TEST PAPER OF JEE(MAIN) EXAMINATION – 2019

(Held On Friday 11th JANUARY, 2019) TIME : 9 : 30 AM To 12 : 30 PM

CHEMISTRY

1. For the cell Zn(s) | Zn^{2+}(aq) || M^{x+} (aq) | M(s), different half cells and their standard electrode potentials are given below :

M^{x+}(aq/M(s)	Au^{3+}(aq)/ Au(s)	Ag^{+}(aq)/ Ag(s)	Fe^{3+}(aq)/ Fe^{2+}(aq)	Fe^{2+}(aq)/ Fe(s)
$E^{o}_{M^{x+}/M^{(v)}}$	1.40	0.80	0.77	–0.44

If $E^{o}_{Zn^{2+}/Zn} = -0.76\,V$, which cathode will give a mximum value of E^{o}_{cell} per electron transferred ?

(1) Fe^{3+} / Fe^{2+} (2) Ag^{+} / Ag

(3) Au^{3+} / Au (4) Fe^{2+} / Fe

Ans. (2)

2. The correct match between items-I and II is :

Item-I (Mixture)	*Item-II (Separation method)*
(A) H_2O : Sugar	(P) Sublimation
(B) H_2O : Aniline	(Q) Recrystallization
(C) H_2O : Toluene	(R) Steam distillation
	(S) Differential extraction

(1) A-Q, B-R, C-S

(2) A-R, B-P, C-S

(3) A-S, B-R, C-P

(4) A-Q, B-R, C-P

Ans. (1)

3. If a reaction follows the Arrhenius equation, the plot lnk vs $\frac{1}{(RT)}$ gives straight line with a gradient (–y) unit. The energy required to activate the reactant is :

(1) y unit (2) –y unit

(3) yR unit (4) y/R unit

Ans. (1)

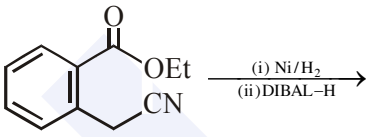
4. The concentration of dissolved oxygen (DO) in cold water can go upto :

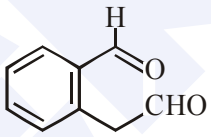
(1) 10 ppm (2) 14 ppm

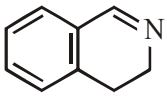
(3) 16 ppm (4) 8 ppm

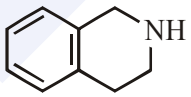
Ans. (1)

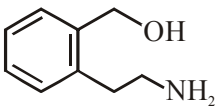
5. The major product of the following reaction is:



(1) 

(2) 

(3) 

(4) 

Ans. (2)

6. Th correct statements among (a) to (d) regarding H_2 as a fuel are :

(a) It produces less pollutant than petrol

(b) A cylinder of compressed dihydrogen weighs ~ 30 times more than a petrol tank producing the same amount of energy

(c) Dihydrogen is stored in tanks of metal alloys like $NaNi_5$

(d) On combustion, values of energy released per gram of liquid dihydrogen and LPG are 50 and 142 kJ, respectively

(1) b and d only

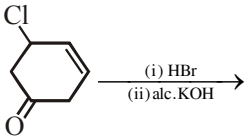
(2) a, b and c only

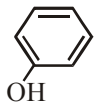
(3) b, c and d only

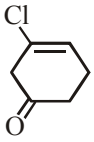
(4) a and c only

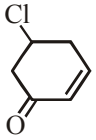
Ans. (2)

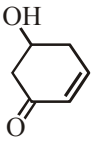
7. The major poduct of the following reaction is:



(1) 

(2) 

(3) 

(4) 

Ans. (1)

8. The element that usually does not show variable oxidation states is :

(1) V (2) Ti (3) Sc (4) Cu

Ans. (3)

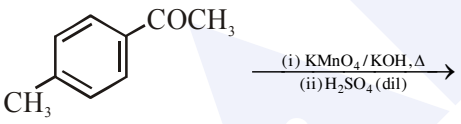
9. An organic compound is estimated through Dumus method and was found to evolve 6 moles of CO_2. 4 moles of H_2O and 1 mole of nitrogen gas. The formula of the compound is :

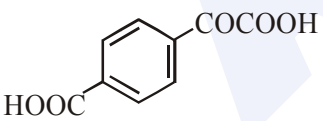
(1) $C_{12}H_8N$ (2) $C_{12}H_8N_2$

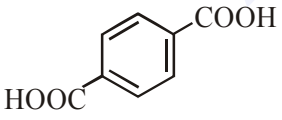
(3) C_6H_8N (4) $C_6H_8N_2$

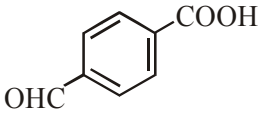
Ans. (4)

