

TEST PAPER OF JEE(MAIN) EXAMINATION – 2019
(Held On Wednesday 09th JANUARY, 2019) TIME : 9 : 30 AM To 12 : 30 PM
CHEMISTRY

1. Which one of the following statements regarding Henry's law is not correct ?
- (1) The value of K_H increases with increase of temperature and K_H is function of the nature of the gas
 - (2) Higher the value of K_H at a given pressure, higher is the solubility of the gas in the liquids.
 - (3) The partial pressure of the gas in vapour phase is proportional to the mole fraction of the gas in the solution.
 - (4) Different gases have different K_H (Henry's law constant) values at the same temperature.

Ans. (2)

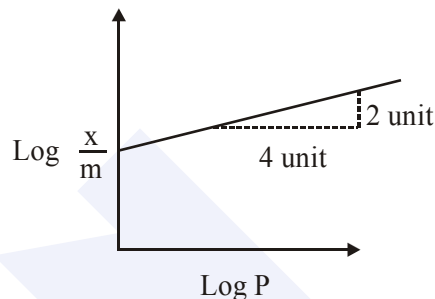
2. The correct decreasing order for acid strength is :-
- (1) $\text{NO}_2\text{CH}_2\text{COOH} > \text{NCCH}_2\text{COOH} > \text{FCH}_2\text{COOH} > \text{ClCH}_2\text{COOH}$
 - (2) $\text{FCH}_2\text{COOH} > \text{NCCH}_2\text{COOH} > \text{NO}_2\text{CHCOOH} > \text{ClCH}_2\text{COOH}$
 - (3) $\text{NO}_2\text{CH}_2\text{COOH} > \text{FCH}_2\text{COOH} > \text{CNCH}_2\text{COOH} > \text{ClCH}_2\text{COOH}$
 - (4) $\text{CNCH}_2\text{COOH} > \text{O}_2\text{NCH}_2\text{COOH} > \text{FCH}_2\text{COOH} > \text{ClCH}_2\text{COOH}$

Ans. (1)

3. Two complexes $[\text{Cr}(\text{H}_2\text{O})_6]\text{Cl}_3$ (A) and $[\text{Cr}(\text{NH}_3)_6]\text{Cl}_3$ (B) are violet and yellow coloured, respectively. The incorrect statement regarding them is :
- (1) Δ_0 value of (A) is less than that of (B).
 - (2) Δ_0 value of (A) and (B) are calculated from the energies of violet and yellow light, respectively
 - (3) Both absorb energies corresponding to their complementary colors.
 - (4) Both are paramagnetic with three unpaired electrons.

Ans. (2)

4. Adsorption of a gas follows Freundlich adsorption isotherm. In the given plot, x is the mass of the gas adsorbed on mass m of the adsorbent at pressure p. $\frac{x}{m}$ is proportional to



- (1) $P^{1/4}$ (2) P^2 (3) P (4) $P^{1/2}$

Ans. (4)

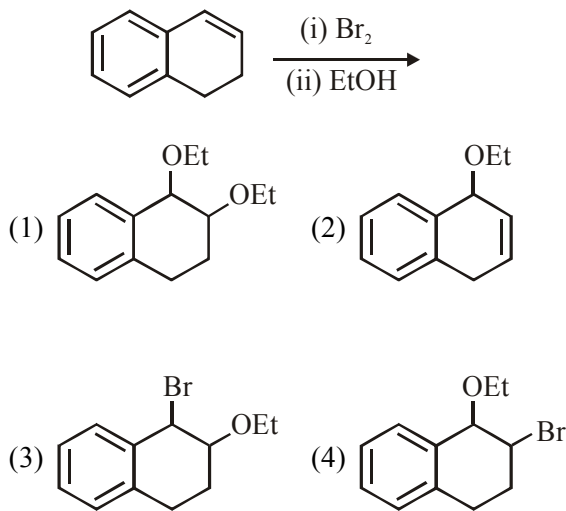
5. Correct statements among a to d regarding silicones are :
- (a) They are polymers with hydrophobic character
 - (b) They are biocompatible.
 - (c) In general, they have high thermal stability and low dielectric strength.
 - (d) Usually, they are resistant to oxidation and used as greases.
- (1) (a), (b) and (c) only
 (2) (a), and (b) only
 (3) (a), (b), (c) and (d)
 (4) (a), (b) and (d) only

