FINAL JEE–MAIN EXAMINATION – JANUARY, 2020

(Held On Wednesday 08ᵗʰ JANUARY, 2020) TIME : 9 : 30 AM to 12 : 30 PM

CHEMISTRY	TEST PAPER WITH ANSWER

1. A flask contains a mixture of isohexane and 3-methylpentane. One of the liquids boils at 63°C while the other boils at 60°C. What is the best way to seprate the two liquids and which one will be distilled out first?

(1) simple distillation, 3-methylpentane

(2) simple distillation, isohexane

(3) fractional distillation, isohexane

(4) fractional distillation, 3-methylpentane

NTA Ans. (3)

ALLEN Ans. (3)

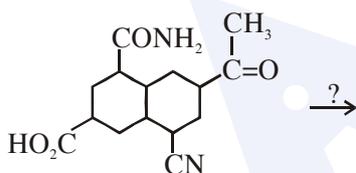**2.** The first ionization energy (in kJ/mol) of Na, Mg, Al and Si respectively, are :

(1) 496, 737, 577, 786

(2) 786, 737, 577, 496

(3) 496, 577, 737, 786

(4) 496, 577, 786, 737

NTA Ans. (1)

ALLEN Ans. (1)

3. The most suitable reagent for the given conversion is :

(1) $LiAlH_4$ (2) $NaBH_4$

(3) H_2/Pd (4) B_2H_6

NTA Ans. (4)

ALLEN Ans. (4)

4. The third ionization enthalpy is minimum for :

(1) Fe (2) Ni (3) Co (4) Mn

NTA Ans. (1)

ALLEN Ans. (1)

5. The predominant intermolecular forces present in ethyl acetate, a liquid, are :

(1) hydrogen bonding and London dispersion

(2) Dipole-dipole and hydrogen bonding

(3) London dispersion and dipole-dipole

(4) London dispersion, dipole-dipole and hydrogen bonding

NTA Ans. (3)

ALLEN Ans. (3)

6. The strength of an aqueous NaOH solution is most accurately determined by titrating :

(Note : consider that an appropriate indicator is used)

(1) Aq. NaOH in a volumetric flask and concentrated H_2SO_4 in a conical flask

(2) Aq. NaOH in a pipette and aqueous oxalic acid in a burette

(3) Aq. NaOH in a burette and concentrated H_2SO_4 in a conical flask

(4) Aq. NaOH in a burette and aqueous oxalic acid in a conical flask
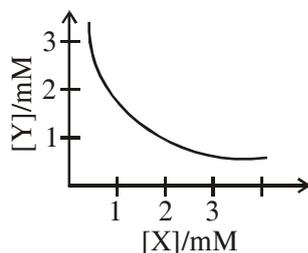
NTA Ans. (4)

ALLEN Ans. (4)

7. The complex that can show fac-and mer-isomers is :

(1) $[Pt(NH_3)_2Cl_2]$ (2) $[Co(NH_3)_4Cl_2]^+$

(3) $[Co(NH_3)_3(NO_2)_3]$ (4) $[CoCl_2(en)_2]$

NTA Ans. (3)

ALLEN Ans. (3)

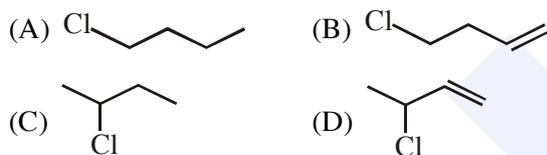**8.** The stoichiometry and solubility product of a salt with the solubility curve given below is, respectively :

(1) X_2Y, $2\times10^{-9}M^3$

(2) XY_2, $1\times10^{-9}M^3$

(3) XY_2, $4\times10^{-9}M^3$

(4) XY, $2\times10^{-6}M^3$

NTA Ans. (3)

ALLEN Ans. (3)

9. The decreasing order of reactivity towards dehydrohalogenation (E_1) reaction of the following compounds is :

(A)   (B)

