Max Marks: 60 **Date: 11.09.2022**

JB 1 MR BATCH
CHEMISTRY: DCT
Topic: Mole Concept + Till Reaction Mechanism

1. What is the oxidation state of Sn in $Ca_2Sn_2Si_6O_{18}$?

(a) I (b) II (c) III (d) IV

2. Consider the salt $K_xH_y(C_2O_4)_x\ 2H_2O$.

The relationship between x, y and z is :

(a) x + y – z = 0 (b) x + y = 2z (c) x y + z =0 (d) None of these

3. Select the reaction which describes the existence of $I_2O_5(s)$ as $(IO_2^+)(IO_3^-)$:

(a) $I_2O_5 + HF \rightarrow HIO_2 + FIO_3$ (b) $I_2O_5 + HF \rightarrow IO_2F + HIO_3$

(c) $I_2O_5 + HF \rightarrow HOI + IO_4F$ (d) $I_2O_5 + HF \rightarrow IOF + HIO_4$

4. Amongst the following, the pair having both the metals in their highest oxidation state is :

(a) $[Fe(CN)_6]^{3-}$ and $[Co(CN)_6]^{3-}$ (b) CrO_2Cl_2 and MnO_4^-

(c) TiO_2 and MnO_2 (d) $[MnCl_4]^{2-}$ and $[NiF_6]^{2-}$

5. $aMnO_4^- + bI^- + cH^+ \rightarrow dMn^{2+} + eI_2 + fH_2O$

In above balanced reaction, value of $\left(\frac{c}{d}\right)$ will be :

(a) 1.3 (b) 1.2 (c) 8 (d) 5

6. In the reaction, $x\ FeCl_3 + yH_2S \rightarrow FeCl_2 + S + HCl$

(a) x = 2, y =1 (b) x = 3, y = 2 (c) x = 4, y = 3 (d) x = 2, y = 2

7. In compound HN_3 (hydrazoic acid,) oxidation state of N atoms are :

(a) 0,0,3 (b) 0,-2,+1 (c) 1,1,-3 (d) -3,-3,-3

8. $P_4(s) + 3OH^-(aq) + 3H_2O(l) \rightarrow PH_3(g) + 3H_2PO_2^-(aq)$. For this reaction, the oxidizing and reducing agents are, respectively.

(a) P_4 and OH^- (b) OH^- and P_4 (c) P_4 and H_2O (d) P_4 and P_4

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9. For the balanced equation :

$8H^+(aq) + 5Fe^{2+}(aq) + MnO_4^-(aq) \rightarrow 5Fe^{3+}(aq) + Mn^{2+}(aq) + 4H_2O$

Which statement is correct?

(a) $Fe^{2+}(aq)$ undergoes oxidation (b) $Fe^{2+}(aq)$ is the oxidizing agent

(c) $H^+(aq)$ undergoes oxidation (d) $H^+(aq)$ is the oxidizing agent

10. Which substance can act only as a reducing agent?

(a) I_2 (b) BrCl (c) NaBr (d) HIO_4

11. Cu reacts with HNO_3 according to the equation $Cu + HNO_3 \rightarrow Cu(NO_3)_2 + NO + NO_2 + H_2O$

If NO and NO_2 are formed in a 2:3 ratio, what is the coefficient for Cu when the equation is balanced with the simplest whole numbers?

(a) 2 (b) 3 (c) 6 (d) 9

12. In the reaction $X^- + XO_3^- + H^+ \rightarrow X_2 + H_2O$, the molar ratio in which $X^- + XO_3^-$ react is :

(a) 1 : 5 (b) 5 : 1 (c) 2 : 3 (d) 3: 2

13. CN^- is oxidised by NO_3^- in presence of acid: $aCN^- + bNO_3^- + cH^+ \rightarrow (a + b)\,NO + aCO_2 + \frac{0}{2}H_2O$

What are the values of a,b, c in that order :

(a) 3,7,7 (b) 3,10,7 (c) 3,10,10 (d) 3,7,10

14. For the balanced redox reaction:

$aNO_3^- + bCu_2O + cH^+ \rightarrow dNO + eCu^{2+} + H_2O$

Where a, b, c, d and e are stoichiometric coefficients if ‘c’ is 14, then the value of ‘e’ is :

(a) 2 (b) 3 (c) 6 (d) 7

15. Consider the balanced chemical reaction:

$aI_2O_5 + bBrF_3 \rightarrow cIF_5 + dO_2 + eBr_2$

Calculate the value of (b + c +e) (a).

