BJNP

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Knowledge is Discipline

Learning with the Speed of Mumbai and the Tradition of Kota

Max Marks:200 **Date: 21.08.2022**

JB 2 MR BATCH
CHEMISTRY: PART TEST
Topic: Periodic + Mole Concept

1. Which of the following involves maximum amount of energy ?

(a) $Mg^{-}(g) \rightarrow Mg(g)$ (b) $Mg^{2+}(g) \rightarrow Mg^{3+}(g)$

(c) $Mg^{-}(g) \rightarrow Mg^{+}(g)$ (d) $Mg^{+}(g) \rightarrow Mg^{3+}(g)$

2. Which of the following is the correct order of ionisation enthalpy?

(1) $Be^{+} > Be$ (2) $Be > Be^{+}$ (3) $C > Be$ (4) $B > Be$

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

3. Successive ionisation energies of an element 'X' are given below (in kcal):

IP_1	IP_2	IP_3	IP_4
165	195	556	595

Electronic configuration of the element 'X' is:

(a) $1s^2, 2s^2 2P^6, 3s^2 3p^2$ (b) $1s^2, 2s^1$ (c) $1s^2, 2s^2 2P^2$ (d) $1s^2, 2s^2 2P^6, 3s^2$

4. (A) $M^{-}(g) \rightarrow M(g)$

(B) $M(g) \rightarrow M^{+}(g)$

(C) $M^{+}(g) \rightarrow M^{+2}(g)$

(D) $M^{+2}(g) \rightarrow M^{+3}(g)$

Minimum and maximum energy will be absorbed by the processes

(a) A,D (b) B,C (c) C,D (d) A,B

5. Which of the following does not represent the correct order of the property indicated?

(a) $Mn^{2+} > Ni^{2+} < Co^{2+} < Fe^{2+}$; ionic radii (b) Sc < Ti < Cr < Mn : Density

(c) $Sc^{3+} > Cr^{3+} < Fe^{3+} < Mn^{3+}$: ionic radii (d) FeO < CaO > MnO < CuO : Basic nature

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6. Which of the following is weakest basic oxide?
   (a) Fe_2O_3 (b) FeO (c) BaO (d) Na_2O

7. Choose incorrect statement
   (a) reducing power in aqueous solution is maximum for lithium metal
   (b) electron affinity order $O^+ > O > O_2^{2-} > O^{-2}$
   (c) order of oxidation number of oxygen
   $O_3 > KO_2 > BaO_2 > K_2O$
   (d) pH of aqueous solution
   $LiCl > BeCl_2 > MgCl_2 < AlCl_3$

8. In which of the following arrangements, the order in not correct according to the property indicated against it?
   (a) Increasing size : $Al^{3+} < Mg^{2+} < Na^+ < F^-$
   (b) Increasing IE_1: B < C < N < O
   (c) Increasing EA_1: I < Br < F < Cl
   (d) Increasing metallic radius : Li < Na < K < Rb

9. The correct order of electron gain enthalpy with negative sign of F, Cl, Br, and I, having atomic number 9,17,35, and 53 respectively, is
   (a) I > Br > Cl > F (b) F > Cl > Br > I (c) Cl > F > Br > I (d) Br > > Cl > I > F

10. Which of the following atoms has the highest first ionization energy?
   (a) Sc (b) Rb (c) Na (d) K

11. The statement that is not correct for the periodic classification of elements is
   (a) The properties of elements are the periodic functions of their atomic numbers.
   (b) Non-metallic elements are lesser in number than metallic elements.
   (c) The first ionization energies of elements along a period do not vary in a regular manner with increases in atomic number.
   (d) For transition elements the d-subshells are filled with electrons monotonically with increase in atomic number.

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12. The correct statement among the following is
    (a) The first ionisation potential Al is less than the first ionisation potential of Mg.
    (b) The second ionisation potential of Mg is greater than the second ionisation potential of Na.
    (c) The first ionisation potential of Na is less than the first ionisation potential of Mg.
    (d) The third ionisation of Mg is greater than third ionisation potential of Al.

