

FINAL JEE-MAIN EXAMINATION – JANUARY, 2020

 (Held On Thursday 09th JANUARY, 2020) TIME : 2 : 30 PM to 5 : 30 PM

CHEMISTRY

1. The correct order of the spin-only magnetic moments of the following complexes is :

- (I) $[\text{Cr}(\text{H}_2\text{O})_6]\text{Br}_2$
 (II) $\text{Na}_4[\text{Fe}(\text{CN})_6]$
 (III) $\text{Na}_3[\text{Fe}(\text{C}_2\text{O}_4)_3]$ ($\Delta_0 > P$)
 (IV) $(\text{Et}_4\text{N})_2[\text{CoCl}_4]$

- (1) (III) > (I) > (II) > (IV)
 (2) (I) > (IV) > (III) > (II)
 (3) (II) \approx (I) > (IV) > (III)
 (4) (III) > (I) > (IV) > (II)

NTA Ans. (2)

ALLEN Ans. (2)

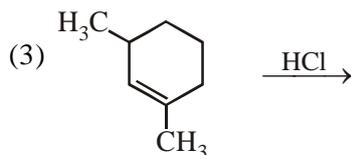
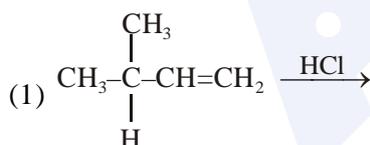
2. The first and second ionisation enthalpies of a metal are 496 and 4560 kJ mol⁻¹, respectively. How many moles of HCl and H₂SO₄, respectively, will be needed to react completely with 1 mole of the metal hydroxide ?

- (1) 1 and 0.5 (2) 2 and 0.5
 (3) 1 and 1 (4) 1 and 2

NTA Ans. (1)

ALLEN Ans. (1)

3. Which of the following reactions will not produce a racemic product ?

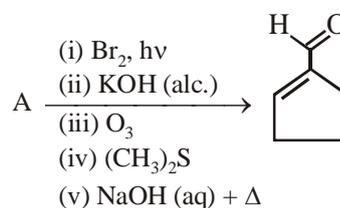


NTA Ans. (1)

ALLEN Ans. (1)

TEST PAPER WITH ANSWER

4. In the following reaction A is :

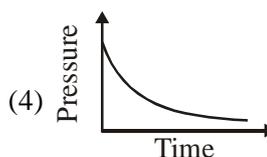
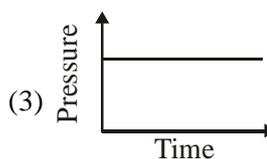
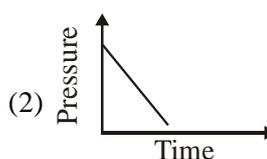
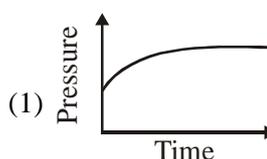


- (1)  (2) 
 (3)  (4) 

NTA Ans. (3)

ALLEN Ans. (3)

5. A mixture of gases O₂, H₂ and CO are taken in a closed vessel containing charcoal. The graph that represents the correct behaviour of pressure with time is :



NTA Ans. (4)

ALLEN Ans. (4)

6. Which polymer has 'chiral' monomer(s) ?

- (1) Buna-N (2) Nylon 6,6
(3) Neoprene (4) PHBV

NTA Ans. (4)

ALLEN Ans. (4)

7. Biochemical Oxygen Demand (BOD) is the amount of oxygen required (in ppm):

- (1) by anaerobic bacteria to breakdown inorganic waste present in a water body.
(2) for the photochemical breakdown of waste present in 1 m³ volume of a water body.
(3) by bacteria to break-down organic waste in a certain volume of a water sample.
(4) for sustaining life in a water body.

NTA Ans. (3)

ALLEN Ans. (3)

8. Among the statements (a)-(d) the correct ones are:

- (a) Lithium has the highest hydration enthalpy among the alkali metals.
(b) Lithium chloride is insoluble in pyridine.
(c) Lithium cannot form ethynide upon its reaction with ethyne.
(d) Both lithium and magnesium react slowly with H₂O.

