplete 3d shell ?

(1) 13 (2) 21 (3) 29 (4) 33

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38. Many salts may be precipitated from aqueous solution by adding alcohol. Select the correct explanation :

(1) Water - alcohol mixtures have lower dielectric constants than that of water alone.
(2) Water - alcohol mixtures have higher dielectric constants than that of water alone.
(3) Salts dissolve less in alcohol.
(4) Alcohol addition precipitates the salts.

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39. What would happen to a reversible reaction at equilibrium when temperature is lowered ? Given that ΔH is $-$ve.

(1) More of the products are formed.
(2) Less of the products are formed.
(3) More of the reactants are formed.
(4) It remains at equilibrium.

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40. Rust is _____.

(1) FeO (2) Fe_2O_3 (3) Fe_3O_4 (4) $Fe(OH)_3$

SPACE FOR ROUGH WORK

41. The reaction

$$CH_3-\overset{H}{\underset{|}{C}}=O + CH_3-\overset{H}{\underset{|}{C}}=O \longrightarrow CH_3-\overset{H}{\underset{|}{\overset{|}{C}}}-\underset{OH}{\underset{|}{}}-CH_2-\overset{H}{\underset{|}{C}}=O$$ is a :

(1) Polymerisation reaction (2) Condensation reaction

(3) Aldol condensation (4) Addition reaction

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42. Which of the following will be paramagnetic ?

(1) $[Mn(PO_4)_2]^{3-}$ (2) $[Co(NH_3)_6]^{3+}$ (3) $[Co(NH_3)_6]^{2+}$ (4) $[Fe(CN)_6]^{4-}$

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43. Which is more covalent AgF or AgBr ?

(1) same (2) AgF (3) AgBr (4) can't say

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44. Applying the law of mass action to the dissociation of Hydrogen iodide,

$H_2 + I_2 \rightleftharpoons 2HI$

we get the following expression,

$$\frac{(a-x)(b-x)}{4x^2} = K$$

where a is original conc. of H_2

b is original conc. of I_2

x is the no. of molecules of H_2 and I_2 reacted with each other.

If the pressure is increased in such a reaction then :

(1) $K = \frac{(a-x)(b-x)}{4x^2}$ (2) $K > \frac{(a-x)(b-x)}{4x^2}$

(3) $K < \frac{(a-x)(b-x)}{4x^2}$ (4) cannot predict

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45. Maximum number of electrons in a subshell are equal to :

(1) $2l + 1$ (2) $2l - 1$ (3) $2(2l + 1)$ (4) $2(2l - 1)$

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46. The following reaction is known by the name of

$$CH_3COCl + H_2 \xrightarrow[Pd/BaSO_4]{Xylene} CH_3CHO + HCl :$$

(1) Stephen's method (2) Hoffmann reaction

(3) Cannizarro reaction (4) Rosenmund's reaction

SPACE FOR ROUGH WORK

P.T.O.

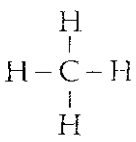
47. The presence of – OH group on the benzene ring causes the new entrant (electrophile) group to attack at – o – or – p – position because :
(1) Electron density at meta position is increased.
(2) Electron density at o – and p – position is increased.
(3) – OH is an electron withdrawing group.
(4) None of the above

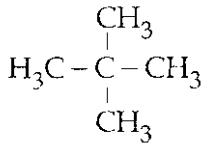
48. If Vant Hoff's factor for dissolution of calcium nitrate in water is 2.5, what will be the degree of dissociation of calcium nitrate ?
(1) 25% (2) 50% (3) 75% (4) 85%

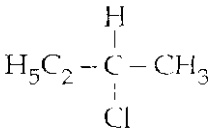
49. NH_3 molecule has a dipole moment of 1.46 D. What will be for NF_3 molecule ?
(1) > 1.46 D (2) < 1.46 D (3) =1.46 D (4) Insufficient data

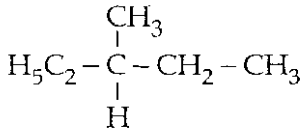
50. The observed mass of $_{26}Fe^{56}$ is 55.9375 amu. Using the mass of proton and neutron 1.00732 amu and 1.00866 amu respectively. The mass defect is :
(1) 0.5126 (2) 0.6126 (3) 0.6226 (4) 0.6136

51. Which of the following compounds has an asymmetric carbon atom ?

(1) 

(2) 

(3) 

(4) 

52. Which of the following structures is expected when d^2sp^3 orbitals are used in bonding ?
(1) Octahedral (2) Square bipyramidal
(3) Square planar (4) Tetrahedral

