# CHEMISTRY

# BOOKS - MTG CHEMISTRY (BENGALI ENGLISH)

# QUESTION PAPER 2015

## Chemistry Category I

**1.** For the reaction $A + 2B \rightarrow C$, the reaction rate is doubled if the concentration of A is

doubled. The rate is increased by four times when concentrations of both A and B are increased by four times. The order of the reaction is

A. 3

B. 0

C. 1

D. 2

**Answer:**

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**2.** At a certain temperature, the value of the slope of the plot of osmotic pressure (n) against concentration $\left(\mathrm{C\ in\ mol} L^{-1}\right)$ of a certain polymer solution is 291R. The temperature at which osmotic pressure is measured is (R is gas constant)

A. $271^0 C$

B. $18^0 C$

C. 564 K

D. 18 k

**Answer:**

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**3.** The rms velocity of Co gas molecules at $27^0C$ is approximately 1000 m/s. For N, molecules at 600 K the rms velocity is approximately

A. 2000 m/s

B. 1414 m/s

C. 1000m/s

D. 1500 m/s

**Answer:**

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**4.** A gas can be liquefied at temperature T and pressure P provided

A. $T = T_c$ and $P < P_c$

B. $T < T_c$ and $P > P_c$

C. $T > T_c$ and $P > P_c$

D. $T > T_c$ and $P < P_c$

**Answer:**

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**5.** Sulphuryl chloride (SO,C1,) reacts with white phosphorus (P4) to give

A. $PCI, SO_2$

B. $OPCI)(3), SOCI_2$

C. $PCI_s, SO_2, S_2CI_2$

D. $OPCI_3, SO_2, S_2CI_2$

**Answer:**

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**6.** The number of lone pair of electrons on the central atoms of $H_2O$, SCI, PCI, and $XeF_2$ respectively, are

A. 2,1,1,3

B. 2,2,1,3

C. 3,1,1,2

D. 2,1,2,3

**Answer:**

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**7.** Consider the following salts: $NaCl, HgCl_2, Hg_2CI_2, CuCl_2, CuCl$ and AgCI. Identify the correct set of insoluble salts in water.

A. $Hg_2CI_2, CuCI, AgCI$

B. $HgCI_2, CuCI, AgCI$

C. $Hg_2CI_2, CuCI_2, AgCI$

D. $Hg_2CI_2, CuCI, NaCI$

**Answer:**

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**8.** In the following compound, the number of 'sp' hybridized carbon is

$$CH_2 = C = CH - \underset{\underset{CN}{|}}{C}H - C \equiv CH$$

A. 2

B. 3

C. 4

D. 5

**Answer:**

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**9.** The dispersed phase and dispersion medium of fog respectively are

A. solid, liquid

B. liquid, liquid

C. liquid, gas

D. gas, liquid

**Answer:**

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**10.** The decreasing order of basic character of $K_2O$, Bao, Cao and MgO is

A. $K_2O > BaO > CaO > MgO$

B. $K_2O > CaO > BaO > MgO$

C. $MgO > BaO > CaO > K_2O$

D. $MgO > CaO > BaO > K_2O$

**Answer:**

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**11.** in aqueous alkaline solution, two electron reduction of $HO_2^-$ gives

A. $HO\_$

B. $H_2O$

C. $O_2$

D. $O_2^-$

**Answer:**

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**12.** Cold ferrous sulphate solution on absorption of NO develops brown colour due to the formation of

A. paramagnetic $[Fe(H_2O)s(NO))SO_4$

B. diamagnetic $[Fe(H_2O)s(N_3)SO_4$

C. paramagnetic $[Fe(H_2O)s(NO_3))(SO_4)_2$

D. diamagnetic $[Fe(H_2O)4(SO_4)NO_3$

**Answer:**

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**13.** Amongst Be, B Mg and Al the second ionization potential is maximum for

A. B

B. Be

C. Mg

D. Al

**Answer:**


**14.** In a mixture, two enantiomers are found to be present in 85% and 15% respectively. The enantiomeric excess (e, e) is

A. 0.85

B. 0.15

C. 0.7

D. 0.6

**Answer:**

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**15.** 1,4-dimethylbenzene on heating with anhydrous $AlCl_3$ and HCl produces

