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For minimum energy $E = E_0$

$E = \left(\frac{hc}{\lambda}\right) = h\nu$

$= 6.6 \times 10^{-34} \times 1.4 \times 10^{+15}$

$= 9.24 \times 10^{-19} J$

2. An ideal gas A is present in a closed rigid container at 27°C and 38 atm pressure, then find pressure of gas at 45°C [report your answer to nearest integer]

Ans. (40)

Sol. At constant volume and mole

$\frac{P_1}{T_1} = \frac{P_1}{T_1}$

$\frac{38}{300} = \frac{P_1}{318}$

$P_2 = \left(\frac{38}{100}\right)318 = 40.28$

3. 0.1 M, 10ml of an acid 'A' neutralize completely by 0.05 M, 20 ml of base $M(OH)_2$, then basicity of acid 'A' is ___ (Here M is metal)

(1) 4 (2) 3 (3) 2 (4) 1

Ans. (3)

Sol. Let basicity of acid is x

$A + M(OH)_2 \longrightarrow$ Salt + Water

At complete neturization.

Millieq. of acid = Millieq. of base

$n[0.1 \times 10] = 2[0.05 \times 20]$

$n = 2$

4. 7 gram of a solute (molar mass = 93g) dissolve in 42 gram of water. If solute get dimerise in water and depression in freezing point is 20°C, then find percentage association of solute. [Given $K_f(H_2O) = 1.86 \frac{KKg}{Mole}$] Report your answer to nearest possible integer

Ans. (80)

Sol. $\Delta T_f = i[K_f \times m]$

$2.0 = i[1.86 \times \frac{7 \times 1000}{93 \times 42}]$

$2.0 = i[3.33]$

$i = 0.6$

$i = 1 + [\frac{1}{n} - 1]\beta$

$0.6 = 1 + [\frac{1}{2} - 1]\beta$

5. For a reaction A $\longrightarrow$ product at pressure 55 KPa $t_{½}$ is 340 sec. while at pressure 27.5 KPa $t_{½}$ is 170 sec. Find order of reaction.

(1) 0 (2) 3 (3) 1 (4) 2

Ans. (4)

Sol. $t_{½} \propto (P)^{1-n}$

$\frac{340}{170} = \left(\frac{55}{27.5}\right)^{1-n}$

$2 = (2)^{1-n}$

$1 - n = 1, n = 2$

6. Arrange following in increasing order of reduction potentials.

(a) Cl_2 / Cl^- (b) I_2 / I^- (c) Li^+ / Li

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(d) Na^+ / Na (e) Ag^+ / Ag

(1) c < d < b < e < a (2) a < b < c < d < e (3) c < d < e < b < a (4) d < c < e < b < a

Ans. (1)

Sol. $E^{\circ}_{Li^+/Li} = -3.05$ V

$E^{\circ}_{Na^+/Na} = -2.71$V

$E^{\circ}_{I_2/I^-} = +0.54$V

$E^{\circ}_{Ag^+/Ag} = 0.80$V

$E^{\circ}_{Cl_2/Cl^-} = 1.36$V

7. For an ideal gas on increasing temperature by 1°C, pressure increase by 0.4% then find initial temperature (in K) (consider volume and amount of gas remain constant). Report your answer as [X] $\times 10^{-2}$, then value of x is.

Ans. (4)

Sol. $\frac{P_1}{T_1} = \frac{P_2}{T_2}$

$\frac{P}{T} = \frac{1.04\,P}{(T+1)}$

(T+1) = 1.04

T = 0.04 K = 4×10^{-2} K

X = 4

8. **Statement-I**: According to Lewis concept H_2O act as amphoteric substance.

Statement-II: H_2O act as acid on reaction with NH_3 while it act as base on reaction with H_2S.

(1) Both Statement-I & Statement-II are True.

(2) Both Statement-I & Statement-II are False.

(3) Statement-I is True while Statement-II is False.

(4) Statement-I is False while Statement-II is True.

Ans. (4)

Sol. According to Lewis concept water act as Base.

9. Calculate solubility of Bi_2S_3 in water [given $k_{sp}(Bi_2S_3) = 1.08 \times 10^{-73}$] report your answer as [X] $\times 10^{-15}$ then value of X is _____.

