Resonance®
Educating for better tomorrow

JEE
(Main)
PAPER-1 (B.E./B. TECH.)

2023

COMPUTER BASED TEST (CBT)
Memory Based Questions & Solutions

Date: 01 February, 2023 (SHIFT-1) | TIME : (9.00 a.m. to 12.00 p.m)

Duration: 3 Hours | Max. Marks: 300

SUBJECT: CHEMISTRY

PART : CHEMISTRY

1. Match the following :

	List-I		List-II
(A)	Slaked Lime	(P)	$CaSO_4$
(B)	Caustic Soda	(Q)	$Ca(OH)_2$
(C)	Washing Soda	(R)	NaOH
(D)	Dead Burnt Plaster	(S)	$Na_2CO_3.10H_2O$

(1) A – Q ; B – R ; C – S ; D – P   (2) A – P ; B – Q ; C – R ; D – S
(3) A – Q ; B – P ; C – R ; D – S   (4) A – R ; B – S ; C – P ; D – Q

Ans. (1)

Sol.

Slaked Lime	$Ca(OH)_2$
Caustic Soda	$NaOH$
Washing Soda	$Na_2CO_3.10H_2O$
Dead Burnt Plaster	$CaSO_4$

2. The sum of oxidation numbers of Bromine in Per bromic acid & Bromic acid is :

Ans. (12)

Sol. $HBrO_4 \rightarrow$ Perbromic acid
$(+1) + x + 4(-2) = 0$
$x = +7$
$HBrO_3 \rightarrow$ Bromic acid
$(+1) + x + 3(-2) = 0$
$x = +5$
Sum of oxidation numbers of Bromine = 7 + 5 = 12

3. The blue pigment prussian blue is an iron complex with formula
(1) $Fe_4[Fe(CN)_6]_3$ (2) $Fe_3[(CN)]_2$ (3) $Fe[Fe(CN)_6]_2$ (4) $K_4[Fe(CN)_6]$

Ans. (1)

Sol. $4Fe^{3+} + 3[Fe(CN)_6]^{4-} \longrightarrow Fe_4[Fe(CN)_6]_3 \downarrow$ Prussian blue precipitate.

4. The complex that has highest crystal field splitting energy (Δ), is :
(1) $[Fe(CN)_6]^{3-}$ (2) $[Fe(NH_3)_6]^{3+}$ (3) $[Fe(Ox)_3]^{3-}$ (4) $[FeF_6]^{3-}$

Ans. (1)

Sol. CN^- is strong ligand, So $[Fe(CN)_6]^{3-}$ has maximum CFSE

5. **Assertion:** Hydrogen is environmental friendly fuel source of energy.

Reason: Atomic number of Hydrogen is 1 and it is a lightest element.

(1) If both Assertion and Reason are true and the Reason is the correct explanation of the Assertion.

(2) If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion.

(3) If Assertion is true but Reason is false.

(4) If both Assertion and Reason are false.

Ans. (2)

Sol. Dihydrogen is used in fuel cells for generating electrical energy. It has many advantages over the conventional fossil fuels and electric power. It does not produce any pollution and releases greater energy per unit mass of fuel in comparison to gasoline and other fuels.

6. For two reversible reaction :
$X(g) \rightleftharpoons Y(g) + Z(g)$ $K_P = 3$
$A(g) \rightleftharpoons 2B(g)$ $K_P = 1$

If degree of dissociation of both reactions is same, then ratio of $\left(\dfrac{P_1}{P_2}\right)$ is..........

