RAMAKRISHNA MISSION VIDYAMANDIRA

Belur Math, Howrah – 711 202

ADMISSION TEST – 2014

INDUSTRIAL CHEMISTRY (Honours)

Date : 23-06-2014　　　　　　**Full Marks : 50**　　　　　　Time : 02·30 p.m – 03·30 p.m

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Instructions for the candidate

There are 25 questions each carrying **2 marks**. Candidates have to select the correct choice by marking in blue/black pencil only in the optical mark recognition (OMR) to be provided during written test. Marking should be dark and should completely fill **only** one blank box out of four choices against the corresponding question number. Incomplete filling or multiple filling of boxes will be rejected. Once one answer is marked in OMR, there is no scope to alter the choice. Doing rough work, or use of eraser, blade, whitener, etc. on the OMR is strictly prohibited. There is no negative marking.

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1. Which of the following has — O — O — linkage?
   a) $H_2S_2O_6$　　　　b) $H_2S_2O_8$　　　　c) $H_2S_2O_3$　　　　d) $H_2S_4O_6$

2. In which one of the following polymers isoprene is present as a monomer?
   a) starch　　　　b) neoprene　　　　c) natural rubber　　　　d) polyvinyl acetal

3. Which blue liquid is obtained on reacting equimolar proportion of two gases at –30°C?
   a) N_2O　　　　b) N_2O_3　　　　c) N_2O_4　　　　d) N_2O_5

4. The number of lone pair(s) of electron in $XeOF_4$ is/are
   a) 0　　　　b) 1　　　　c) 2　　　　d) 3

5. The total number of electrons present in 1·6g of methane is
   a) $6·023×10^{23}$　　　　b) $60·23×10^{23}$　　　　c) $6·023×10^{24}$　　　　d) none of these

6. 0·25g of an organic compound on Kjeldahls' analysis gave enough ammonia to just neutralise 25ml 0·2(N) sulphuric acid. The percentage of Nitrogen in the organic compound is
   a) 14　　　　b) 7　　　　c) 5　　　　d) 12

7. Chlorobenzene on treatment with sodium in dry ether gives diphenyl. The name of the reaction is
   a) Fittig Reaction　　b) Sandmeyer Reaction　　c) Wurtz Fittig Reaction　　d) Gattermann Reaction

8. Which ore contains both iron and copper?
   a) Cuprite　　　　b) Chalcocite　　　　c) Chalcopyrite　　　　d) Malachite

9. The ratio of rates of diffusion of helium and methane under identical conditions of pressure and temperature will be
   a) 4　　　　b) 2　　　　c) 1　　　　d) 0·5

10. $\text{'X'} + O_3 \rightarrow H - \underset{\underset{O}{\diagdown\diagup}}{\overset{\overset{O\quad O}{|\quad|}}{C - C}} - H \xrightarrow[H_2O]{Zn} H - \overset{\overset{O}{\|}}{C} - \overset{\overset{O}{\|}}{C} - H$. In the above reaction 'X' is

    (ozonide)　　　　　　(Ethanedial)

    a) ethylene　　　　b) acetylene　　　　c) acetaldehyde　　　　d) ethylene dichloride

11. The pH of the black coffee when the concentration of H^+ or H_3O^+ in a cup of black coffee is $1·2×10^{-5}\text{gmL}^{-1}$ is
    a) 4·92　　　　b) 7·86　　　　c) 7　　　　d) 6·8
    Is the coffee acidic or alkaline?

12. Which of the following is not oxidised by ozone?
    a) KI
    b) $FeSO_4$
    c) $KMNO_4$
    d) K_2MnO_4

13. The solubility of Ag_2SO_4 is 0·026 g.mole lit^{-1} at 25°C. The solubility product of it at 25°C is
    a) $7·03\times10^{-5}$
    b) $14·06\times10^{-5}$
    c) 2×10^{-4}
    d) none of these

14. An organic compound 'X' (Molecular Formula $C_9H_{10}O$) gives the following chemical tests :
    i)   Forms 2,4-DNPH derivative
    ii) Reduces Tollen's Reagent
    iii) Undergoes Cannizzaro's reaction
    iv) On vigorous oxidation, 1,2-benzene dicarboxylic acid is obtained. The compound 'X' is
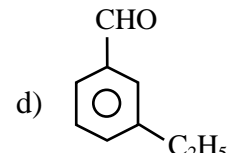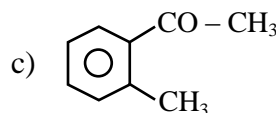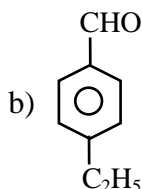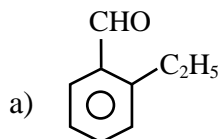
15. Sodium salt of an unknown anion when treated with $MgCl_2$ gives white precipitate only on boiling. The anion is
    a) SO_4^{2-}
    b) HCO_3^-
    c) CO_3^{2-}
    d) NO_3^-

