

**TEST PAPER OF JEE(MAIN) EXAMINATION – 2019**  
**(Held On Friday 11<sup>th</sup> 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 :

$M^{x+}(aq)/M(s)$	$Au^{3+}(aq)/Au(s)$	$Ag^+(aq)/Ag(s)$	$Fe^{3+}(aq)/Fe^{2+}(aq)$	$Fe^{2+}(aq)/Fe(s)$
$E_{M^{x+}/M}^{\circ}$	1.40	0.80	0.77	-0.44

If  $E_{Zn^{2+}/Zn}^{\circ} = -0.76V$ , which cathode will give a maximum value of  $E_{cell}^{\circ}$  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	Item-II
(Mixture)	(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  $\ln k$  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

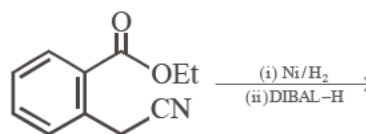
Ans. (1)

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)

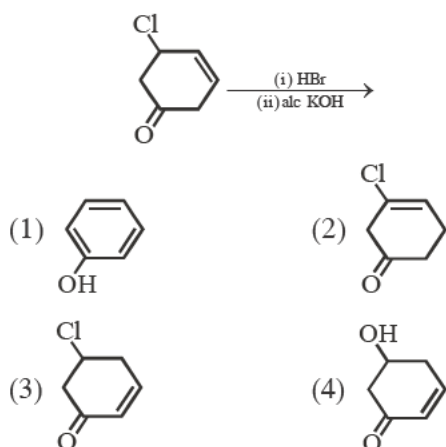
6. The correct statements among (a) to (d) regarding  $H_2$  as a fuel are :

- (a) It produces less pollutant than petrol  
 (b) A cylinder of compressed dihydrogen weighs ~30times 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 product of the following reaction is:



Ans. (1)

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

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

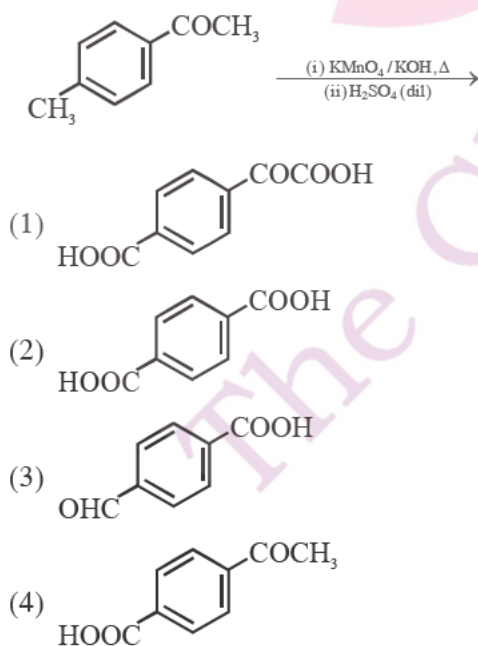
Ans. (3)

9. An organic compound is estimated through Dumus method and was found to evolve 6 moles of  $\text{CO}_2$ , 4 moles of  $\text{H}_2\text{O}$  and 1 mole of nitrogen gas. The formula of the compound is :

- (1)  $\text{C}_{12}\text{H}_8\text{N}$                       (2)  $\text{C}_{12}\text{H}_8\text{N}_2$   
 (3)  $\text{C}_6\text{H}_8\text{N}$                         (4)  $\text{C}_6\text{H}_8\text{N}_2$

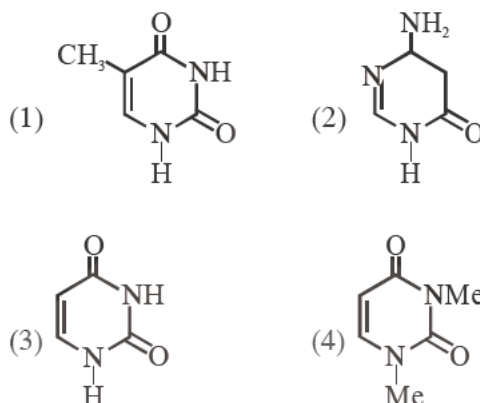
Ans. (4)

10. The major product of the following reaction is :



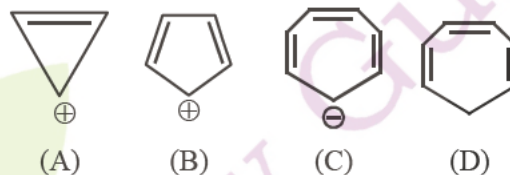
Ans. (2)

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



Ans. (3)

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



- (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 ?