[Where P_1 and P_2 are equilibrium pressure of above two reactions]

Ans. (12)

Sol. $X(g) \rightleftharpoons Y(g) + Z(g)$ $K_{P_1} = \dfrac{\alpha^2}{1-\alpha^2} \times P_1 = 3$

$A(g) \rightleftharpoons 2B(g)$ $K_{P_2} = \dfrac{4\alpha^2}{1-\alpha^2} \times P_2 = 1$
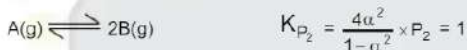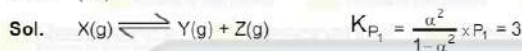
$\dfrac{K_{P_1}}{K_{P_2}} = \dfrac{P_1}{4P_2} = \dfrac{3}{1}$

so $\left(\dfrac{P_1}{P_2}\right) = 12$

7. 3M NaCl solution have density 1.0 gram/ml and its molality is (X) × 10^{-2}, then value of X is :
[Nearest integer]

Ans. (364)

Sol. Molality(m) = $\dfrac{M \times 1000}{1000 \times d - M \times M_{solute}}$

$= \left(\dfrac{3 \times 1000}{1000 \times 1 - 3 \times 58.5}\right)$

$$= 3.6386 \text{ m}$$
$$= 363.86 \times 10^{-2} \text{ m} \quad \text{Ans.} = 364$$

8. Average kinetic energy of an ideal gas depends upon :
(1) Nature of the gas (2) Pressure of the gas
(3) Temperature of the gas (4) Volume of the gas

Ans. (3)

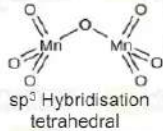**Sol.** Average kinetics energy, $\overline{KE} = \dfrac{3}{2}kT$

9. For Mn_2O_7
(A) Mn has tetrahedral geometry (B) Mn has octahedral geometry
(C) Mn–O–Mn bond is present (D) Mn–Mn bond is present
The correct statementss are
(1) A & C only (2) B & D only
(3) A & D only (4) B & C only

Ans. (1)

Sol. Mn_2O_7

sp^3 Hybridisation
tetrahedral

---

10. Which of the following statement/s is/are correct regarding Be
(A) It's oxide is purely acidic
(B) It's sulphate is soluble in water
(C) It's shows anomalous properties w.r.t. other element of same group
(D) It's carbonate is thermally stable
(1) Only A & B (2) Only B & C (3) Only B, C & D (4) Only A, C & D

Ans. (2)

Sol. BeO is amphoteric. $BeSO_4$, and $MgSO_4$ are readily soluble in water. Beryllium, the first member of the Group 2 metals, shows anomalous behaviour as compared to magnesium and rest of the members. Beryllium carbonate is unstable.

11. At what pH reduction potential of electrode MnO_4^- (0.1 M) | Mn^{2+} (0.001 M) is 1.282 V
[Given $E^0_{MnO_4^-|MnO_4^-} = 1.54 \text{ V}$] [Nearest integer]

Ans. (3)

Sol. $MnO_4^- + 8H^+ + 5e^- \longrightarrow Mn^{2+} + 4H_2O$
   10^{-1} M 10^{-3} M

$$E_{RP} = E^0_{RP} - \frac{0.059}{5}\log\frac{[Mn^{2+}]}{[MnO_4^-][H^+]^8}$$

$$1.282 = 1.54 - \frac{0.059}{5}\log\frac{10^{-3}}{10^{-1} \times [H^+]^8}$$

$$-0.258 = -\frac{0.06}{5}[\log 10^{-2} - 8\log[H^+]]$$

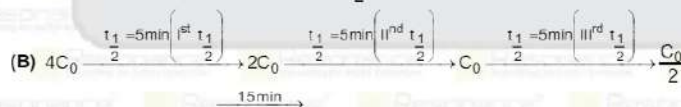$$-0.258 = -\frac{0.06}{5}[-2 + 8\text{ pH}]$$

$$-21.5 = 2 - 8\text{ pH}$$

$$+\frac{23.5}{8} = \text{pH}$$

$$\text{pH} = 2.9375 \approx 3$$

12. Compound A and B are radioactive with half life 15 min and 5 min respectively. Initial concentration of B is 4 times of A then time at which concentration of A and B become equal

Ans. (15)

Sol. (A) Initially $\quad C_0 \xrightarrow{\; t_{\frac{1}{2}} = 15min \;} C_{t_A} = \dfrac{C_0}{2}$