Ans. (1)

Sol. $Bi_2S_3(s) \rightleftharpoons 2Bi^{3+} + 3s^{2-}$

2S 3S

$K_{sp}(Bi_2S_3) = (2S)^2\,(3S)^3$

$= (2)^2(3)^3\,(S)^5$

$1.08 \times 10^{-73} = 4 \times 27(S)^5$

$108 \times 10^{-75} = 108(S)^5$

$S = 1 \times 10^{-15}$

10. How many of following molecule have non-zero dipole moment.

BeF_2, BF_3, H_2O, NH_3, HCl, CCl_4

Ans. (3)

Sol. Polar molecules = H_2O, NH_3, HCl

Non-polar molecules = BeF_2, BF_3, CCl_4

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Non-polar molecules = BeF_2, BF_3, CCl_4

11. Which of the following ion have minimum magnetic moment (spin only).

(1) Cr^{2+} (2) V^{2+} (3) Fe^{2+} (4) Ni^{2+}

Ans. (4)

Sol.

	Ion	Electronic configuration	No. of unpaired electron
(1)	Cr^{2+}	$3d^4$	4
(2)	V^{2+}	$3d^3$	3
(3)	Fe^{2+}	$3d^6$	4
(4)	Ni^{2+}	$3d^8$	2

Less is no. of unpaired electron less is magnetic moment (spin only).

12. Identify the correct increasing order of magnetic moment (spin only) of following complex.

(1) $FeCl_3.6H_2O < K_3[Fe(CN)_6] < [Co(NH_3)_6]^{3+}$ (2) $K_3[Fe(CN)_6] < FeCl_3.6H_2O < [Co(NH_3)_6]^{3+}$

(3) $[Co(NH_3)_6]^{3+} < K_3[Fe(CN)_6] < FeCl_3.6H_2O$ (4) $[Co(NH_3)_6]^{3+} < FeCl_3.6H_2O < K_3[Fe(CN)_6]$

Ans. (3)

Sol.

Complex	EC	No. of unpaired e
(i) $FeCl_3.6H_2O$	$Fe^{3+} = 3d^5$	5
(ii) $K_3[Fe(CN)_6]$	$Fe^{3+} = 3d^5$	1
(iii) $[Co(NH_3)_6]^{3+}$	$Co^{3+} = 3d^6$	0

13. The correct order of electron gain enthalpy for given elements F, Cl, Te, Po

(1) F < Cl < Te < Po (2) F > Cl > Te > Po (3) Cl < F < Po < Te (4) Cl > F > Te > Po

Ans. (4)

Sol.

Eelement	Electron Gain Enthalpies (kJ mol^{-1})
F	–328
Cl	–349
Te	–190
Po	–174

14. $PCl_5 + H_2O \longrightarrow A + HCl$

$A + H_2O \longrightarrow B + HCl$

Then find maximum numbers of ionisable hydrogen in B.

Ans. (4)

Sol. $PCl_5 + H_2O \longrightarrow POCl_3 + 2HCl$

$POCl_3 + 3H_2O \longrightarrow H_3PO_4 + 3HCl$

No. of ionisable hydrogen = 3

H_3PO_4
Orthophosphoric acid

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15. Lead nitrate decompose on heating as

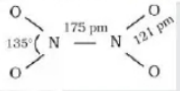
$Pb(NO_3)_2 \xrightarrow{\Delta} A + PbO + O_2$

'A' on dimerization gives 'B' then number of bridging oxygen atom in 'B' is_____.

Ans. (0)

Sol. $2Pb(NO_3)_2 \xrightarrow[673K]{\Delta} 2PbO + 4NO_2 + O_2$

$2NO_2 \xrightarrow{Dimerisation} N_2O_4$



16. **Statement-I**: In electro-refining of blister copper precious metal are obtained in anode mud.

Statement-II: Pure copper is obtained by above method.

(1) Both Statement-I & Statement-II are True (2) Both Statement-I & Statement-II are False.

(3) Statement-I is True while Statement-II is False. (4) Statement-I is False while Statement-II is True.

Ans. (1)

Sol. Impure Cu obtained from ores is converted to pure Cu in an electrolyte cell that the impure copper as the anode an pure copper as the cathode. The electrolyte is an aqueous solution of $CuSO_4$. At the impure Cu anode, Cu is oxidized along with the more easily oxidized metallic impurities such as Zn and Fe. The less easily oxidized impurities such as Ag, Au, and Pt fall to the bottom of the cell as anode mud, which is reprocessed to recover the precious metals. At the pure Cu cathode, Cu^{2+} ions get reduced to pure copper metal

Anode (oxidation) : $M(s) \longrightarrow M^{2+}(aq) + 2e^-$ (M = Cu, Zn, Fe)

Cathode (reduction) : $Cu^{2+}(aq) + 2e^- \longrightarrow Cu(s)$

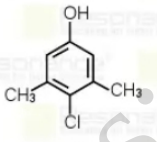
Thus, the net cell reaction simply involves transfer of Cu metal from the impure anode to the pure cathode, Cu obtained by this process is 99.95% pure.

