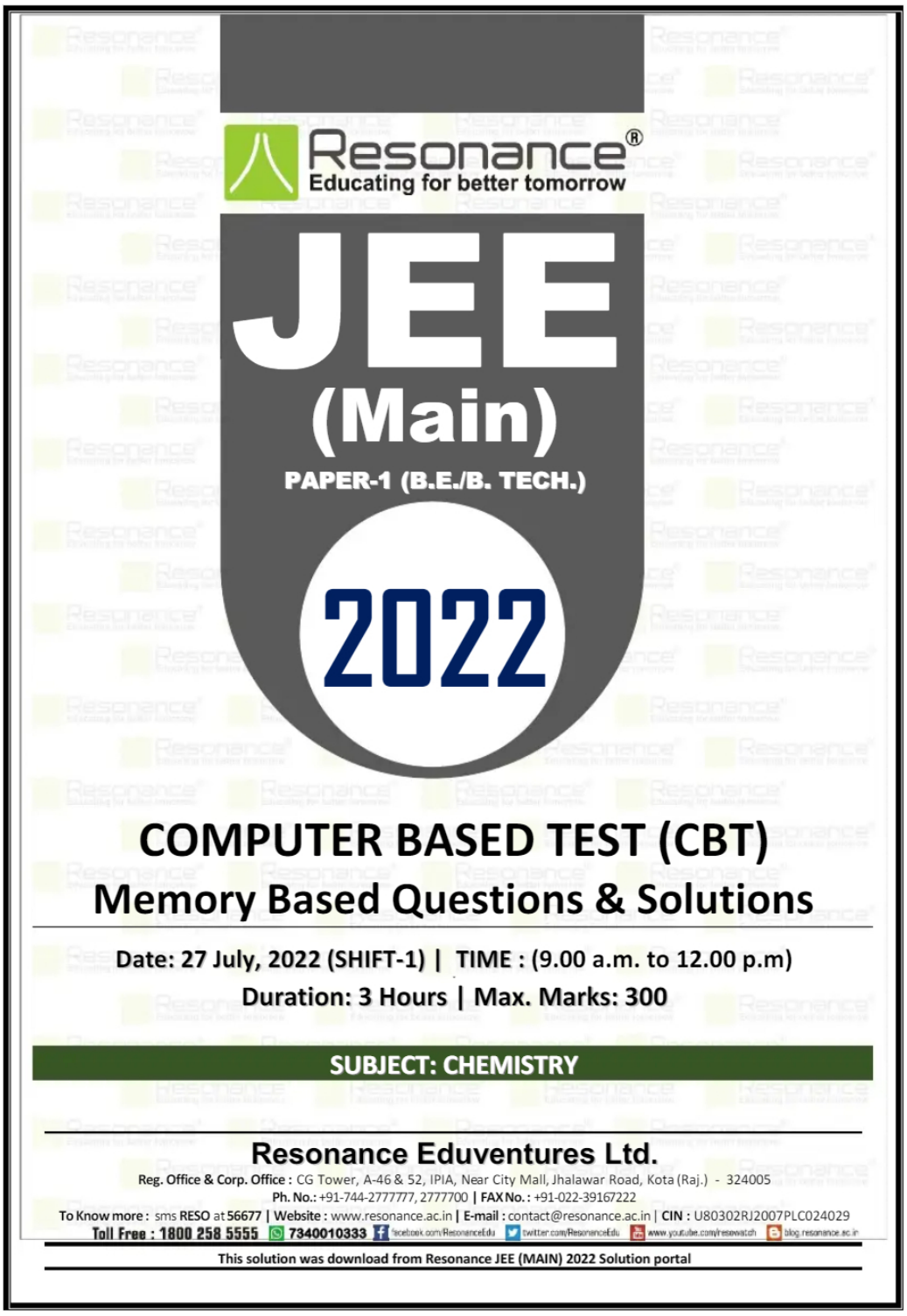


COMPUTER BASED TEST (CBT)

Memory Based Questions & Solutions

Date: 27 July, 2022 (SHIFT-1) | TIME : (9.00 a.m. to 12.00 p.m)

Duration: 3 Hours | Max. Marks: 300

SUBJECT: CHEMISTRY

Resonance Eduventures Ltd.