(B) $4C_0 \xrightarrow[\;\;\;]{t_{\frac{1}{2}}=5min\left(I^{st}\, t_{\frac{1}{2}}\right)} 2C_0 \xrightarrow[\;\;\;]{t_{\frac{1}{2}}=5min\left(II^{nd}\, t_{\frac{1}{2}}\right)} C_0 \xrightarrow[\;\;\;]{t_{\frac{1}{2}}=5min\left(III^{rd}\, t_{\frac{1}{2}}\right)} \dfrac{C_0}{2}$

$$\xrightarrow{\;15min\;}$$

Radioactive decay is a I^{st} order reaction
So, t = 15 min when concentration of A = concentration of B

13. In cathode rays electron moving with 1000 m/sec velocity and colloide with metal plate, then how many of the following statements are correct.
[Given mass of e^- = 9 × 10^{-31} kg, Plank's constant (h) = 6 × 10^{-34} J/sec]
(A) Characteristics of Cathode rays depends on nature of gas.
(B) Cathode rays travel from cathode to anode
(C) de Broglie wavelength of moving electron is 666.67 nm
(D) Characteristics of Cathode rays depends on metal plate
(1) B and C only   (2) B and D only   (3) A and C only   (4) B, C and A only

Ans. (1)
Sol. Given mass of e^- = 9 × 10^{-31} kg   h = 6 × 10^{-34} J/sec

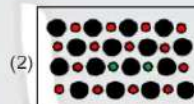wavelength $(\lambda) = \dfrac{h}{m_e v_e} = \dfrac{6 \times 10^{-34}}{9 \times 10^{-31} \times 10^3}$

$= \dfrac{2}{3} \times 10^{-6}$ m

$= 0.66667 \times 10^{-6}$ m $= 666.67 \times 10^{-9}$ m

$= 666.67$ nm   Cathode rays does not depends on nature of gas and metal plate.

14. If Fe^{2+} is represent by ●(red)
Fe^{3+} is represent by ●(green)
O^{-2} is represent by ● (black)
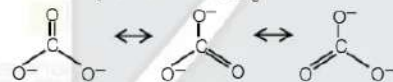The correct lattice of $Fe_{0.95}$ O is

(1)

(2)

(3)
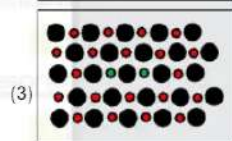
(4) None of these

Ans. (1)
Sol. In FeO lattice when one Fe^{2+} is missing then two Fe^{2+} ions are converted into Fe^{3+} ion. As formula is $Fe_{0.95}$O so 0.05 Fe^{2+} ion are missing and (0.05×2) Fe^{2+} ion are converted in Fe^{3+} ion so for each O^{2-} ion total Fe^{2+} ion 0.85 and Fe^{3+} ion is 0.1.
For 20 O^{2-} ion total 17 Fe^{2+} ion and 2 Fe^{3+} ions.

15. Resonating structures of CO_3^{2-}

Which one of the following is correct
(1) CO_3^{2-} exist as resonance hybrid   (2) All are in dynamic equilibrium
(3) All exist for same time   (4) None of these

Ans. (1)
Sol. CO_3^{2-} exist as resonance hybrid

16. Math the column :

	Column-I		Column-II
(A)	Tranquilizer	(P)	Antidepressant
(B)	Aspirin	(Q)	Salvarsan
(C)	Antibiotic	(R)	Blood clotting
(D)	Antiseptics	(S)	Soframycin

(1) (A) – (R), (B) – (P), (C) – (Q), (D) – (S)   (2) (A) – (P), (B) – (R), (C) – (S), (D) – (Q)
(3) (A) – (P), (B) – (R), (C) – (Q), (D) – (S)   (4) (A) – (P), (B) – (Q), (C) – (R), (D) – (S)
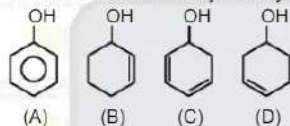
Ans. (3)
Sol. Based on fact given in NCERT.