53. In order to bring a conversion
$RCOOH \longrightarrow RCH_2COOH$, use is made of :
(1) Kilianis synthesis (2) Arndt-Eistert synthesis
(3) Reformatsky reaction (4) Knovenagel reaction

54. The quantum yield, if no. of molecules reacting are 6×10^6 and no. of quantum absorbed is 2×10^7 is :
(1) 0.3 (2) 12×10^{-1} (3) 3.3 (4) 12×10^{-37}

SPACE FOR ROUGH WORK

55. Calculate the amount of work obtained in the isothermal reversible expansion of 20 gm of Argon at 27°C from a pressure of 4 atmosphere to 1 atm :

(1) 17.08 litre - atm (2) 34.16 litre - atm
(3) 24.08 litre - atm (4) 42.07 litre - atm

---

56. Which of the following configurations account for the tetravalency of carbon ?

(1) $1s^2, 2s^2, 2px^1, 2py^1$ (2) $1s^2, 2s^2, 2px^2$
(3) $1s^2, 2s^2, 2pz^2$ (4) $1s^2, 2s^1, 2px^1, 2py^1, 2pz^1$

---

57. In the reaction,

$$\begin{matrix}CHO \\ | \\ CHO\end{matrix} \xrightarrow[(ii)\ H_2O]{(i)\ HCN} A$$

A is :

(1) Citric acid (2) Tartaric acid (3) Succinic acid (4) Malonic acid

---

58. In the case of a reaction

$2HI \rightarrow H_2 + I_2$ at 556 K containing 1 mole of reactant per litre, the total number of molecules colliding per cubic centimetre per second is 6×10^{31}. The fraction of these molecules which are activated is 3×10^{-18}. Find out the value for the specific rate (k) of the reaction.

(1) 2×10^{49} molecules/cubic cm/sec.
(2) 18×10^{13} molecules/cubic cm/sec.
(3) 0.5×10^{-49} molecules/cubic cm/sec.
(4) 1.8×10^{13} molecules/cubic cm/sec.

---

59. Ostwald process is for the manufacture of :

(1) Nitric acid (2) Sulphuric acid (3) Ammonia (4) Ozone

---

60. Maleic acid and fumaric acids are :

(1) Positional isomers (2) Functional isomers
(3) Geometrical isomers (4) Metamers

---

61. Which of the two carbonium ions is more stable ?

Allyl carbonium ion, $CH_2 = CH - \overset{(+)}{C}H_2$

and

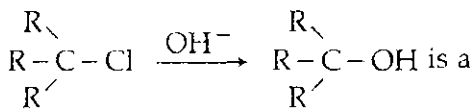
Propyl carbonium ion, $CH_3 - CH_2 - \overset{(+)}{C}H_2$

(1) Both are equally stable (2) Allyl is more stable
(3) Propyl is more stable (4) Can't say

SPACE FOR ROUGH WORK

P.T.O.

62. Conversion of tertiary alkyl halide into a tertiary alcohol by substitution of OH group by Cl atom,



(1) SN_1 mechanism (2) SN_2 mechanism (3) E_1 mechanism (4) E_2 mechanism

63. Select the most proper order in terms of inductive effect :

(1) $CH_3 -> CH_3CH_2 - (CH_3)_2CH - (CH_3)_3C -$

(2) $(CH_3)_3C -> (CH_3)_2CH -> CH_3CH_2 -> CH_3 -$

(3) $(CH_3)_2CH -> (CH_3)_3C -> CH_3CH_2 -> CH_3 -$

(4) $(CH_3)_3C -> (CH_3)_2CH -> CH_3 -> CH_3CH_2 -$

64. An organic compound (X) (vapour density = 37.5) contains C (32%) ; H (6.66%) ; N (18.67%) and O (42.67%).

(X), on reduction, gave a primary amine (Y) which on treatment with HNO_2, gave C_2H_5OH. Assign the structures of (X) and (Y) :

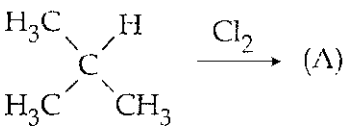
(1) $X = C_2H_5NH_2$; $Y = C_2H_5NO_2$

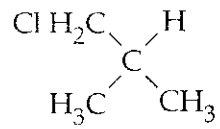
(2) $X = C_2H_5NO_2$; $Y = C_2H_5NH_2$

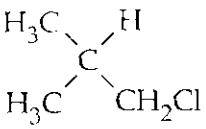
(3) $X = (CH_3)_2NO_2$; $Y = (CH_3)_2NH_2$