Reg. Office & Corp. Office : CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Raj.) - 324005

Ph. No.: +91-744-2777777, 2777700 | FAX No. : +91-022-39167222

To Know more : sms RESO at 56677 | Website : www.resonance.ac.in | E-mail : contact@resonance.ac.in | CIN : U80302RJ2007PLC024029

Toll Free : 1800 258 5555 | 7340010333 | facebook.com/ResonanceEdu | twitter.com/ResonanceEdu | www.youtube.com/resowatch | blog.resonance.ac.in

This solution was download from Resonance JEE (MAIN) 2022 Solution portal

PART : CHEMISTRY

1. **Assertion** : 2s-orbital of hydrogen atom has more energy than corresponding 2s-orbital of lithium
Reason : As atomic number increases energy of orbitals in the same sub shell decreases.
(1) Assertion is true, Reason is true and Reason is correct explanation of Assertion
(2) Assertion is true, Reason is true and Reason is not correct explanation of Assertion.
(3) Assertion is true and Reason is false

(4) Assertion is false and Reason is true

Ans. (1)

Sol. **Energies of the orbitals in the same subshell decrease with increase in the atomic number (Z_{eff}).**

For example, energy of $2s$ orbital of hydrogen atom is greater than that of $2s$ orbital of lithium and that of lithium is greater than that of sodium and so on, that is, $E_{2s}(H) > E_{2s}(Li) > E_{2s}(Na) > E_{2s}(K)$.

2. 250 gram of D-Glucose solution contain 10.8% carbon by weight. Find molality of solution.
[Report your answer to nearest value]

(1) 1.03 m (2) 2.055 (3) 0.05 (4) 4.03

Ans. (2)

Sol. Glucose $\Rightarrow C_6H_{12}O_6$ [GMM =180]

Mass of carbon (in 250 gram solution) = $\left[\frac{250\times10.8}{100}\right]$

$\therefore$ 72 gram of carbon in total mass of glucose (180)

$\therefore$ $\frac{250\times10.8}{100}$ Gram carbon present in = $\frac{180}{72}\times\frac{250\times10.8}{100}$

= 67.5 gram

Mass of solvent = (250–67.5) = 182.5 gram

Molality = $\left(\frac{67.5\times1000}{180\times182.5}\right)$

= 2.055

3. Which of the following method is not used for refining of any metal
(I) Liquation (II) Calcination (III) Electrolysis (IV) Leaching (V) Distillation
Correct set are

(1) II, IV only (2) I, II, IV only (3) I, II, III, IV only (4) II, IV, V only

Ans. (1)

Sol. Calcination and leaching are not used in refining

4. The $CoCl_3.4NH_3$ produce 1 : 1 moles of ions in aqueous solution then primary valence of Co in this complex is:

Ans. (3)

Sol. $CoCl_3.4NH_3$

Complex is $\Rightarrow$ $[Co(NH_3)_4Cl_2]Cl$

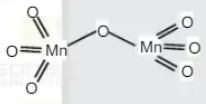
Primary Valency = 3

5. Total number of Mn = 0 bonds in Mn_2O_7 is

(1) 3 (2) 4 (3) 6 (4) 7

Ans. (3)

Sol. $\Rightarrow$ structure of Mn_2O_7 is



Total Mn = 0 Bonds = 6

6. **An** aqueous solution of 2% by mass of compound A has same boiling point as 8% aqueous solution of B then correct relation between molar mass of A and B is:

(1) $M_A = 4M_B$ (2) $M_B = 4M_A$ (3) $M_A = 8M_B$ (4) $M_A = 0M_B$

Ans. (1)