(C)   (D)

(1) B > D > A > C

(2) B > D > C > A

(3) D > B > C > A

(4) B > A > D > C

NTA Ans. (3)

ALLEN Ans. (3)

10. The number of bonds between sulphur and oxygen atoms in $S_2O_8^{2-}$ and the number of bonds between sulphur and sulphur atoms in rhombic sulphur, respectively, are :

(1) 4 and 8   (2) 4 and 6

(3) 8 and 8   (4) 8 and 6

NTA Ans. (3)

ALLEN Ans. (3)

11. The rate of a certain biochemical reaction at physiological temperature (T) occurs 10^6 times faster with enzyme than without. The change in the activation energy upon adding enzyme is :

(1) $-6RT$ (2) $+6RT$

(3) $+6(2.303)RT$ (4) $-6(2.303)RT$

NTA Ans. (4)

ALLEN Ans. (4)

12. Which of the following statement is not true for glucose?

(1) The pentaacetate of glucose does not react with hydroxylamine to give oxime

(2) Glucose gives Schiff's test for aldehyde

(3) Glucose exists in two crystalline forms α and β

(4) Glucose reacts with hydroxylamine to form oxime

NTA Ans. (2)

ALLEN Ans. (2)

13. A graph of vapour pressure and temperature for three different liquids X, Y and Z is shown below :
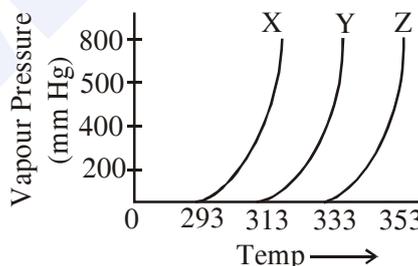
The following inferences are made :

(A) X has higher intermolecular interactions compared to Y.

(B) X has lower intermolecular interactions compared to Y.

(C) Z has lower intermolecular interactions compared to Y.

The correct inference(s) is/are :

(1) A   (2) (C)

(3) (B)   (4) (A) and (C)

NTA Ans. (3)

ALLEN Ans. (3)

14. Among the gases (a) - (e), the gases that cause greenhouse effect are :

(a) CO_2 (b) H_2O

(c) CFCs   (d) O_2

(e) O_3

(1) (a), (b), (c) and (d)

(2) (a), (c), (d) and (e)

(3) (a) and (d)

(4) (a), (b), (c) and (e)

NTA Ans. (4)

ALLEN Ans. (4)

15. As per Hardy-Schulze formulation, the flocculation values of the following for ferric hydroxide sol are in the order :

(1) $AlCl_3 > K_3[Fe(CN)_6] > K_2CrO_4 > KBr=KNO_3$

(2) $K_3[Fe(CN)_6] < K_2CrO_4 < AlCl_3 < KBr < KNO_3$

(3) $K_3[Fe(CN)_6] > AlCl_3 > K_2CrO_4 > KBr > KNO_3$

(4) $K_3[Fe(CN)_6] < K_2CrO_4 < KBr=KNO_3=AlCl_3$

NTA Ans. (4)

ALLEN Ans. (4)

16. The major products A and B in the following reactions are :

NTA Ans. (1)

ALLEN Ans. (1)

17. For the Balmer series in the spectrum of H atom, $\bar{v} = R_H \left\{ \dfrac{1}{n_1^2} - \dfrac{1}{n_2^2} \right\}$, the correct statements among (I) and (IV) are :

(I) As wavelength decreases, the lines in the series converge

(II) The integer n_1 is equal to 2

(III) The lines of longest wavelength corresponds to $n_2 = 3$

(IV) The ionization energy of hydrogen can be calculated from wave number of these lines

(1) (II), (III), (IV)

(2) (I), (II), (III)

(3) (I), (III), (IV)

(4) (I), (II), (IV)

NTA Ans. (2)

ALLEN Ans. (2)