A. 1,2-dimethylbenzene

B. 1,3-dimethylbenzene

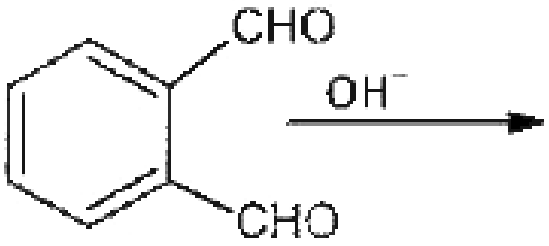
C. 1,2,3-trimethylbenzene

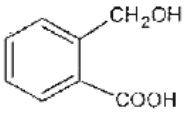
D. Ethylbenzene

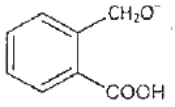
**Answer:**

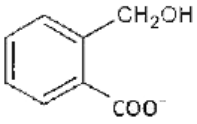

**16.** The product of the above reaction is (Unique set of options is provided for both English and

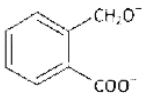
Bengali versions)




A. 


B. 


C. 


D. 


**Answer:**

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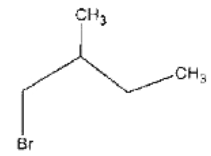
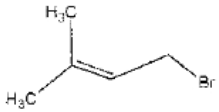
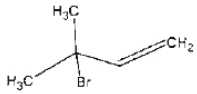
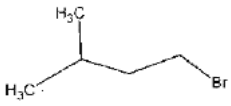
**17.** The major product of the above reaction is

A. 


B. 


C. 


D. 


**Answer:**

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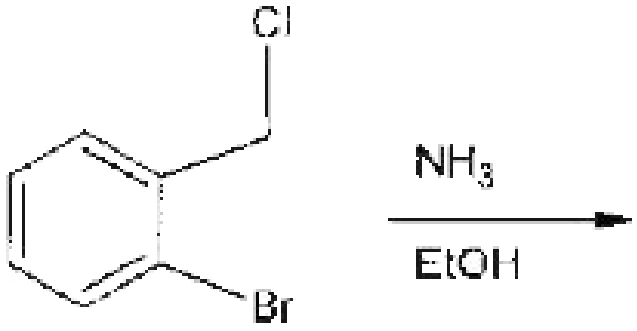
**18.** The product of the above reaction is (Unique set of options is provided for both English and Bengali versions)

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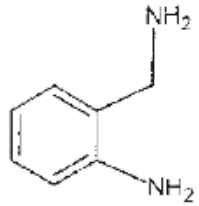

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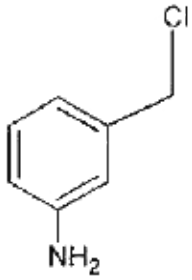


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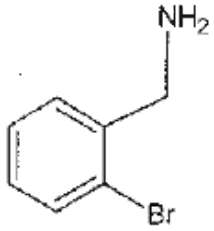


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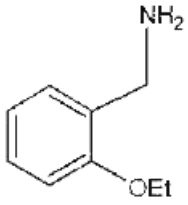


**Answer:**

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**19.** The reaction of methyltrichloroacetate $(CI_3CCO_2Me)$ with sodium methoxide (NaOme) generates

A. Carbocation

B. Carbene

C. Carbanion

D. Carbon radical

**Answer:**

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**20.** Best reagent for nuclear iodination of aromatic compounds is

A. $KI/CH_3COCH_3$

B. $I_2/CH_3CN$

C. $KI/CH_3COOH$

D. $I_2/HNO_3$

**Answer:**

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**21.** In the Lassaigne's test for the detection of nitrogen in an organic compound, the appearance of blue coloured compound is due to

A. ferric ferricyanide

B. ferrous ferricyanide

C. ferric ferrocyanide

D. ferrous ferrocyanide

**Answer:**

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**22.** In the following reaciton

$$RMgBr + HC(OEt)_3 \xrightarrow{\text{ether}} \xrightarrow{H_3O^+} p$$

The product 'p' is

A. RCHO

B. $R_2CHOET$

C. $R_3CH$

D. $RCH(OET)_2$

**Answer:**

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**23.** Match the flame colours of the alkaline earth metal salts in the Bunsen burner.