Sol. $\Delta T_b = K_b \times m$

$(\Delta T_b)_A = (\Delta T_b)_B$

$m_A = m_B$

$$\text{Molality} = \frac{\%(W/W)\times 1000}{M_A \times W_{solvent}}$$

$$\frac{2\times 1000}{M_A \times 98} = \frac{8\times 1000}{M_B \times 92}$$

$M_B \approx 4M_A$

7. **Statement I:** O_2, Cu^{2+}, Fe^{3+} are weakly attracted by manganic field and get magnetise in same direction.
Statement II: NaCl and H_2O magnetise in opposite direction
(1) Both Statement I & Statement II are true (2) Statement I is true & Statement II is false.
(3) Statement I is false & Statement II is true (4) Both Statement I & Statement II are false.

Ans. (1)

Sol. **Statement I:** O_2, Cu^{2+}, Fe^{3+} and Fe^{3+} are para magnetic and both are weakly attracted by magnetic field and get magnetise in same direction
Statement II: NaCl and H_2O are diamagnetic and magnetise in opposite direction

8. Oxalic acid is titrated with $KMnO_4$ in acidic medium, then find change in oxidation state carbon

Ans. (1)

Sol. $MnO_4^- + \overset{+3}{C_2O_4^{2-}} \longrightarrow Mn^{2+} + \overset{+4}{CO_2}$

Change in oxidation state of carbon = 1

9. 20 ml, 0.02M $K_2Cr_2O_7$ is titrated with 10 ml solution of Fe^{2+} ion, then molarity of Fe^{2+} ion solution is---$X10^{-2}$ M.

Ans. (24)

Sol. $Cr_2O_7^{2-} + Fe^{2+} \rightarrow Cr^{3+} + Fe^{3+}$

Vf = 6 Vf =1

Mili. eq. of $Cr_2O_7^{2-} = 1[M \times 10]$

$M = 24\times 10^{-2}$

10. Which of the following statement is incorrect?
(1) Ionisation energy of potassium is less than sodium and lithium.
(2) Xe does not have least ionisation energy in its group.
(3) Ionisation energy of gallium is more than that of atomic number 30
(4) Ionisation energy of atomic number 38 element is greater than atomic number 37 element

Ans. (3)

Sol. $\overset{Zn}{30} = [Ar]\ 3d^{10}\ CS^2$

$\overset{Ga}{31} = [Ar]\ 3d^{10}\ 4S^2\ 4P^1$

IE of Zn > IE of Ga.

11. Which compound has maximum number of oxygen atoms ?
(1) Hypophosphorous acid (2) Pyrophosphorous acid
(3) Hypophosphoric acid (4) Pyrophosphoric acid

Ans. (4)

Sol.

Name	Formula
Hypophosphorous (Phosphinic)	H_3PO_2

Pyrophosphorous	$H_4P_2O_5$
Hypophosphoric	$H_4P_2O_6$
Pyrophosphoric	$H_4P_2O_7$

12. **Assertion :** Charcoal adsorb SO_2 gas more than CH_4 gas.

Reason : Gas with lower critical temperature will adsorb more by charcoal

(1) Assertion is true, Reason is true and Reason is correct explanation of Assertion

(2) Assertion is true, Reason is true and Reason is not correct explanation of Assertion.

(3) Assertion is true and Reason is false

(4) Assertion is false and Reason is true

Ans. (3)

Sol. **Assertion :** SO_2 adsorb more by charcoal than CH_4 as SO_2 is polar and CH_4 is non polar

Reason : Gas with higher critical temperature will adsorb more by charcoal

13. **Statement I:** H_2O_2 can act as an oxidising agent both in acidic and basic medium.

Statement II: H_2O_2 has more density than D_2O at 298K.

(1) Both Statement I & Statement II are true (2) Statement I is true & Statement II is false.

(3) Statement I is false & Statement II is true (4) Both Statement I & Statement II are false.

Ans. (1)

Sol. **Statement I:** H_2O_2 can act as an oxidising agent both in acidic and basic medium.

Statement II: At 298K.