- (1) (a), (b) and (d) only
(2) (b) and (c) only
(3) (a), (c) and (d) only
(4) (a) and (d) only

NTA Ans. (3)

ALLEN Ans. (3)

9. Amongst the following, the form of water with the lowest ionic conductance at 298 K is:

- (1) distilled water
(2) water from a well
(3) saline water used for intravenous injection
(4) sea water

NTA Ans. (1)

ALLEN Ans. (1)

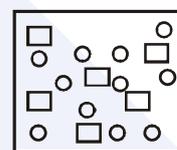
10. Which of the following has the shortest C-Cl bond?

- (1) Cl-CH=CH-OCH₃
(2) Cl-CH=CH-CH₃
(3) Cl-CH=CH₂
(4) Cl-CH=CH-NO₂

NTA Ans. (4)

ALLEN Ans. (4)

11. In the figure shown below reactant A (represented by square) is in equilibrium with product B (represented by circle). The equilibrium constant is :



- (1) 2 (2) 1 (3) 8 (4) 4

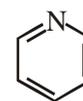
NTA Ans. (1)

ALLEN Ans. (1 or Bonus)

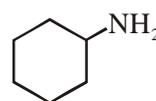
12. The decreasing order of basicity of the following amines is :



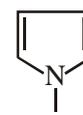
(I)



(II)



(III)



(IV)

- (1) (I) > (III) > (IV) > (II)
(2) (III) > (I) > (II) > (IV)
(3) (III) > (II) > (I) > (IV)
(4) (II) > (III) > (IV) > (I)

NTA Ans. (3)

ALLEN Ans. (3)

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13. The solubility product of $\text{Cr}(\text{OH})_3$ at 298 K is 6.0×10^{-31} . The concentration of hydroxide ions in a saturated solution of $\text{Cr}(\text{OH})_3$ will be :

- (1) $(18 \times 10^{-31})^{1/4}$ (2) $(2.22 \times 10^{-31})^{1/4}$
 (3) $(4.86 \times 10^{-29})^{1/4}$ (4) $(18 \times 10^{-31})^{1/2}$

NTA Ans. (1)

ALLEN Ans. (1)

14. 5 g of zinc is treated separately with an excess of

- (a) dilute hydrochloric acid and
 (b) aqueous sodium hydroxide.

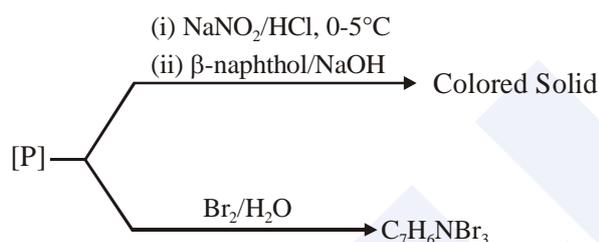
The ratio of the volumes of H_2 evolved in these two reactions is :

- (1) 1 : 4 (2) 1 : 2 (3) 2 : 1 (4) 1 : 1

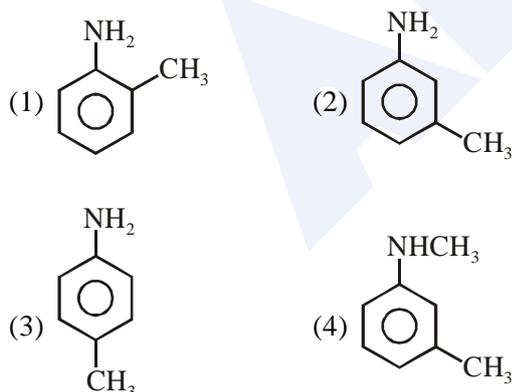
NTA Ans. (4)

ALLEN Ans. (4)

15. Consider the following reactions,



The compound [P] is :



NTA Ans. (2)

ALLEN Ans. (2)

16. A, B and C are three biomolecules. The results of the tests performed on them are given below:

	Molisch's Test	Barfoed Test	Biuret Test
A	Positive	Negative	Negative
B	Positive	Positive	Negative
C	Negative	Negative	Positive