Ans. (4)

6. For emission line of atomic hydrogen from $n_i = 8$ to $n_f = n$ the plot of wave number $\bar{\nu}$ against $\left(\frac{1}{n^2}\right)$ will be (The Rydberg constant, R_H is in wave number unit).
- (1) Linear with slope - R_H
 - (2) Linear with intercept - R_H
 - (3) Non linear
 - (4) Linear with slope R_H

Ans. (4)

7. The major product the following reaction is :



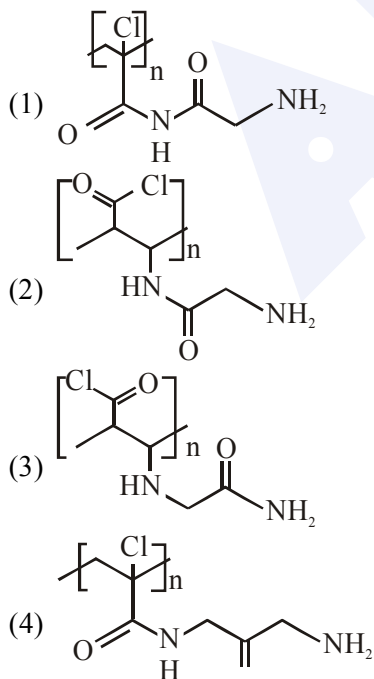
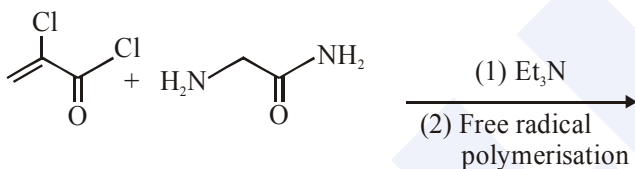
Ans. (4)

8. The alkaline earth metal nitrate that does not crystallise with water molecules, is :

- (1) $\text{Sr}(\text{NO}_3)_2$ (2) $\text{Mg}(\text{NO}_3)_2$
 (3) $\text{Ca}(\text{NO}_3)_2$ (4) $\text{Ba}(\text{NO}_3)_2$

Ans. (4)

9. Major product of the following reaction is :



Ans. (4)

10. The highest value of the calculated spin only magnetic moment (in BM) among all the transition metal complexes is :

- (1) 5.92 (2) 3.87 (3) 6.93 (4) 4.90

Ans. (1)

11. 20 mL of 0.1 M H_2SO_4 solution is added to 30 mL of 0.2 M NH_4OH solution. The pH of the resultant mixture is : [$\text{p}K_b$ of $\text{NH}_4\text{OH} = 4.7$].

- (1) 9.4 (2) 5.0 (3) 9.0 (4) 5.2

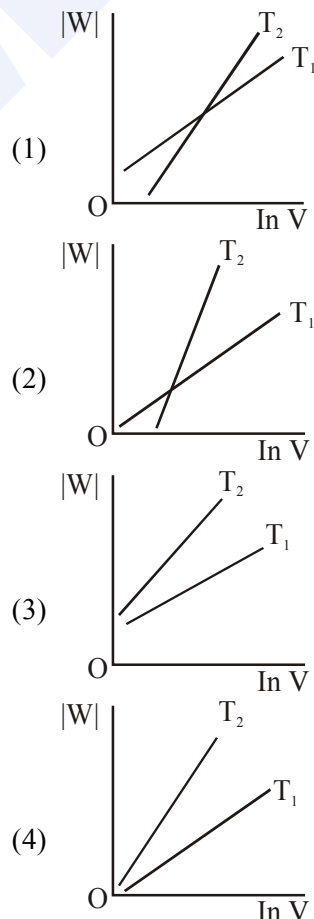
Ans. (3)