Density of D_2O = 1.1059 gram / cm^3

Density of H_2O_2 = 1.44 gram/ cm^3

14. How many of the following have identical bond order?

CN^-, NO^+, O_2, O_2^{2+}, O_2^+

Ans. (3)

Sol.

Species	CN^-	NO^+	O_2	O_2^{2+}	O_2^+
Bond order	3	3	2	3	2.5

15. How many are paramagnetic species

Na_2O, KO_2, N_2O, NO_2, SO_2, ClO_2, Cl_2O

Ans. (3)

Sol. Diamagnetic $\Rightarrow$ Na_2O, N_2O, SO_2, Cl_2O

Paramagnetic $\Rightarrow$ KO_2, NO_2, ClO_2

Ans = 3

16. For reaction at 800°C

$NO + 2H_2 \rightarrow N_2 + 2H_2O$

Following experimental result are collected

Exp. No.	Pressure of H_2 (in k Pa)	Initial press of NO (in k Pa)	Initial rate
1	65.2	40	0.135
2	65.2	20	0.033
3	38.5	65.2	0.213
4	19.6	65.2	0.105

Order of reaction with respect to NO is-

Ans. (2)

Sol. Rate = $K[H_2]^X [NO]^Y$

From exp I and Exp II

$$\frac{R_2}{R_1} = \frac{0.033}{0.135} = \left(\frac{20}{40}\right)^Y$$

$$= \frac{1}{4} = \left(\frac{1}{2}\right)^Y$$

Y = 2

Order = 2

17. **Statement I:** Chlorides of both beryllium and aluminium have Cl^- bridged chloride structure in vapour phase and both are lewis bases.

Statement II: Beryllium and aluminium hydroxides dissolve in excess of alkali to give beryllate and aluminate ions.

(1) Both Statement I & Statement II are true (2) Statement I is true & Statement II is false.

(3) Statement I is false & Statement II is true (4) Both Statement I & Statement II are false.

Ans. (3)

Sol. The chlorides of both beryllium and aluminium have Cl^- bridged chloride structure in vapour phase. Both the chlorides are soluble in organic solvents and are strong Lewis acids.

Beryllium hydroxide dissolves in excess of alkali to give a beryllate ion, $[Be(OH)_4]^{2-}$ just as aluminium hydroxide gives aluminate ion, $[Al(OH)_4]^-$.

18. Solubility of CaF_2 in aqueous solution is 2.34×10^{-3} gram / 100 ml, then solubility product is —X10^{-10} $\left(\frac{Mole}{lit}\right)^3$

[Given molar mass of CaF_2 = 78 gram]

[Report your answer to nearest integer]

Ans. (1)

Sol. Solubility (s) of $CaF_2 = \frac{2.34 \times 10^{-3}}{78} \times 10 \frac{Mole}{lit}$

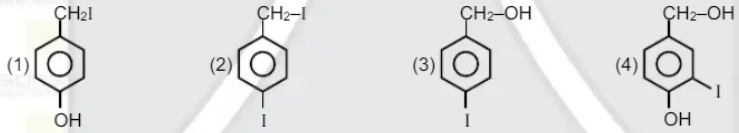
$$= \left(\frac{234}{78}\right) \times 10^{-4} \frac{Mole}{lit}$$

$$CaF_2\,(s) \rightleftharpoons \underset{S}{Ca^{2+}} + \underset{2s}{2F^-}$$

$K_{sp} = 4s^3 = 4 \left[\frac{234 \times 10^{-4}}{\quad}\right]^3$

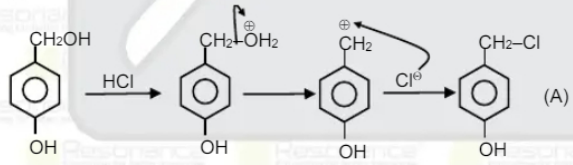
$$= 4\,[3\times10^{-4}]^3$$
$$= 4\times27\times10^{-12} = 108\times10^{-12}$$
$$= 1.08\times10^{-10}\left(\frac{\text{Mole}}{\text{lit}}\right)^3$$

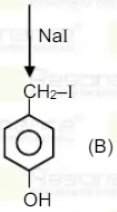
19. Identify structure of 'B'



Ans. (1)

Sol.





