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JEE MAIN 2016

ONLINE EXAMINATION

DATE : 10-04-2016

SUBJECT : CHEMISTRY

TEST PAPER
WITH SOLUTIONS & ANSWER KEY

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1. The correct statement about the synthesis of erythritol ($C(CH_2OH)_4$) used in the preparation of PETN is:

(1) The synthesis requires two aldol condensations and two Cannizzaro reactions.

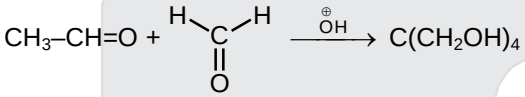
(2) Alpha hydrogens of ethanol and methanol are involved in this reaction.

(3) The synthesis requires four aldol condensations between methanol and ethanol.

(4) The synthesis requires three aldol condensations and one Cannizzaro reaction.

Ans. **4**

Sol. The synthesis requires three aldol & one cannizzaro reaction.



2. The following statements concern elements in the periodic table. Which of the following is true?

(1) The Group 13 elements are all metals.

(2) All the elements in Group 17 are gases.

(3) Elements of Group 16 have lower ionization enthalpy values compared to those of Group 15 in the corresponding periods.

(4) For Group 15 elements, the stability of +5 oxidation state increases down the group.

Ans. 3

3. Identify the incorrect statement:

(1) Rhombic and monoclinic sulphur have S_8 molecules.

(2) S_8 ring has a crown shape.

(3) S_2 is paramagnetic like oxygen.

(4) The S–S–S bond angles in the S_8 and S_6 rings are the same.

Ans. **4**

Sol. Fact

4. **Assertion:** Among the carbon allotropes, diamond is an insulator, Whereas, graphite is a good conductor of electricity.

Reason: Hybridization of carbon in diamond and graphite are sp^3 and sp^2, respectively.

(1) Both assertion and reason are correct, but the reason is not the correct explanation for the assertion.

(2) Assertion is incorrect statement, but the reason is correct.

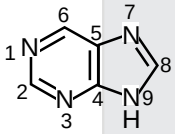
(3) Both assertion and reason are correct, and the reason is the correct explanation for the assertion.

(4) Both assertion and reason are incorrect.

Ans. **1**

Sol. Fact

5. The "N" which does not contribute to the basicity for the compound is :

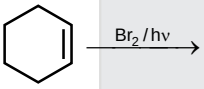


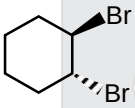
(1) N 7 (2) N 1 (3) N 9 (4) N 3

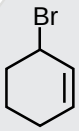
Ans. **3**

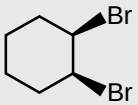
Sol. Lone pair of N9 is involve in aromaticity.

6. Bromination of cyclohexene under conditions given below yeilds:



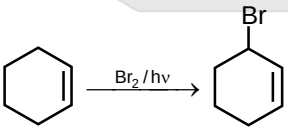
(1) 

(2) 

(3) 

(4) 

Ans. 2

Sol. 

It is free radical substitution reaction.

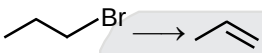
7. The commercial name for calcium oxide is:

(1) Quick lime (2) Milk of lime (3) Slaked lime (4) Limestone

Ans. **1**

Sol. Fact

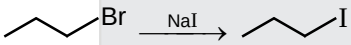
8. Which one of the following reagents is not suitable for the elimination reaction ?



(1) NaI (2) NaOH / H_2O-EtOH (3) NaOH / H_2O (4) NaOEt / EtOH

Ans. **1**

Sol. NaI gives Nucleophilic substitution reaction.



9. Which of the following is a bactericidal antibiotic?

(1) Erythromycin (2) Tetracycline (3) Ofloxacin (4) Chloramphenicol

Ans. **3**

Sol. All others are beteriostatic antibiotic.

10. A solid XY kept in an evacuated sealed container undergoes decomposition to form a mixture of gases X and Y at temperature T. The equilibrium pressure is 10 bar in this vessel. K_P for this reaction is :

(1) 25 (2) 5 (3) 10 (4) 100

Ans. **1**

Sol. $XY(s) \rightleftharpoons X(g) + Y(g)$

At eq. P P

Total pressure = 2P = 10 bar

$\Rightarrow P = 5$

Now, $K_P = (P_X)(P_Y) = P^2 = 25$

11. The transition metal ions responsible for color in ruby and emerald are, respectively :

(1) Cr^{3+} and Cr^{3+} (2) Co^{3+} and Co^{3+} (3) Co^{3+} and Cr^{3+} (4) Cr^{3+} and Co^{3+}

Ans. **1**

Sol. Fact

12. Which of the following polymers is synthesized using a free radical polymerization technique?

(1) Teflon (2) Melamine polymer (3) Nylon 6,6 (4) Terylene

Ans. **1**

Sol. 