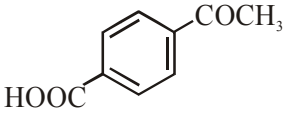
10. The major product of the following reaction is :



(1) 

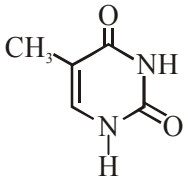
(2) 

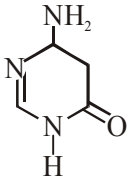
(3) 

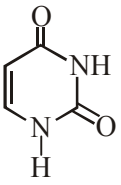
(4) 

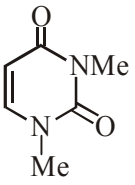
Ans. (2)

11. Among the following compound which one is found in RNA ?

(1) 

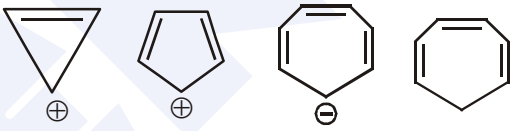
(2) 

(3) 

(4) 

Ans. (3)

12. Which compound(s) out of the following is/are not aromatic ?



(A) (B) (C) (D)

(1) C and D (2) B, C and D

(3) A and C (4) B

Ans. (2)

13. The correct match between Item(I) and Item(II) is :

Item-I	**Item-II**
(A) Nortehindrone	(P) Anti-biotic
(B) Ofloxacin	(Q) Anti-fertility
(C) Equanil	(R) Hypertension
	(S) Analgesics

(1) A-R, B-P, C-S (2) A-Q, B-P, C-R

(3) A-R, B-P, C-R (4) A-Q, B-R, C-S

Ans. (2)

14. Heat treatment of muscular pain involves radiation of wavelength of about 900 nm. Which spectral line of H-atom is suitable for this purpose ?

[$R_H = 1 \times 10^5\ cm^{-1}$, $h = 6.6 \times 10^{-34}$ Js, $c = 3 \times 10^8\ ms^{-1}$]

(1) Paschen, $5 \rightarrow 3$ (2) Paschen, $\infty \rightarrow 3$

(3) Lyman, $\infty \rightarrow 1$ (4) Balmer, $\infty \rightarrow 2$

Ans. (2)

15. Consider the reaction,

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

The equilibrium constant of the above reaction is K_P. If pure ammonia is left to dissociate, the partial pressure of ammonia at equilibrium is given by (Assume that $P_{NH_3} << P_{total}$ at equilibrium)

(1) $\frac{3^{\frac{3}{2}} K_P^{\frac{1}{2}} P^2}{4}$ (2) $\frac{3^{\frac{3}{2}} K_P^{\frac{1}{2}} P^2}{16}$

(3) $\frac{K_P^{\frac{1}{2}} P^2}{16}$ (4) $\frac{K_P^{\frac{1}{2}} P^2}{4}$

Ans. (2)

16. Match the ores(Column A) with the metals (column B) :

Column-A Ores	*Column-B Metals*
(I) Siderite	(a) Zinc
(II) Kaolinite	(b) Copper
(III) Malachite	(c) Iron
(IV) Calamine	(d) Aluminium

(1) I-b ; II-c ; III-d ; IV-a
(2) I-c ; II-d ; III-a ; IV-b
(3) I-c ; II-d ; III-b ; IV-a
(4) I-a ; II-b ; III-c ; IV-d

Ans. (3)

17. The correct order of the atomic radii of C, Cs, Al and S is :

(1) S < C < Al < Cs (2) S < C < Cs < Al
(3) C < S < Cs < Al (4) C < S < Al < Cs

Ans. (4)

18. Match the metals (Column I) with the coordination compound(s) / enzyme(s) (Column II)

Column-I Metals	*Column-II Coordination compound(s) / Enzyme(s)*
(A) Co	(i) Wilkinson catalyst
(B) Zn	(ii) Chlorophyll
(C) Rh	(iii) Vitamin B_{12}
(D) Mg	(iv) Carbonic anhydrase

(1) A-ii ; B-i ; C-iv ; D-iii
(2) A-iii ; B-iv ; C-i ; D-ii
(3) A-iv ; B-iii ; C-i ; D-ii
(4) A-i ; B-ii ; C-iii ; D-iv