17. Photo chemical smog can be minimized by :

(1) By tall chimney

(2) By using catalyst converter

(3) Metalic catalyst in auto mobile industries

(4) By full consumption of fuel

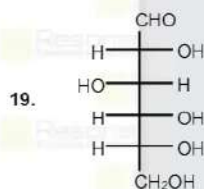**Ans.** (2)

Sol. Solution from NCERT-XI (vol.-2) Pg. 405

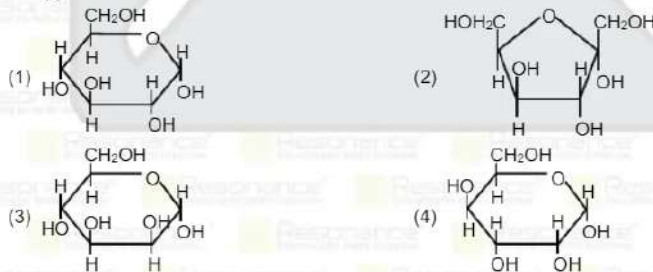**18.** The correct order of easy of dehydration of following compounds is :

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

(1) C > B > A > D

(2) D > B > C > A

(3) C > A > D > B

(4) C > B > D > A

Ans. (4)

Sol. Easy of dehydration $\propto$ stability of carbocation.

19.

The pyranose form of the structure is :

Ans. (1)

Sol. Pyranose from has a 6 member cycle, similar to pyran

20. A compound $C_9H_{10}O$ which does not reacts with NaOH & KOH and 2,4-DNP. On hydrogenation it gives $C_9H_{12}O$. The total no. of structural isomer of $C_9H_{12}O$

Ans. (8)

Sol. $C_9H_{10}O \xrightarrow{H_2/Pd} C_9H_{12}O$
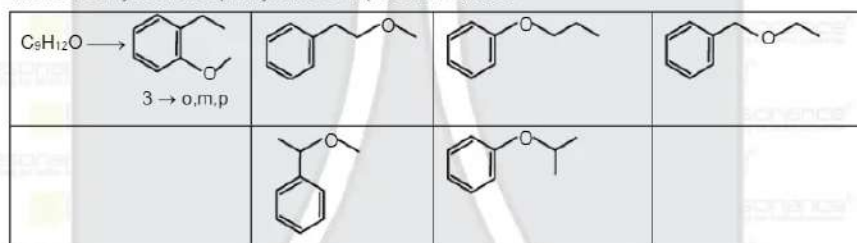
DU = 5   DU = 4

No π bond i.e aromatic

No reaction with NaOH/KOH $\Rightarrow$ no acidic group
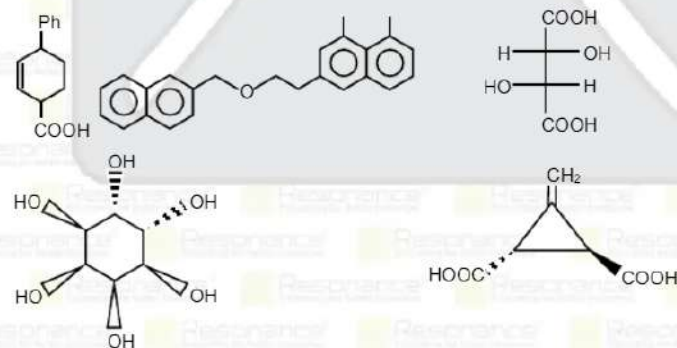
No reaction with NaOH/KOH ⟹ no aldehyde group

No reaction with 2,4-DNP ⟹ no carbonyl group

Therefore only saturated phenyl ether is expected in $C_9H_{12}O$.

$C_9H_{12}O \longrightarrow$ $3 \rightarrow$ o,m,p			

Total structural isomer = 3 + 2 + 2 + 1 = 8

21. How many compounds are chiral :

Ans. (4)

Sol. are chiral, as

they have neither plane of symmetry nor centre of symmetry.