Tetrafluoroethylene Teflon

13. Extraction of copper by smelting uses silica as an additive to remove :

(1) FeS (2) FeO (3) Cu_2S (4) Cu_2O

Ans. 2

Sol. $\underset{\text{Basic impurity}}{FeO} + \underset{\text{acidic flux}}{SiO_2} \longrightarrow \underset{\text{slag}}{FeSiO_3}$

14. Initially, the root mean square (rms) velocity of N_2 molecules at certain temperature is u. If this temperature is doubled and all the nitrogen molecules dissociate into nitrogen atoms, then the new *rms* velocity will be :

(1) 2 u (2) 14 u (3) u / 2 (4) 4 u

Ans. **1**

Sol. $\text{rms } (N_2) = \sqrt{\frac{3RT}{M_{N_2}}} = \sqrt{\frac{3RT}{28}} = U$ …(1)

After dissociation

$\text{rms } (N) = \sqrt{\frac{3R(2T)}{M_N}} = \sqrt{\frac{3R(2T)}{14}} = 2u$

15. Gold numbers of some colloids are : Gelatin : 0.005 – 0.01, Gum Arabic : 0.15 – 0.25 ; Oleate : 0.04 – 1.0 ; Starch : 15 – 25. Which among these is a better protective colloid ?

(1) Gelatin (2) Starch (3) Gum Arabic (4) Oleate

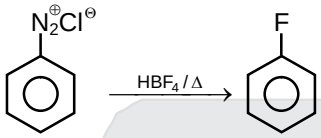
Ans. **1**

Sol. Lower the gold number, more will be protective power of colloid.

16. Fluorination of an aromatic ring is easily accomplished by treating a diazonium salt with HBF_4. Which of the following conditions is correct about this reaction?

(1) Only heat (2) $NaNO_2$ / Cu (3) Cu_2O / H_2O (4) NaF / Cu

Ans. **1**

Sol. 

17. Identify the correct statement:

(1) Corrosion of iron can be minimized by forming an impermeable barrier at its surface.

(2) Iron corrodes in oxygen-free water.

(3) Iron corrodes more rapidly in salt water because its electrochemical potential is higher.

(4) Corrosion of iron can be minimized by forming a contact with another metal with a higher reduction potential.

Ans. **1**

Sol. Fact

18. An aqueous solution of a salt MX_2 at certain temperature has a van't Hoff factor of 2. The degree of dissociation for this solution of the salt is :

(1) 0.67 (2) 0.33 (3) 0.80 (4) 0.50

Ans. **4**

Sol. For MX_2 type salt

Vant factor (i) = $1 + 2\alpha = 2$

$\Rightarrow \quad \alpha = 0.5$

19. Oxidation of succinate ion produces ethylene and carbon dioxide gases. On passing 0.2 Faraday electricity through an aqueous solution of potassium succinate, the total volume of gases (at both cathode and anode) at STP (1 atm and 273 K) is :

(1) 6.72 L (2) 2.24 L (3) 4.48 L (4) 8.96 L

Ans. 4

20. If 100 mole of H_2O_2 decompose at 1 bar and 300 K, the work done (kJ) by one mole of $O_2(g)$ as it expands against 1 bar pressure is :

$2H_2O_2(l) \rightleftharpoons 2H_2O(l) + O_2(g)$ ($R = 8.3\ J\ K^{-1}\ mol^{-1}$)

(1) 498.00 (2) 62.25 (3) 124.50 (4) 249.00

Ans. **3**

Sol. $2H_2O_2(l) \rightleftharpoons 2H_2O(l) + O_2(g)$

$W = -P_{ext}(\Delta V) = -(n_{O_2})RT$

$\because$ 100 mol H_2O_2 on decomposition will give 50 mol O_2

$\Rightarrow$ $W = -(50)(8.3)(300)J$

$= -124500\ J$

$W = -124.5\ kJ$

$\Rightarrow$ Work done by O2(g) = 124.5 kJ Ans.