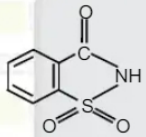
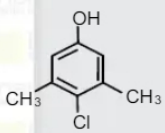
20. A sugar 'X' on heating dehydrated very slowly and form furfural which react with resorcinol/HCl and give coloured compound than compound 'X' will be.

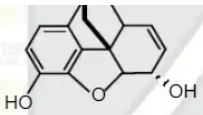
(1) Aldopentose (2) Aldoketose (3) Ketotetrose (4) Oxalic acid

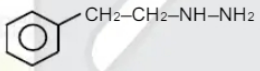
Ans. (1)

Sol. This is seliwanoff test use to identify Aldose and Ketose. Ketose rapidly dehydrated and give dark Red color with resorcinol & HCl but Aldose give light pink colour.

21.

Column-I	**Column-II**
(A) 	(P) Antiseptic
(B) 	(Q) 550 time sweetner
	

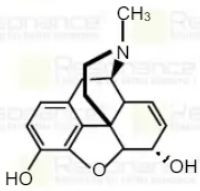
(C)  (R) Narcotic drugs

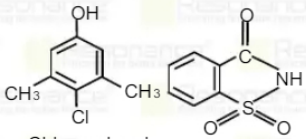
(D)  (S) Transquiliser

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

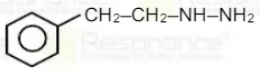
(3) (A)-S, (B)-P, (C)-Q, (D)-R (4) (A)-Q, (B)-R, (C)-P, (D)-S

Ans. (1)

Sol. 
Morphine


Chloroxylenol

Saccharin


Phenelzine (Nardil)

22.

Column-I	Column-II
(A) Benzene sulphonyl chloride	(P) 1° amine
(B) Hoffman bromamide degradation	(Q) Hinsberg reagent
(C) Carbyl amine test	(R) Antisatyzeff alkene
(D) Hoffman method	(S) Isocyanide formation

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

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

Ans. (3)

23.

Column-I	Column-II
(A) Novolac	(P) Terephthalic acid & glycol
(B) Glyptal	(Q) Phthalic acid and Glycol
(C) Dacron	(R) Butadiene and Styrene
(D) Buna-S	(S) Formaldehyde and phenol

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

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

Ans. (4)

24. **Statement-I :** 
(I) (Aromatic) (II) (Non Aromatic) (III) Aromatic)

Statement-II : Planarity is one essential condition for aromatic compound.

(1) Statement-I is correct only.

(2) Statement-II is correct only.

(3) Both statement-I & II are correct.

(4) Statement-I is incorrect and Statement-II is correct.

Ans. (4)

25.

Column-I	Column-II
(A) F^- > 2 ppm	(P) Brown teeth
(B) SO_4^{2-} > 500 ppm	(Q) Laxative effect

(C) NO_3^- > 50 ppm (R) Methemoglobinemia

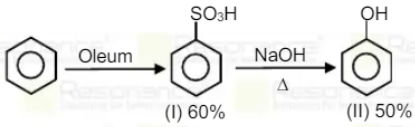
(D) Pb^{2+} > 50 ppb (S) Kidney damage

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

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

Ans. (1)

26.



yield of Ist product = 60%

yield of IInd product = 50%

percentage yield of product.

Ans. (30)

27. It optical rotation of a mixture is 12.6° and rotation of pure optical isomer is +30° than find out optical purity of mixture.

Ans. (42)

Sol. $\frac{12.6}{30} \times 100$

= 42%

28. If 0.45 gm organic compound reacts with $AgNO_3$ gives 0.36 gm pale yellow precipitate of AgBr. Find out percentage of Br, in given compound by Carius method.

Ans. (34.04)

Sol. % of Br = $\frac{0.36}{0.45} \times \frac{80}{188} \times 100$