17. Dettol is formed from two compound A & B. A having 6π electron and B having 2π electron. Then the name of compound "B" is:

(1) Chloroxylenol (2) Terpineol (3) Chloramphenicol (4) Bethionol

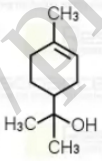
Ans. (2)

Sol.



Chloroxylenol

and

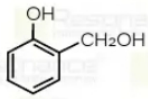


Terpineol

18. How many monomeric units of NOVALAC are there in 963 gram of polymer.

Ans. (9)

Sol. Monomer of NOVOLAC is



with molar mass 124.

Let there is n no. of monomer unit, therefore in Novalac formation (n–1) unit of water is removed.

or $n \times 124 = 963 + (n-1) \times 18$

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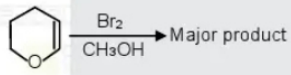
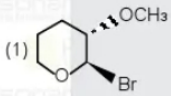
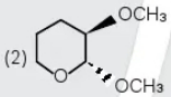
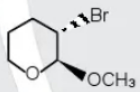
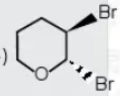
n = 9.

19. 

(1) 
(2) 
(3) 
(4) 

Ans. (3)

Sol. The reaction proceed via cyclic bromonium ion.

20. How many compound gives biureate test

Tripeptide, Methionine, Glycine, Biureate, Glycosamine

Ans. (1)

Sol. Tripeptide, only species with peptide bond gives biureate test.

21. Match the coloumn:

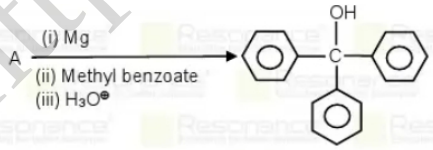
	Column-I		**Column-II**
(A)	Pepsin	(i)	Stomach
(B)	Diastage	(ii)	Yeast
(C)	Urease	(iii)	Malt
(D)	Zymase	(iv)	Soyabean

(1) (A)-(i), (B)-(iii), (C)-(iv), (D)-(ii) (2) (A)-(ii), (B)-(iii), (C)-(iv, (D)-(i)

(3) (A)-(iii), (B)-(i), (C)-(ii), (D)-(iv) (4) (A)-(iv), (B)-(iii), (C)-(i), (D)-(ii)

Ans. (1)

Sol. It is fact.

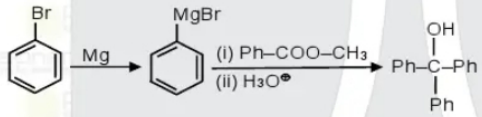
22. 

A is:

(1) Bromobenzene (2) Benzylbromide

(3) Acetophenone (4) Phenol

Ans. (1)

Sol. 

23. **Statement-I :** Water with BOD value greater than 17 is highly polluted.

Statement-II : The oxygen required to decompose biodegradable and non-biodegradable impurities is called BOD

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called BOD.

(1) Statement-I is correct only. (2) Statement-II is correct only.

(3) Both statement-I & II are correct. (4) None of the statement is correct.

Ans. (3)

Sol. It is fact. Both statement-I & II are correct.

24. The Glycine content of a protein is 0.3% what is the minimum mass of protein [Molecular weight of Glycine = 75]

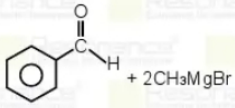
Ans. (25000)

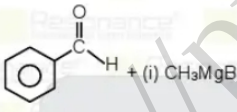
Sol. 0.3 g is present in 100 g.

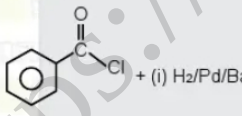
1 g is present in 100/0.3 g.

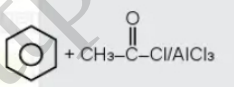
75 g is present in 100/0.3 × 75 = 25000.

25. Which of the following will not form acetophenone.

(1)  + 2CH₃MgBr

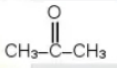
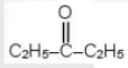
(2)  + (i) CH₃MgBr (ii) P.C.C.

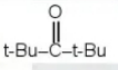
(3)  + (i) H₂/Pd/BaSO₄ (ii) CH₃MgBr (iii) P.C.C.

(4) 

Ans. (1)

26. Which of the following 2° amine will not form enamine.

(1)  (2) 

(3)  (4)

Ans. (3)

Sol. neither has α H, as well as sterically crowded for any nucleophilic attack by 2° amine.

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