PART : CHEMISTRY

1. Difference of B.P and M.P in oxygen and sulpher can be explained by
(1) Atomicity (2) Atomic mass (3) Electronegativity (4) Electron gain enthalphy

Ans. **(1)**

Sol. The large difference between the melting and boiling points of oxygen and sulpher may be explained on the basis of their atomicity. O_2 exist as diatomic molcule where sulpher exist as polyatomic molecule S_8

2. Which of the following strong oxidising agent?
(1) Eu^{+2} (2) Ce^{2+} (3) Ce^{4+} (4) Eu^{4+}

Ans. **(4)**

Sol. M^{4+} will reduce itself to stable (+3) so, it will be good Oxidizing agent.

3. If 280 kg CO and 2320 kg of fe_3O_4 are made to react according to

$$fe_3O_4 + 4\,CO \rightarrow 4CO_2 + 3Fe$$

what is the weight of Fe produce (in kg)
Given : Mol. Wt. of CO and Fe_3O_4 are 28 and 232 u

Ans. **(420)**

Sol.

	fe_3O_4	+	4 CO	$\rightarrow$	$3Fe + 4CO_2$
n_i	10000		10000 (LR)		
n_f					$10000 \times \frac{3}{4} = 7500$

$\therefore$ $W_{Fe} = 7500 \times 56\ g = 420\ kg$

4. A reaction is non spontaneous at freezing point and spontaneous at boiling point select the correct option
(1) Both ΔH and ΔS are positive (2) $\Delta H > 0$, $\Delta S < 0$
(3) $\Delta H < 0$, $\Delta S > 0$ (4) Both ΔH and ΔS are negative

Ans. **(1)**

Sol.

Case I	**Case II**
At freezing point	At boiling point
$\Delta G > 0$	$\Delta G < 0$
$\Delta G - T\Delta S > 0$	$\Delta H - T\Delta S < 0$
$\lvert\Delta G\rvert > \lvert T\Delta S\rvert$	$\lvert\Delta H\rvert < \lvert T\Delta S\rvert$

5. Standard potential
(i) $Fe^{3+} + 3e^- \rightarrow Fe$; $E_1^0 = Z$ volt
(ii) $Ag^+ + 1e^- \rightarrow Ag$; $E_2^0 = Y$ volt
(iii) $Fe^{2+} + 2e^- \rightarrow Fe$; $E_3^0 = X$ volt
Find E^0 of reaction $Fe^{2+} + Ag^+ \rightarrow Fe^{3+} + Ag$ (s)
(1) (Z – 2X +3Y) volt (2) (X – 2Y +3Z) volt (3) (Y – 2Z +3X) volt (4) (Y – 3Z +2X) volt

Ans. **(4)**

Sol. $Fe^{3+} + e^- \rightarrow Fe^{2+}$
(iv) = (i) – (iii)

$$\Delta G_4^0 = \Delta G_1^0 - \Delta G_3^0$$

$$-1.f.E_4^0 = -3.f.E_1^0 + 2.f.E_3^0$$

$$E_4^0 = 3E_1^0 - 2E_3^0 = 3Z - 2x$$

$$E^0 = E^0_{\frac{Ag^+}{Ag}} - E^0_{\frac{Fe^{2+}}{Fe^{3+}}} = Y - E^0_{\frac{Fe^{2+}}{Fe^{3+}}} = Y - 3Z + 2x$$

6. In a process pressure of gas is directly proportional to temperature then choose correct option
(A) Process is isochoric
(B) Work done in process is zero
(C) Internal energy increases with increase in temperature
(1) A and B are correct (2) A and C are correct
(3) A, B and C are correct (4) B and C are correct

Ans. **(3)**

Sol. $P \propto T$ (V, n =constant)

7. 1 mole of a complex with molecular formula $CO(NH_3)_5Cl_3$ produces 3 mole ions upon complete ionisation. Upon adding excess $AgNO_3$, 2 mole AgCl are precipitated. Complex is:
(1) $[Co(NH_3)_5Cl]Cl_2$ (2) $[Co(NH_3)_4Cl_2]Cl.NH_3$
(3) $[Co(NH_3)_3Cl_3].2NH_3$ (4) $[Co(NH_3)_4Cl]Cl_2.NH_3$

Ans. **(1)**

Sol. $2Cl^-$ should be outside square bracket. Also, Co^{3+} shows CN =6
$\therefore$ Complex : $[Co(NH_3)_5Cl]Cl_2$

8. Consider H_2O, NH_3, CH_4 and select correct statements:
(A) All are sp^3 hybridised
(B) Bond angle H–O–H, H–N–H, H–C–H are 104.5°, 107°, 109.5°
(C) Dipole moment: $CH_4 < NH_3 < H_2O$
(D) H_2O and NH_3 are lewis base and lewis acid
(E) NH_3 in H_2O is basic in nature
(1) A, B, C and E (2) A, B and D (3) A, C, D (4) B, D, E

Ans. **(1)**

Sol. Both NH_3 and H_2O behave as lewis base.