12. 0.5 moles of gas A and x moles of gas B exert a pressure of 200 Pa in a container of volume 10 m^3 at 1000 K. Given R is the gas constant in $\text{JK}^{-1} \text{ mol}^{-1}$, x is :

- (1) $\frac{2R}{4+12}$ (2) $\frac{2R}{4-R}$ (3) $\frac{4-R}{2R}$ (4) $\frac{4+R}{2R}$

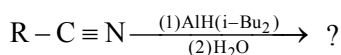
Ans. (3)

13. Consider the reversible isothermal expansion of an ideal gas in a closed system at two different temperatures T_1 and T_2 ($T_1 < T_2$). The correct graphical depiction of the dependence of work done (w) on the final volume (V) is:



Ans. (2)

14. The major product of following reaction is :



- (1) RCHO (2) RCOOH
(3) RCH₂NH₂ (4) RCONH₂

Ans. (1)

15. In general, the properties that decrease and increase down a group in the periodic table, respectively, are :

- (1) electronegativity and electron gain enthalpy.
(2) electronegativity and atomic radius.
(3) atomic radius and electronegativity.
(4) electron gain enthalpy and electronegativity.

Ans. (2)

16. A solution of sodium sulfate contains 92 g of Na⁺ ions per kilogram of water. The molality of Na⁺ ions in that solution in mol kg⁻¹ is:

- (1) 16 (2) 8 (3) 4 (4) 12

Ans. (3)

17. A water sample has ppm level concentration of the following metals: Fe= 0.2; Mn = 5.0; Cu = 3.0; Zn = 5.0. The metal that makes the water sample unsuitable drinking is :

- (1) Zn (2) Fe (3) Mn (4) Cu

Ans. (3)

18. The increasing order of pK_a of the following amino acids in aqueous solution is :

Gly Asp Lys Arg

- (1) Asp < Gly < Arg < Lys
(2) Arg < Lys < Gly < Asp
(3) Gly < Asp < Arg < Lys
(4) Asp < Gly < Lys < Arg

Ans. (4)

19. According to molecular orbital theory, which of the following is true with respect to Li₂⁺ and Li₂⁻?

- (1) Both are unstable
(2) Li₂⁺ is unstable and Li₂⁻ is stable
(3) Li₂⁺ is stable and Li₂⁻ is unstable
(4) Both are stable

Ans. (4)

20. The following results were obtained during kinetic studies of the reaction :
2A + B → Products

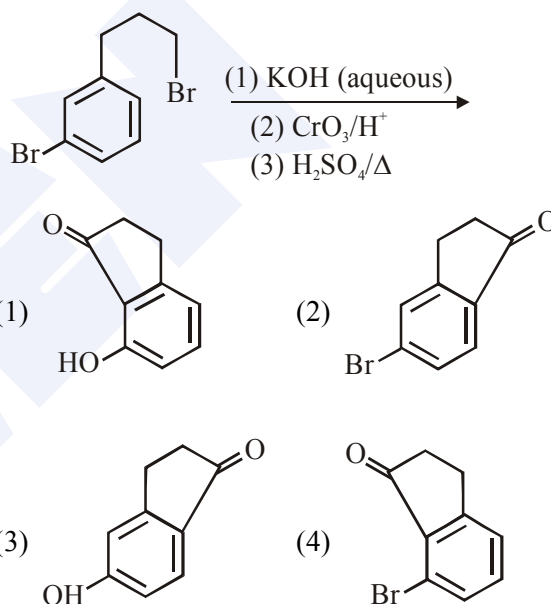
Experiment	[A] (in mol L ⁻¹)	[B] (in mol L ⁻¹)	Initial Rate of reaction (in mol L ⁻¹ min ⁻¹)
(I)	0.10	0.20	6.93 × 10 ⁻³
(II)	0.10	0.25	6.93 × 10 ⁻³
(III)	0.20	0.30	1.386 × 10 ⁻²