(a) 10 (b) 7 (c) 6 (d) 3

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JB 1 MR BATCH
MATHEMATICS : DCT
Topics: Sequence and Series

16. The mth term of the series 3, $\sqrt{3}$, 1, …. is $\frac{1}{243}$ then m is

(a) 15 (b) 14 (c) 13 (d) 12

17. The sequence $\frac{6}{\sqrt{7}}, \sqrt{7}, \frac{8}{\sqrt{7}}, \ldots$ is

(a) H.P. (b) A.P. (c) G.P. (d) A.G.P.

18. If $1^2 + 2^2 + 3^2 + \ldots + n^2 = 1015$. Then the value of n is

(a) 14 (b) 15 (c) 13 (d) 16

19. An infinite G.P. has first term 'x' and sum '5', then x belongs to:

(a) $x < -10$ (b) $-10 < x < 0$ (c) $0 < x < 10$ (d) $x > 10$

20. If a, b, c are in G.P. and x, y, z are also in G.P. Then $\frac{a}{z}, \frac{b}{y}, \frac{c}{x}$ are in

(a) A.P. (b) G.P. (c) H.P. (d) None of these

21. The harmonic mean of $\frac{a}{1-ab}$ and $\frac{a}{a+ab}$ is

(a) $\frac{a}{\sqrt{1-a^2b^2}}$ (b) $\frac{a}{1-a^2b^2}$ (c) $\frac{1}{1-a^2b^2}$ (d) a

22. If u, v, w, x, y, z are in A.P. Then (y – w) is equal to

(a) 2(w – u) (b) (x – w) (c) 2(z – x) (d) 2(x – w)

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23. If $5 + 5x^2 + 5x^4 + \ldots + \infty = \frac{45}{8}$ then the value of x will be

(a) $\frac{1}{4}$ (b) $\frac{1}{5}$ (c) $\frac{3}{5}$ (d) $\frac{1}{3}$

24. The consecutive terms $\frac{1}{1+\sqrt{x}}, \frac{1}{1-x}, \frac{1}{1-\sqrt{x}}$ of a sequence are in

(a) H.P. (b) A.P. and G.P. both (c) A.P. (d) G.P.

25. If $\frac{3+5+7+\ldots+n}{5+8+11+\ldots+10 \text{ terms}} = 7$ the value of n is

(a) 40 (b) 37 (c) 36 (d) 35

26. If $Z = 1 + r^a + r^{2a} + r^{3a} + \ldots \infty$ then the value of r will be

(a) $\left(\frac{Z+1}{Z}\right)^a$ (b) $\left(\frac{Z-1}{Z}\right)^a$ (c) $\left(\frac{Z-1}{Z}\right)^{\frac{1}{a}}$ (d) None of these

27. If the sum of n terms of an A.P. is $3n^2 + 5n$ then the nth term will be

(a) $3n + 5$ (b) $6n + 2$ (c) $n + 6$ (d) $8n + 2$

28. If a, b, c are in A.P. and b, c, d are in H.P. Then

(a) $ac = bd$ (b) $ad = bc$ (c) $ab = cd$ (d) $a^2b = c^2d$

29. If a, b, c are in A.P., a, mb, c are in G.P. Then a, m^2b, c are in

(a) A.P. (b) G.P. (c) H.P. (d) None of these

30. If the sum of n terms of an A.P. is $n^2P + nQ$. Where P, Q are constants, then its common difference will be

(a) 2P (b) 2Q (c) P (d) Q

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CHEMISTRY: DCT ANSWER KEY
Topic: Mole Concept + Till Reaction Mechanism

1.	(d)	2.	(b)	3.	(b)	4.	(b)	5.	(c)
6.	(a)	7.	(b)	8.	(d)	9.	(a)	10.	(c)
11.	(d)	12.	(b)	13.	(d)	14.	(c)	15.	(b)

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JB 1 MR BATCH
MATHEMATICS : DCT ANSWER KEY
Topics: Sequence and Series

16.	(c)	17.	(b)	18.	(a)	19.	(c)	20.	(b)
21.	(d)	22.	(d)	23.	(d)	24.	(c)	25.	(d)
26.	(c)	27.	(b)	28.	(b)	29.	(c)	30.	(a)