22. (B) $\xleftarrow{\text{Na}}_{\text{liq. NH}_3}$ $CH_3 - C \equiv C - CH_3$ $\xrightarrow[+H_2]{\text{Pd/C}}$ (A)

(1) A has more dipole moment than B

(2) B has more dipole moment than A

(3) B is more soluble than A

(4) A has more M.P. and B.P. than B

Ans. (1)

Sol.

Physical properties			Remarks

	B μ=0	<	A μ≠0		

Dipole moment		A > B	cis-isomer has resultant of dipoles while in trans isomer dipole moments cancel out
Boiling point		A > B	Molecules having higher dipole moment have higher boiling point due to larger intermoleculer force of attraction
Solubility (in H_2O)		A > B	More polar molecules are more soluble in H_2O.
Melting point		B > A	More symmetric isomers have higher melting points due to better packing in crystalline lattice & trans isomers are more symmetric than cis.

23.

Ans. (2)

Sol. Given reactant under goes S_N^2 th reaction with diethyl carbonate.

24. Match the following :

	Column-I		Column -II
(A)	Schiff's test	(P)	Carbohydrate
(B)	Carbylamine test	(Q)	Peptide
(C)	Molish test	(R)	Aldehyde
(D)	Biuret test	(S)	1° Amine

(1) A – P ; B – Q ; C – S ; D – R   (2) A – Q ; B – S ; C – R ; D – P
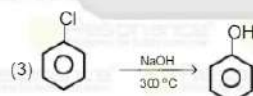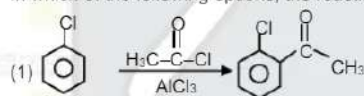(3) A – S ; B – R ; C – Q ; D – P   (4) A – R ; B – S ; C – P ; D – Q

Ans. (4)
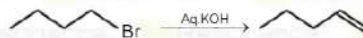
Sol. (4) A – R ; B – S ; C – P ; D – Q
Based on facts

25. In which of the following options, the reaction does not match with their correct option.

Ans. (4)

Sol. Reaction with alc KOH gives alkene

RESONites ने फिर लहराया सफलता का परचम

STUDENTS FROM CLASSROOM PROGRAM (OFFLINE/ ONLINE)

AIR 6
KARTHIKEYA POLISETTY
Roll No.: 21925115
AIR-1 GEN-EWS

AIR 8
DHEERAJ KURUKUNDA
Roll No.: 21925114

Students in TOP-100 All India Ranks (AIRs)

AIR-11	AIR-15	AIR-35	AIR-50	AIR-54	AIR-58
DEEVYANSHU MALU	ABHIJEET ANAND	SANSKAR SHJURYA	ANIRUDH GARG	SOUMITRA D. NAYAK	KANISHK SHARMA
Roll No.: 21915044	Roll No.: 21925115	Roll No.: 21925113	Roll No.: 21220122	Roll No.: 21220054	Roll No.: 21230454

ADMISSIONS OPEN FOR ACADEMIC SESSION 2023-24

TARGET: JEE (Adv.) 2024
for Class XII Passed Student
VISHESH COURSE
MODE: OFFLINE / ONLINE
CLASS STARTS
10th & 17th April

TARGET: JEE (Main) 2024
for Class XII Passed Student
ABHYAAS COURSE
MODE: OFFLINE / ONLINE
CLASS STARTS
10th & 24th April

SCHOLARSHIP ON THE BASIS OF JEE (MAIN) 2023 %ILE / AIR

Resonance Eduventures Limited
REGISTERED & CORPORATE OFFICE: CG Tower, A-46 & 52, IPIA, Near City Mall, Jhalawar Road, Kota (Rajasthan) - 324005
Tel. No.: 0744-2777777, 2777700 | CIN: U80302RJ2007PLC024029

Social Media Connect

83087 41444 | youtube.com/@ResonanceEdu | t.me/OfficialResonance
facebook.com/ResonanceEdu | instagram.com/resonance_edu | in.linkedin.com/school/resonance-eduventures-ltd/ | twitter.com/ResonanceEdu