18. Arrange the following compounds in increasing order of C–OH bond length :

methanol, phenol, p-ethoxyphenol

(1) phenol < methanol < p-ethoxyphenol

(2) phenol < p-ethoxyphenol < methanol

(3) methanol < p-ethoxyphenol < phenol

(4) methanol < phenol < p-ethoxyphenol

NTA Ans. (2)

ALLEN Ans. (2)

19. The major product of the following reaction is :

$$\xrightarrow{\text{dil. H}_2\text{SO}_4}$$

(1)

(2)

(3)

(4)
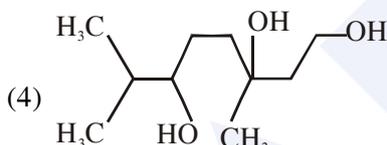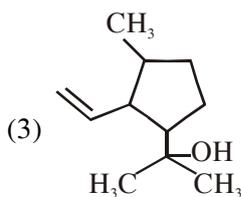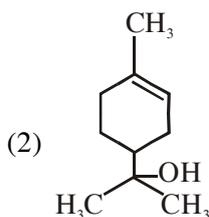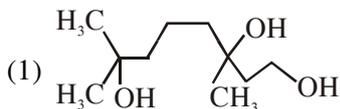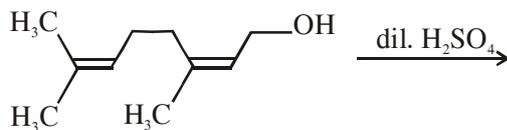
NTA Ans. (2)

ALLEN Ans. (2)

20. When gypsum is heated to 393 K, it forms :

(1) Dead burnt plaster

(2) Anhydrous $CaSO_4$

(3) $CaSO_4.5H_2O$

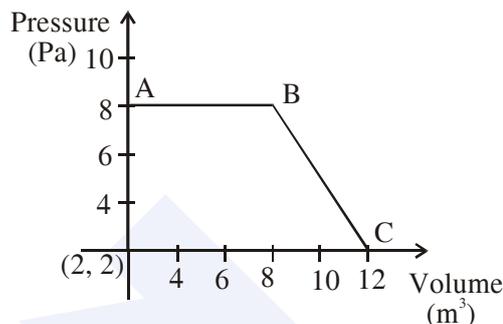(4) $CaSO_4.0.5H_2O$

NTA Ans. (4)

ALLEN Ans. (4)

21. The number of chiral centres in penicillin is _____.

NTA Ans. (3.00 to 3.00)

ALLEN Ans. (3.00)

22. The magnitude of work done by a gas that undergoes a reversible expansion along the path ABC shown in the figure is _____

NTA Ans. (48.00 to 48.00)

ALLEN Ans. (48.00)

23. The volume (in mL) of 0.125 M $AgNO_3$ required to quantitatively precipitate chloride ions in 0.3 g of $[Co(NH_3)_6]Cl_3$ is _____.
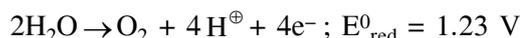
$^M[Co(NH_3)_6]Cl_3$ = 267.46 g/mol

$^M AgNO_3$ = 169.87 g/mol

NTA Ans. (26.80 to 27.00)

ALLEN Ans. (29.92)

24. What would be the electrode potential for the given half cell reaction at pH = 5 ?_____

$2H_2O \rightarrow O_2 + 4H^{\oplus} + 4e^-$; E^0_{red} = 1.23 V
(R = 8.314 J mol^{-1} K^{-1} ; Temp = 298 K; oxygen under std. atm. pressure of 1 bar)

NTA Ans. (1.52 to 1.53)

ALLEN Ans. (1.52)

25. Ferrous sulphate heptahydrate is used to fortify foods with iron. The amount (in grams) of the salt required to achieve 10 ppm of iron in 100 kg of wheat is _____.
Atomic weight : Fe = 55.85 ; S = 32.0 ; O = 16.00

NTA Ans. (4.95 to 4.97)

ALLEN Ans. (4.97)