The time (in minutes) required to consume half of A is :

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

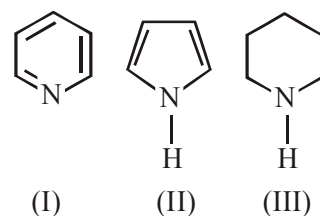
Ans. (2)

21. The major product of the following reaction is:



Ans. (2)

22. Arrange the following amines in the decreasing order of basicity:



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

Ans. (4)

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23. Which amongst the following is the strongest acid ?

- (1) CHI_3 (2) CHCl_3
 (3) CHBr_3 (4) $\text{CH}(\text{CN})_3$

Ans. (4)

24. The anodic half-cell of lead-acid battery is recharged using electricity of 0.05 Faraday. The amount of PbSO_4 electrolyzed in g during the process in : (Molar mass of $\text{PbSO}_4 = 303 \text{ g mol}^{-1}$)

- (1) 22.8 (2) 15.2 (3) 7.6 (4) 11.4

Ans. (3)

25. The one that is extensively used as a piezoelectric material is :

- (1) Quartz (2) Amorphous silica
 (3) Mica (4) Tridymite

Ans. (1)

26. Aluminium is usually found in +3 oxidation state. In contrast, thallium exists in +1 and +3 oxidation states. This is due to :

- (1) lanthanoid contraction
 (2) lattice effect
 (3) diagonal relationship
 (4) inert pair effect

Ans. (4)

27. The correct match between Item -I and Item-II is :

Item - I (drug)		Item - II (test)	
(A)	Chloroxylenol	(P)	Carbylamine Test
(B)	Norethindrone	(Q)	Sodium Hydrogen carbonate Test
(C)	Sulphapyridine	(R)	Ferric chloride test
(D)	Penicillin	(S)	Bayer's test

- (1) $\text{A} \rightarrow \text{Q}$; $\text{B} \rightarrow \text{P}$; $\text{C} \rightarrow \text{S}$; $\text{D} \rightarrow \text{R}$
 (2) $\text{A} \rightarrow \text{R}$; $\text{B} \rightarrow \text{P}$; $\text{C} \rightarrow \text{S}$; $\text{D} \rightarrow \text{Q}$
 (3) $\text{A} \rightarrow \text{R}$; $\text{B} \rightarrow \text{S}$; $\text{C} \rightarrow \text{P}$; $\text{D} \rightarrow \text{Q}$
 (4) $\text{A} \rightarrow \text{Q}$; $\text{B} \rightarrow \text{S}$; $\text{C} \rightarrow \text{P}$; $\text{D} \rightarrow \text{R}$

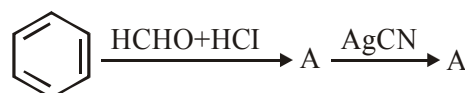
Ans. (3)

28. The ore that contains both iron and copper is:

- (1) malachite
 (2) dolomite
 (3) azurite
 (4) copper pyrites

Ans. (4)

29. The compounds A and B in the following reaction are, respectively:



- (1) A = Benzyl alcohol, B = Benzyl isocyanide
 (2) A = Benzyl alcohol, B = Benzyl cyanide
 (3) A = Benzyl chloride, B = Benzyl cyanide
 (4) A = Benzyl chloride, B = Benzyl isocyanide

Ans. (4)

30. The isotopes of hydrogen are :

- (1) Tritium and protium only
 (2) Deuterium and tritium only
 (3) Protium and deuterium only
 (4) Protium, deuterium and tritium

Ans. (4)

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