| | |
|---|---|
| (a)Calcium | (p) brick red |
| (b)Strontium | (q) apple green |
| (c)Barium | (r) crimson |

A. a-p,b-r,c-q

B. a-r,b-p,c-q

C. a-q,b-r,c-p

D. a-p,b-q,c-r

**Answer:**

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**24.** Extraction of gold (Au) involves the formation of complex ions 'X' and 'Y'

$$\text{Goldore} \xrightarrow[CN^-, H_2O, O_2]{\text{Roasting}} HO^- + 'X' \xrightarrow{\text{Zn}} 'Y' + Au$$

'X' and 'Y' are respectively

A. $Au(CN)(2)^-$ and $Zn(CN)_4^{2}$

B. $Au(CN)_4^{3-}$ and $Zn(CN)_4^{2-}$

C. $Au(CN)_3^-$ and $Zn(CN)_6^{4-}$

D. $Au(CN)_4^-$ and $Zn(CN)_3^-$

**Answer:**

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**25.** The atomic number of cerium (Ce) is 58. The correct electronic configuration of $Ce^{3+}$ ion is

A. $[Xe]4t^2$

B. $[kr]4f^1$

C. $[Xe]4f^3$

D. $[kr]4d^23$

**Answer:**

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**26.** Suppose the mass of a single Ag atom is 'm'. Ag metal crystallizes in fcc lattice with unit cell of length 'a'. The density of Ag metal in terms of 'a' and 'm' is

A. $\frac{4m}{a^3}$

B. $\frac{2m}{a^3}$

C. $\frac{m}{a^3}$

D. $\frac{m}{4a^3}$

**Answer:**

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**27.** For the reaction $2SO_2(g) + O_2(g) \Rightarrow 2SO_3(g)$ at 300k, the value of $\Delta G^0$ is -690.9R. The equilibrium constant value for the reaction at that temperature is (R is gas constant)

A. $10atm^{-1}$

B. 10 atm

C. 10

D. 1

**Answer:**


**28.** At a particular temperature the ratio of equivalent conductance to specific conductance of a 0.01 (N) NaCl solution is

A. $10^5 cm^3$

B. $10^3 cm^3$

C. $10 cm^3$

D. $10^5 cm^3$

**Answer:**

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**29.** The units of surface tension and viscosity of liquids are respectively

A. $kgm^{-1}s^{-1}, Nm^{-1}$

B. $kgs^{-2}, kgm^{-1}s^{-1}$

C. $Nm^{-1}, kgm^{-1}s^{-2}$

D. $kgs^{-1}, kgm^{-2}s^{-1}$

**Answer:**

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**30.** The ratio of volumes of CH,COOH 0.1 (N) to CH.COONa 0.1 (N) required to prepare a buffer

solution of pH 5.74 is (given: pka of $CH_3COOH$ is 4.74)

A. $10:1$

B. $5:1$

C. $1:5$

D. $1:0$

**Answer:**

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Chemistry Category Ii

**1.** For the reaction $X_2Y_4(I) \rightarrow 2XY_2(g)$ at 300 K the values of $\Delta U$ and $\Delta S$ are 2 kCal and $20CalK^{-1}$ respectively. The value of AG for the reaction is

A. $-3400Cal$

B. 3400 Cal

C. $-2800Cal$

D. 2000 Cal

**Answer:**

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**2.** t temperature of 298 K the emf of the following electrochemical cell

$Ag(S)Ag^{+}(0.1M)\mid \left|Zn^{2}(0.1M)\right|Zn(s)$ will be $\left(\text{given}E^{0}_{\text{cell}} = -1.526V\right)$

A. $-1.523V$

B. $-1.503V$

C. $1.532V$

D. $-3.06V$

**Answer:**

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**3.** Addition of sodium thiosulphate solution to a solution of silver nitrate gives 'X' as white precipitate, insoluble in water but soluble in excess thiosulphate solution to give 'Y'. On boiling in water, 'Y' gives 'Z'. 'X', 'Y' and 'Z' respectively, are