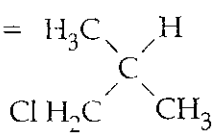
(4) $X = (CH_3)_2NH_2$; $Y = (CH_3)_2NO_2$

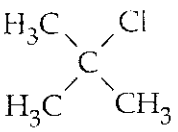
65. In the reaction :



(1) A = 

(2) A = 

(3) A = 

(4) A = 

66. Which of the following will not form hydrogen bond ?

(1) Nitrogen (2) Fluorine (3) Chlorine (4) Oxygen

SPACE FOR ROUGH WORK

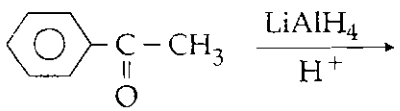
67. Which of the following orders will suit the precipitating action of cations Na^+, Mg^{++}, A on As_2S_3 solution ?

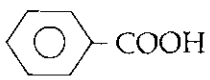
(1) $Na^+ > Mg^{++} > Al^{+++}$ (2) $Mg^{++} > Na^+ > Al^{+++}$

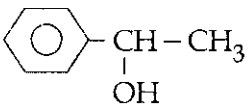
(3) $Al^{+++} > Mg^{++} > Na^+$ (4) $Na^+ > Al^{+++} > Mg^{++}$

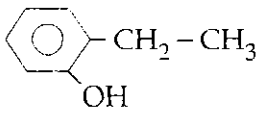
---

68. What will be the product of the reaction ?



(1) 

(2) 

(3) 

(4) None of these

---

69. Calculate the frequency of the spectral line corresponding to an electron jump from the second orbit to the first orbit in the hydrogen atom :

Rydberg constant $= 109677.6\ cm^{-1}$

(1) 3.298×10^{15} vibrations.sec^{-1}

(2) 4.67×10^{15} vibrations/sec

(3) 2.475×10^{15} vibrations/sec

(4) 4.275×10^{15} vibrations.sec^{-1}

---

70. Consider the following series of steps in making a cup of instant coffee :

(a) An aluminium kettle containing water is heated over a stove until it whistles

(b) The hot water is poured into a cup containing instant coffee

(c) Two lumps of sugar are added

(d) A chip of ice is added to cool the coffee

Excluding the kettle and cup, identify the number of phases in each step :

(1) 2, 1, 1, 1 (2) 1, 2, 1, 1 (3) 2, 2, 1, 1 (4) 1, 1, 1, 1

---

71. What atom is formed as a product of the radioactive decay of an atom of $^{226}_{88}Ra$ by α - particle emission ?

(1) $^{222}_{86}Rn$ (2) $^{222}_{83}Bi$ (3) $^{1197}_{79}Au$ (4) $^{226}_{86}Rn$

SPACE FOR ROUGH WORK

P.T.O.

72. For the combustion of 1 mole of a liquid benzene at 25°C, the heat of reaction at c pressure is given by :

$$C_6H_{6(l)} + 7\frac{1}{2}O_{2(g)} \rightarrow 6\ CO_{2(g)} + 3\ H_2O_{(l)}\ ;\ \Delta H = -780{,}980 \text{ calories}$$

What would be the heat of reaction at constant volume ?

(1) −780,090 calories (2) −790,090 calories

(3) 800,000 calories (4) −390,045 calories

---

73. Although Kr and HBr molecules have 36 electrons each, the normal boiling point of Kr is 121 K whereas that of HBr is 206 K. The large difference in the boiling point is because :

(1) Polar HBr molecules are attracted to each other by Vander Waal's forces as well as dipole forces whereas in Kr molecules there are only Vander Waal's forces of attraction.

(2) HBr molecules have covalent bonds while Kr molecules have ionic bonds only.

(3) In polar HBr molecules there are Vander Waal's forces as well as dipole - dipole interactions whereas in Kr there are only dipole - dipole interaction.

(4) None of these

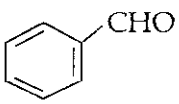
---

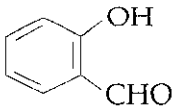
74. If the Vander Waal's radius of $H_2 = 1.2$ Å then, the minimum distance between two H atoms at which they can approach is :

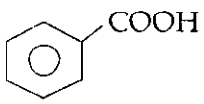
(1) 1.2 Å (2) 2.4 Å (3) 3.6 Å (4) 0.6 Å

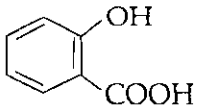
---

75. When phenol is heated with chloroform and alkali we get :

(1) 

(2) 

(3) 

(4) 

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76. Which amongst the following represents the decreasing order of strength of acids ?