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

- (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,  

$$\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$$
 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  $P_{\text{NH}_3} \ll P_{\text{total}}$  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) :

<i>Column-A</i> Ores	<i>Column-B</i> 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)

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

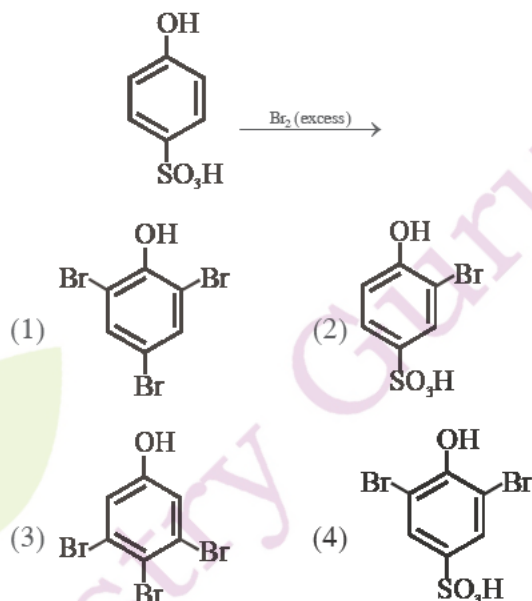
- (1) A-ii ; B-i ; C-iv ; D-iii  
 (2) A-iii ; B-iv ; C-i ; D-ii  
 (3) A-iv ; B-iii ; C-i ; D-ii  
 (4) A-i ; B-ii ; C-iii ; D-iv

Ans. (2)

19. A 10 mg effervescent tablet containing sodium bicarbonate and oxalic acid releases 0.25 ml of CO<sub>2</sub> at T = 298.15 K and p = 1 bar. If molar volume of CO<sub>2</sub> is 25.0 L under such condition, what is the percentage of sodium bicarbonate in each tablet ? [Molar mass of NaHCO<sub>3</sub> = 84 g mol<sup>-1</sup>]  
 (1) 16.8      (2) 8.4      (3) 0.84      (4) 33.6

Ans. (1)

20. The major product of the following reaction is :



Ans. (1)

21. Two blocks of the same metal having same mass and at temperature T<sub>1</sub> and T<sub>2</sub>, 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)  $2C_p \ln \left( \frac{T_1 + T_2}{4T_1 T_2} \right)$       (2)  $2C_p \ln \left[ \frac{(T_1 + T_2)^{\frac{1}{2}}}{T_1 T_2} \right]$

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

Ans. (3)

22. The chloride that CANNOT get hydrolysed is :

- (1)  $\text{SiCl}_4$                       (2)  $\text{SnCl}_4$   
 (3)  $\text{PbCl}_4$                       (4)  $\text{CCl}_4$

Ans. (4)

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

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

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  $-0.2^\circ\text{C}$ , while it should have been  $-0.5^\circ\text{C}$  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  $9 \times 10^3 \text{ kg m}^{-3}$  forms face centred cubic crystals of edge length  $200\sqrt{2} \text{ pm}$ . What is the molar mass of the solid ?

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

- (1)  $0.0216 \text{ kg mol}^{-1}$               (2)  $0.0305 \text{ kg mol}^{-1}$   
 (3)  $0.4320 \text{ kg mol}^{-1}$               (4)  $0.0432 \text{ kg mol}^{-1}$

Ans. (2)

26. The polymer obtained from the following reactions is :



- (1)  $\left[ \text{C} \begin{array}{c} \text{O} \\ \parallel \\ \text{---}(\text{CH}_2)_4\text{---} \end{array} \text{N} \begin{array}{c} \text{H} \\ | \end{array} \right]_n$   
 (2)  $\left[ \text{O} \text{---}(\text{CH}_2)_4\text{---} \text{C} \begin{array}{c} \text{O} \\ \parallel \\ \text{---} \end{array} \right]_n$   
 (3)  $\left[ \text{HNC} \begin{array}{c} \text{O} \\ \parallel \\ \text{---}(\text{CH}_2)_4\text{---} \end{array} \text{C} \begin{array}{c} \text{O} \\ \parallel \\ \text{---} \end{array} \text{N} \begin{array}{c} \text{H} \\ | \end{array} \right]_n$   
 (4)  $\left[ \text{OC} \begin{array}{c} \text{O} \\ \parallel \\ \text{---}(\text{CH}_2)_4\text{---} \end{array} \right]_n$

Ans. (2)

27. An example of solid sol is :

- (1) Butter                              (2) Gem stones  
 (3) Paint                                (4) Hair cream

Ans. (2)

28. Peroxyacetyl 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)  $\text{Ca(OH)}_2$                       (2)  $\text{Be(OH)}_2$   
 (3)  $\text{Sr(OH)}_2$                       (4)  $\text{Mg(OH)}_2$

Ans. (2)