A. $Ag_2S_2O_3, Na\left[Ag(S_2O_3)_2\right], Ag_2S$

B. $Ag_2SO_4, Na\left[Ag(S_2O_3)_2\right], Ag_2S_2$

C. $Ag_2S_2O_3, Na_s\left[Ag(S_2O_3)_3\right], AgS$

D. $Ag_2SO_3, Na_3\left[Ag(S_2O_3)_2\right], Ag_2O$

**Answer:**

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**4.** Roasted copper pyrite on smelting with sand produces

A. $FeSiO_3$ as fusible slag and $Cu_2S$ as matter

B. $CaSiO_3$ infusible slag and $Cu_2O$ as matter

C. $Ca_3(PO_4)_2$ as fusible slag and $Cu_2S$ as mattee

D. $Fe_3(PO_4)_2$, as infusible slag and $Cu_2S$ as matter

**Answer:**

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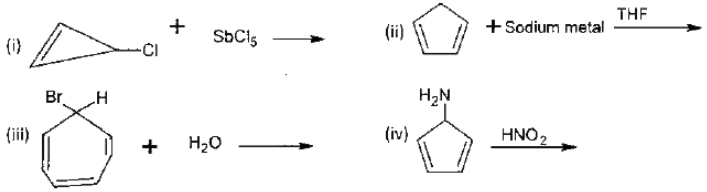
**5.** The total number of aromatic species generated in the following reaction is




A. zero

B. 2

C. 3

D. 4

**Answer:**

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## Chemistry Category Iii

**1.** The increase in rate constant of a chemical reaction with increasing temperature is(are) due to the fact(s) that

A. the number of collisions among the reactant molecules increases with increasing temperature.

B. the activation energy of the reaction decreases with increasing temperature.

C. the concentration of the reactant molecules increases with increasing temperature.

D. the number of reactant molecules acquiring the activation energy increases with increasing temperature.

**Answer:**

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**2.** Optical isomerism is exhibited by (ox = oxalate anion, en-ethylenediamine)

A. cis - $\left[CrCI_2(ox)_2\right]^{3-}$

B. $\left[Co(en)_3\right]^{3+}$

C. trans - $\left[CrCI_2(ox)_2\right]^{3-}$

D. $\left[\cos(ox)(en)_2\right]^{+}$

**Answer:**

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**3.** Ionization potential values of noble gases decrease down the group with increase in atomic size. Xenon forms binary fluorides by the direct reaction of elements. Identify the correct statements) from below.

A. Only the heavier noble gases form such compounds.

B. It happens because the noble gases have higher ionization energies.

C. it happens because the compounds are formed with electronegative ligands.

D. Octet of electrons provide the stable arrangements.

**Answer:**

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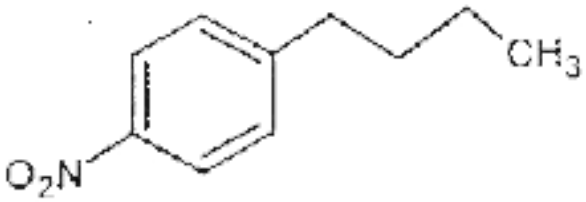
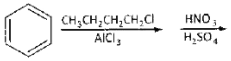
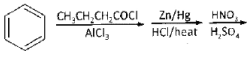
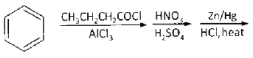
**4.** Identify the correct method for the synthesis of the compound shown above from the following alternatives (Unique set of options is

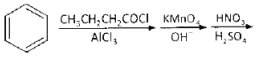
provided for both English and Bengali versions)




A. 


B. 


C. 


D. 


**Answer:**

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**5.** Within the list shown below, the correct pair of structures of alanine in pH ranges 2-4 and 9-11 is

A. $H_3N^- - CH(CH_3)CO_2H$

B. $H_2N - CH(CH_3)CO_2^-$

C. $H_3N^-CH(CH_3)CO_2^-$

D. $H_2N - CH(CH_3)CO_2H$

**Answer:**

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