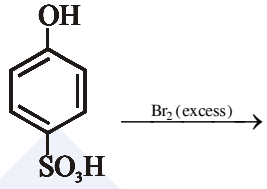
Ans. (2)

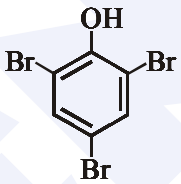
19. A 10 mg effervescent tablet contianing sodium bicarbonate and oxalic acid releases 0.25 ml of CO_2 at T = 298.15 K and p = 1 bar. If molar volume of CO_2 is 25.0 L under such condition, what is the percentage of sodium bicarbonate in each tablet ? [Molar mass of $NaHCO_3$ = 84 g mol^{-1}]

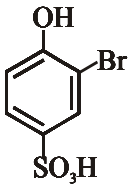
(1) 16.8 (2) 8.4 (3) 0.84 (4) 33.6

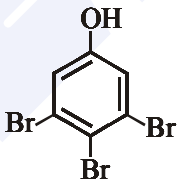
Ans. (1)

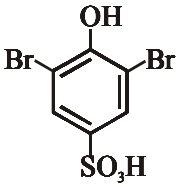
20. The major product of the following reaction is :



(1) 

(2) 

(3) 

(4) 

Ans. (1)

21. Two blocks of the same metal having same mass and at temperature T_1 and T_2, respectively. are brought in contact with each other and allowed to attain thermal equilibrium at constant pressure. The change in entropy, ΔS, for this process is :

(1) $2C_P \ln\left(\frac{T_1+T_2}{4T_1T_2}\right)$ (2) $2C_P \ln\left[\frac{(T_1+T_2)^{\frac{1}{2}}}{T_1T_2}\right]$

(3) $C_P \ln\left[\frac{(T_1+T_2)^2}{4T_1T_2}\right]$ (4) $2C_P \ln\left[\frac{T_1+T_2}{2T_1T_2}\right]$

Ans. (3)

22. The chloride that CANNOT get hydrolysed is :

(1) $SiCl_4$ (2) $SnCl_4$

(3) $PbCl_4$ (4) CCl_4

Ans. (4)

23. For the chemical reaction $X \rightleftharpoons Y$, the standard reaction Gibbs energy depends on temperature T (in K) as :

$$\Delta_r G^o \text{ (in kJ mol}^{-1}) = 120 - \frac{3}{8}T$$

The major component of the reaction mixture at T is :

(1) X if T = 315 K (2) X if T = 350 K

(3) Y if T = 300 K (4) Y if T = 280 K

Ans. (1)

24. The freezing point of a diluted milk sample is found to be –0.2°C, while it should have been –0.5°C for pure milk. How much water has been added to pure milk to make the diluted sample ?

(1) 2 cups of water to 3 cups of pure milk

(2) 1 cup of water to 3 cups of pure milk

(3) 3 cups of water to 2 cups of pure milk

(4) 1 cup of water to 2 cups of pure milk

Ans. (3)

25. A solid having density of 9×10^3 kg m^{-3} forms face centred cubic crystals of edge length $200\sqrt{2}$ pm. What is the molar mass of the solid ?

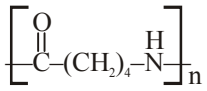
(Avogadro constant $\cong 6 \times 10^{23}$ mol^{-1}, $\pi \cong 3$)

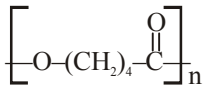
(1) 0.0216 kg mol^{-1} (2) 0.0305 kg mol^{-1}

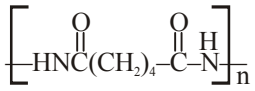
(3) 0.4320 kg mol^{-1} (4) 0.0432 kg mol^{-1}

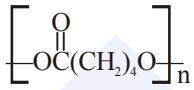
Ans. (2)

26. The polymer obtained from the following reactions is :

(1) 

(2) 

(3) 

(4) 

Ans. (2)

27. An example of solid sol is :

(1) Butter (2) Gem stones

(3) Paint (4) Hair cream

Ans. (2)

28. Peoxyacetyl nitrate (PAN), an eye irritant is produced by :

(1) Acid rain

(2) Photochemical smog

(3) Classical smog

(4) Organic waste

Ans. (2)

29. NaH is an example of :

(1) Electron-rich hydride

(2) Molecular hydride

(3) Saline hydride

(4) Metallic hydride

Ans. (3)

30. The amphoteric hydroxide is :

(1) $Ca(OH)_2$ (2) $Be(OH)_2$

(3) $Sr(OH)_2$ (4) $Mg(OH)_2$

Ans. (2)