A, B and C are respectively :

- (1) A = Glucose, B = Fructose, C = Albumin
 (2) A = Lactose, B = Fructose, C = Alanine
 (3) A = Lactose, B = Glucose, C = Alanine
 (4) A = Lactose, B = Glucose, C = Albumin

NTA Ans. (4)

ALLEN Ans. (2)

17. The reaction of $\text{H}_3\text{N}_3\text{B}_3\text{Cl}_3$ (A) with LiBH_4 in tetrahydrofuran gives inorganic benzene (B). Further, the reaction of (A) with (C) leads to $\text{H}_3\text{N}_3\text{B}_3(\text{Me})_3$. Compounds (B) and (C) respectively, are:

- (1) Boron nitride and MeBr
 (2) Borazine and MeMgBr
 (3) Borazine and MeBr
 (4) Diborane and MeMgBr

NTA Ans. (2)

ALLEN Ans. (2)

18. The isomer(s) of $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]$ that has/have a Cl-Co-Cl angle of 90° , is/are :

- (1) meridional and trans
 (2) cis and trans
 (3) trans only
 (4) cis only

NTA Ans. (4)

ALLEN Ans. (4)

19. The number of sp^2 hybrid orbitals in a molecule of benzene is :
 (1) 24 (2) 6 (3) 12 (4) 18

NTA Ans. (4)

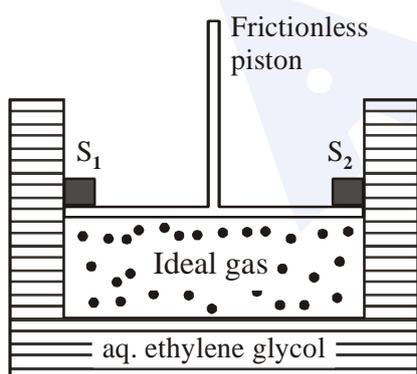
ALLEN Ans. (4)

20. The true statement amongst the following is:
 (1) Both ΔS and S are functions of temperature.
 (2) S is not a function of temperature but ΔS is a function of temperature.
 (3) Both S and ΔS are not functions of temperature.
 (4) S is a function of temperature but ΔS is not a function of temperature.

NTA Ans. (1)

ALLEN Ans. (1)

21. A cylinder containing an ideal gas (0.1 mol of 1.0 dm^3) is in thermal equilibrium with a large volume of 0.5 molal aqueous solution of ethylene glycol at its freezing point. If the stoppers S_1 and S_2 (as shown in the figure) are suddenly withdrawn, the volume of the gas in litres after equilibrium is achieved will be ____.
 (Given, K_f (water) = $2.0 \text{ K kg mol}^{-1}$,
 $R = 0.08 \text{ dm}^3 \text{ atm K}^{-1} \text{ mol}^{-1}$)



NTA Ans. (2.18 to 2.23)

ALLEN Ans. (2.17 or 2.18)

22. 10.30 mg of O_2 is dissolved into a liter of sea water of density 1.03 g/mL. The concentration of O_2 in ppm is _____.

NTA Ans. (10)

ALLEN Ans. (10.00)

23. A sample of milk splits after 60 min. at 300 K and after 40 min. at 400 K when the population of *lactobacillus acidophilus* in it doubles. The activation energy (in kJ/mol) for this process is closest to _____.

(Given, $R = 8.3 \text{ J mol}^{-1} \text{ K}^{-1}$, $\ln\left(\frac{2}{3}\right) = 0.4$,
 $e^{-3} = 4.0$)

NTA Ans. (3.98 to 3.99 or -3.98 to -3.99)

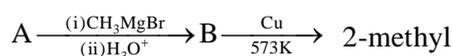
ALLEN Ans. (3.98 to 3.99 or -3.98 to -3.99)

24. The sum of the total number of bonds between chromium and oxygen atoms in chromate and dichromate ions is _____.

NTA Ans. (12)

ALLEN Ans. (18.00)

25. Consider the following reactions



2-butene

The mass percentage of carbon in A is _____.

NTA Ans. (66.66 to 66.67)

ALLEN Ans. (66.67%)