(1) $CH_3COOH > ClCH_2COOH > Cl_2CHCOOH > Cl_3CCOOH$

(2) $ClCH_2COOH > Cl_2CHCOOH > CH_3COOH > Cl_3CCOOH$

(3) $Cl_3CCOOH > Cl_2CHCOOH > ClCH_2COOH > CH_3COOH$

(4) $Cl_3CCOOH > Cl_2CHCOOH > CH_3COOH > ClCH_2COOH$

---

77. How many moles of Carbon dioxide are produced by complete combustion of 100 gm of Carbon monoxide ?

(1) 7.0 moles (2) 4.57 moles (3) 3.57 moles (4) 2.0 moles

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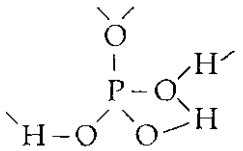
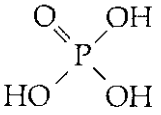
78. The molecular orbital formed by two atomic orbitals will be called antibonding if :
(1) The energy of the molecular orbital is less than that of either of atomic orbitals.
(2) The energy of the molecular orbital is more than the energy of either of two atomic orbitals.
(3) The energy of the molecular orbital is less than the sum of the energy of the two atomic orbitals.
(4) The energy of the molecular orbital is higher than the sum of the energy of the two atomic orbitals.

---

79. Structure of orthophosphoric acid (H_3PO_4) is :

(1) 

(2) 

(3) $HO-\underset{\underset{OH}{|}}{P}-O-O-H$

(4) $HO-P-O-\underset{\underset{H}{|}}{O}-OH$

---

80. Using the following reduction potential

2.9 V for $F_2|F^-$

0.8 V for $Ag^+|Ag$

0.5 V for $Cu^+|Cu$

0.3 V for $Cu^{+2}|Cu$

-0.4 V for $Fe^{+2}|Fe$

-2.7 V for $Na^+|Na$

-2.9 V for $K^+|K$

Arrange these oxidising agents in the order of their increasing strengths :

(1) $F_2 < Na^+ < K^+ < Cu^+ < Cu^{+2}$

(2) $Cu^{+2} < Cu^+ < K^+ < Na^+ < F_2$

(3) $Cu^{+2} < Na^+ < K^+ < Cu^+ < F_2$

(4) $K^+ < Na^+ < Cu^{+2} < Cu^+ < F_2$

- o 0 o -

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सूचना — (पृष्ठ 1 वरून पुढे....)

(8) प्रश्नपुस्तिकेमध्ये विहित केलेल्या विशिष्ट जागीच कच्चे काम (रफ वर्क) करावे. प्रश्नपुस्तिकेव्यतिरिक्त उत्तरपत्रिकेवर वा इतर कागदावर कच्चे काम केल्यास ते कॉपी करण्याच्या उद्देशाने केले आहे, असे मानले जाईल व त्यानुसार उमेदवारावर शासनाने जारी केलेल्या "परीक्षांमध्ये होणाऱ्या गैरप्रकारांना प्रतिबंध करण्याबाबतचे अधिनियम-82" यातील तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एक वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.

(9) सदर प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपल्यानंतर उमेदवाराला ही प्रश्नपुस्तिका स्वत:बरोबर परीक्षाकक्षाबाहेर घेऊन जाण्यास परवानगी आहे. **मात्र परीक्षा कक्षाबाहेर जाण्यापूर्वी उमेदवाराने आपल्या उत्तरपत्रिकेचा भाग-1 समवेक्षकाकडे न विसरता परत करणे आवश्यक आहे.**

नमुना प्रश्न

Pick out the correct word to fill in the blank :

Q. No. 201. I congratulate you _____ your grand success.

(1) for (2) at (3) on (4) about

ह्या प्रश्नाचे योग्य उत्तर "(3) on" असे आहे. त्यामुळे या प्रश्नाचे उत्तर "(3)" होईल. यास्तव खालीलप्रमाणे प्रश्न क्र. 201 समोरील उत्तर-क्रमांक "③" हे वर्तुळ पूर्णपणे छायांकित करून दाखविणे आवश्यक आहे.

प्र. क्र. 201. ① ② ● ④

अशा पद्धतीने प्रस्तुत प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाचा तुमचा उत्तरक्रमांक हा तुम्हाला स्वतंत्ररीत्या पुरविलेल्या उत्तरपत्रिकेवरील त्या त्या प्रश्नक्रमांकासमोरील संबंधित वर्तुळ पूर्णपणे छायांकित करून दाखवावा. **ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.**

कच्च्या कामासाठी जागा /SPACE FOR ROUGH WORK

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