21. Which of the following is an example of homoleptic complex ?

(1) $[Co(NH_3)_4Cl_2]$ (2) $[Co(NH_3)_6]Cl_3$ (3) $[Co(NH_3)_5Cl]Cl_2$ (4) $[Pt(NH_3)_2Cl_2]$

Ans. **2**

Sol. Complex having only 1 type of ligands are examples of homoleptic complex.

22. The bond angle H–X–H is the greatest in the compound :

(1) NH_3 (2) PH_3 (3) CH_4 (4) H_2O

Ans. 3

23. The rate law for the reaction below is given by the expression k [A][B]

$A + B \rightarrow$ Product

If the concentration of B is increased from 0.1 to 0.3 mole, keeping the value of A at 0.1 mole, the rate constant will be :

(1) 9 k (2) 3 k (3) k/3 (4) k

Ans. 4

24. Sodium extract is heated with concentrated HNO_3 before testing for halogens because :

(1) Ag reacts faster with halides in acidic medium.

(2) Silver halides are totally insoluble in nitric acid.

(3) Ag_2S and AgCN are soluble in acidic medium.

(4) S^{2-} and CN^-, if present, are decomposed by conc. HNO_3 and hence do not interfere in the test.

Ans. **4**

Sol. Fact

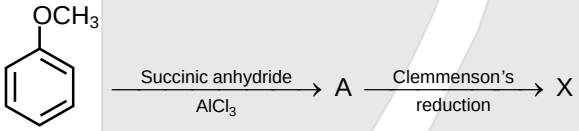
25. Which one of the following substances used in dry cleaning is a better strategy to control environmental pollution?

(1) Nitrogen dioxide (2) Sulphur dioxide (3) Tetrachloroethylene (4) Carbon dioxide

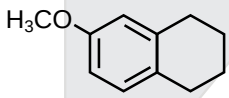
Ans. **4**

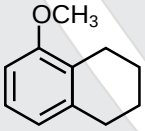
Sol. All other gases are itself environmental pollutant.

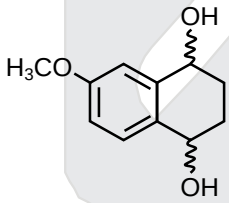
26. Consider the reaction sequence below :

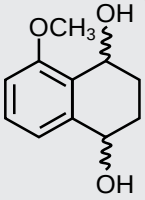


X is :

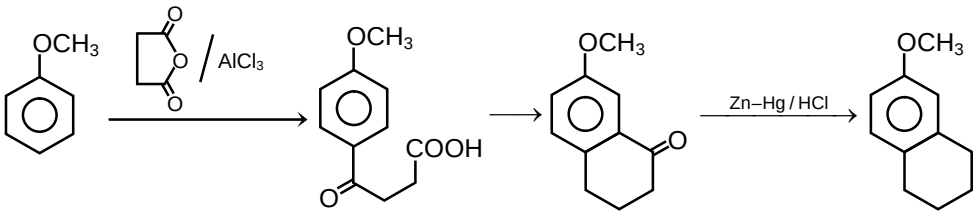
(1) 

(2) 

(3) 

(4) 

Ans. **1**

Sol. 

27. Observation of "Rhumann's purple" is a confirmatory test for the presence of :

(1) Reducing sugar (2) Starch (3) Protein (4) Cupric ion

Ans. **3**

Sol. Ninhydrin is often used to detect α-Amino acids and also free amino and carboxylic acid groups on proteins and peptides. Ninhydrin produce blue or purple pigment, sometimes called Ruhemann's purple.

28. Aqueous solution of which salt will not contain ions with the electronic configuration $1s^2 2s^2 2p^6 3s^2 3p^6$?

(1) NaCl (2) CaI_2 (3) NaF (4) KBr

Ans. **3**

Sol. NaF: $Na^+ = 1s^2 2s^2 2p^6$

$F^- = 1s^2 2s^2 2p^6$

29. The volume of 0.1 N dibasic acid sufficient to neutralize 1 g of a base that furnishes 0.04 mole of OH^- in aqueous solution is :

(1) 400 mL (2) 600 mL (3) 200 mL (4) 80 mL

Ans. **3**

30. Identify the reaction which does not liberate hydrogen :

(1) Allowing a solution of sodium in liquid ammonia to stand.

(2) Reaction of zinc with aqueous alkali.

(3) Reaction of lithium hydride with B_2H_6.

(4) Electrolysis of acidified water using Pt electrodes.

Ans. **3**

Sol. $B_2H_6 + 2LiH \longrightarrow 2LiBH_4$