16. The molarity of Sodium Hydroxide solution made by dissolving 4g of it in 250ml. of water is
    a) 0·4M
    b) 0·8M
    c) 0·2M
    d) 0·1M

17. An aqueous solution of 6·3g oxalic acid dihydrate is made upto 250ml. The volume of 0·1N caustic soda solution required to neutralise 10ml of this solution is
   a) 40ml
    b) 20ml
    c) 10ml
    d) 6·3ml

18. A gas cylinder containing cooking gas can withstand a pressure of 14·9 atmosphere. The pressure gauge of the cylinder indicates 12 atmosphere at 27°C. Due to an accidental fire in the building the temperature starts rising. The cylinder will explode at
    a) 99·5°C
    b) 54°C
    c) 68°C
    d) 49°C

19. A solution which is $10^{-3}M$ each in Mn^{2+}, Fe^{2+}, Zn^{2+} and Hg^{2+} is treated with $10^{-16}M$ sulphide ion (H_2S). If K_{SP} of MnS, FeS, ZnS and HgS are 10^{-15}, 10^{-23}, 10^{-20} and 10^{-54} respectively which one will precipitate first?
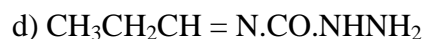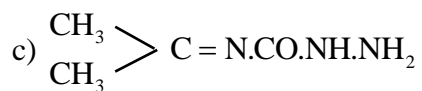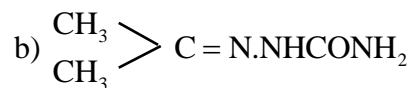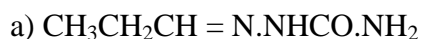   a) FeS
    b) MnS
    c) HgS
    d) ZnS

20. Gastric juice contains about 3g HCl per litre. If a racing horse produces about 2·5 litre of gastric juice per day, how many antacid tablets each containing 400mg of $Al(OH)_3$ are needed to neutralize all the HCl produces in one day? (Al = 27, Cl = 35·5)
    a) 14
    b) 7
    c) 4
    d) none of these

21. Which one of the following properties is exhibited by phenol (Hydroxy benzene)?
    a) It is soluble in aq. NaOH and evolves CO_2 with aq. $NaHCO_3$
    b) It is soluble in aq. NaOH and does not evolve CO_2 with aq. $NaHCO_3$
    c) It is insoluble in aq. NaOH but evolves CO_2 with aq. $NaHCO_3$
    d) It is insoluble in aq. NaOH and does not evolve CO_2 with aq. $NaHCO_3$

22. Which product is formed when Benzaldehyde reacts with concentrated aqueous KOH solution?
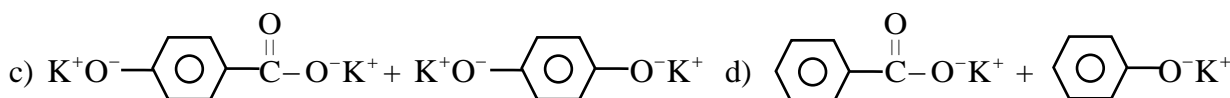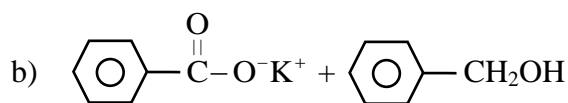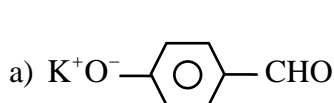
23. An organic compound 'A' (molecular Formula C_3H_8O) is oxidised with $K_2Cr_2O_7$ to form a product 'B' (molecular Formula C_3H_6O). 'B' forms a shining silver mirror on warming with ammonical silver nitrate. 'B' when treated with an aqueous solution of $H_2N.CO - NH.NH_2.HCl$ gives a product 'C'. Identify 'C'.

a) $CH_3CH_2CH = N.NHCO.NH_2$

b) $\dfrac{CH_3}{CH_3}\!\!>\!\! C = N.NHCONH_2$

c) $\dfrac{CH_3}{CH_3}\!\!>\!\! C = N.CO.NH.NH_2$

d) $CH_3CH_2CH = N.CO.NHNH_2$

24. Which of the following molecular species has unpaired electron(s)?

a) N_2 b) F_2 c) O_2^- d) O_2^{2-}
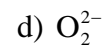
25. The number of protons in 2·8 liter oxygen gas at STP containing exclusively O^{16} isotope is

a) $12·046\times10^{23}$ b) $6·023\times10^{23}$ c) $2·8\times10^{16}$ d) $4·6\times10^{18}$

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FOR ROUGH WORK