9. Which of the following is not true combination from given statement.
(a) Elements in periodic table are linearly arranged with atomic weight
(b) Elements in periodic table are linearly arranged with atomic number
(c) Element having similar electronic configuration are arranged in same group
(d) Using periodic table we can identify in which subshell last electron enters
(e) Isotopes of an element are placed in periodic table.
(1) a, e only (2) b, e only (3) b, c, d only (4) a, c, d, e only

Ans. **(1)**

10. If the k_{sp} of $Cr(OH)_3$ is 1.6×10^{-30} M^4 the molar solubility of salt in water is
(1) $\left(\frac{1.6\times10^{-30}}{27}\right)^{1/4}$ (2) $\left(\frac{16}{27}\times10^{-30}\right)^{1/4}$ (3) $\left(\frac{160}{27}\times10^{-30}\right)^{1/4}$ (4) None of these

Ans. **(1)**

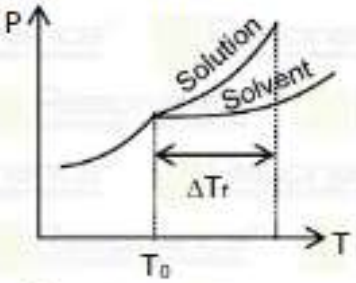
Sol. $Cr(OH)_3(s) \rightleftharpoons \underset{s}{Cr^{3+}} + \underset{3s}{3OH^-}$

$k_{sp} = [Cr^{3+}][OH^-]^3 = s(3s)^3$
$= 27\,S^4$

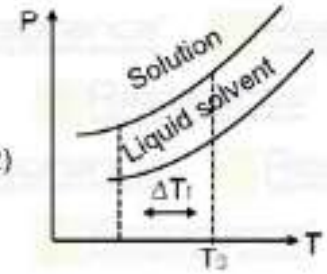
$S = \left(\frac{1.6\times10^{-30}}{27}\right)^{1/4}$

11. Select the correct graph.

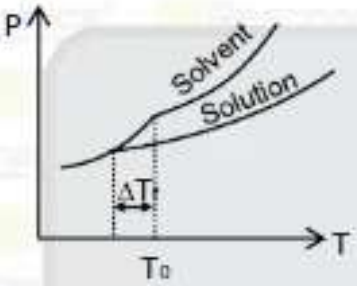
(1)



(2)



(3)



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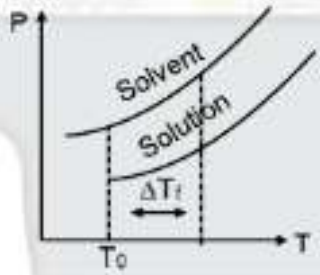
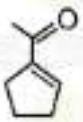
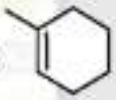


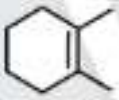
Ans. **(3)**

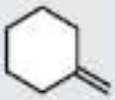
Sol. T at which $VP_{solid} = VP_{liquid}$ is freezing point of solution is less than that of solvent.

12.  is formed by ozonolysis followed by aldol condensation of Alkene. Alkene can be:

(1) 

(2)

(3) 

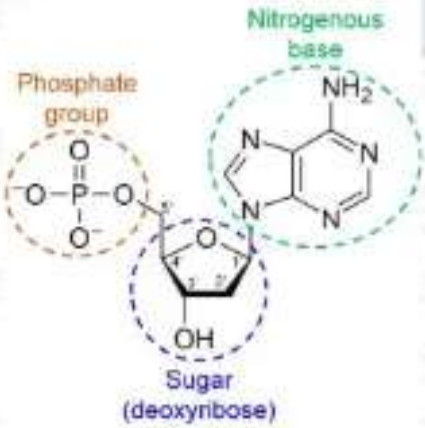
(4) 

Ans. **(1)**

13. Ribose present in DNA
(A) It is a pentose sugar
(B) It is a present in pyranose form
(C) It is present in D-configuration
(D) It is reducing sugar in free form
(E) α anomeric form is present
Correct options are :
(1) A, C, D (2) A, B, D (3) A, B, C, D, E (4) A, C, E

Ans. **(1)**

Sol.



14. Arrange following for reaction rate with nucleophilic attack

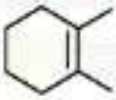
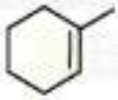
(a) Acetophenone (b) p-tolylaldehyde

(c) Benzaldehyde (d) p-Nitrobenzaldehyde

(1) d >c >b >a (2) a >c >b >d (3) d >b >c >a (4) d >a >b >c

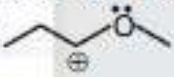
Ans. (1)

15. Which compound react fastest with HBr?

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

Ans. (1)

16. Stability of carbocation is maximum is?

(1)  (2)

(3) (4)

Ans. (2)

17. **Statement-I :** Dumas method is used for estimation of Nitrogen.

Statement-II : In Dumas method Nitrogen present in compound is converted to $(NH_4)_2SO_4$

(1) Both Statement I and statement II are true

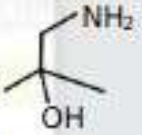
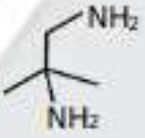
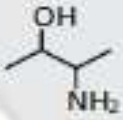
(2) Both statement I and statement II are false

(3) Statement I is true but statement II is false

(4) Statement I is false but statement II is true

Ans. (3)

18. $CH_3–C{\equiv}CH \xrightarrow[2.HCN/HO^{\ominus}]{1.HgSO_4} \xrightarrow[3.H_2/Ni]{}$

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

Ans. (1)

19. **Statement-I :** $CH_3–CH_2–CH_2–CH_2–Cl + OH^{\ominus} \longrightarrow$ Reaction is favoured in less polar solvent.

Statement-II : $CH_3–CH_2–CH_2–CH_2–Cl + R_3N \longrightarrow$ Reaction is favoured in more polar solvent.

(1) Both Statement I and statement II are true (2) Both statement I and statement II are false

(3) Statement I is true but statement II is false (4) Statement I is false but statement II is true

Ans. (1)