13. Which of the following represent the correct order of increasing IE_1 for Ca, Ba, S Se and Ar?
    (a) S < Se < Ca < Ba < Ar
    (b) Ba < Ca < Se < S < Ar
    (c) Ca < Ba < S < Se < Ar
    (d) Ca < S < Ba < Se < Ar

14. The number of Ca^{2+} and Cl^- ions present in anhydrous $CaCl_2$ is 3.01×10^{23} and 6.023×10^{23} respectively. The weight of the anhydrous sample is
    (a) 40 g
    (b) 55.5 g
    (c) 222 g
    (d) 75.5 g

15. Insulin contains 3.4% sulphur. What will be the minimum molecular weight of insulin?
    (a) 94.176
    (b) 1884
    (c) 941.176
    (d) 976

16. If mole percentage of C-12 and C-14 in nature is 98% and 2% respectively, then the number of C-14 atoms in 12 g of carbon is
    (a) 1.2×10^{22}
    (b) 3.01×10^{22}
    (c) 5.88×10^{23}
    (d) 6.02×10^{23}

17. 2.76 g of silver carbonate on being strongly heated yields a residue weighing.
    ($Ag_2CO_3 \xrightarrow{\Delta} 2Ag + CO_2 + \frac{1}{2} O_2$)
    (a) 2.16 g
    (b) 2.48 g
    (c) 2.32 g
    (d) 2.64 g

18. 100 g impure $CaCO_3$ on heating gives 5.6 L. CO_2 gas at STP. Find the percentage of calcium in the limestone sample. [At. wt.: Ca = 40; C=12; O = 16]
    (a) 10
    (b) 20
    (c) 1
    (d) 30

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19. 1.84 grams mixture of $CaCO_3$ and $MgCO_3$ on heating gives CO_2. Volume of CO_2 obtained is measured to be 448 mL at STP. Mass of $CaCO_3$ in mixture is

(a) 0.5 gram (b) 0.84 gram (c) 0.92 gram (d) 1.00 gram

20. 3 g of Mg is burnt in a closed vessel containing 3 g of oxygen. The weight of excess reactant left is

(a) 0.5 g of oxygen (b) 1.0 g of oxygen (c) 1.0 g of Mg (d) 0.5 of Mg

21. How many moles of potassium chlorate need to be heated to produce 11.2 litres oxygen at NTP?

(a) $\frac{1}{2}$ mol (b) $\frac{1}{3}$ mol (c) $\frac{1}{4}$ mol (d) $\frac{2}{3}$ mol

22. Equal weight of 'X' (At. wt. = 36) and 'Y' (At. wt. = 24) are reacted to form the compound X_2Y_3. Then:

(a) X is the limiting reagent

(b) Y is the limiting reagent

(c) No reactant is left over and mass of X_2Y_3 formed is double the mass of 'X' taken

(d) none of these

23. For the reaction $2P + Q \rightarrow R$, 8 mol of P and 5 mol of Q will produce.

(a) 8 mol of R (b) 5 mol of R (c) 4 mol of R (d) 13 mol of R

24. The mass of Mg_3N_2 produced if 48 g of Mg metal is reacted with 34 g NH_3 gas is

$3\,Mg + 2NH_3 \rightarrow Mg_3N_2 + 3H_2$

(a) $\frac{200}{3}$ (b) $\frac{100}{3}$ (c) $\frac{400}{3}$ (d) $\frac{150}{3}$

25. The volume of water that must be added to a mixture of 250 ml of 0.6 M HCl and 750 ml of 0.2 M HCl to obtain 0.25 M solution of HCl is

(a) 750 ml (b) 100 ml (c) 200 ml (d) 300ml

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JB 2 MR BATCH
MATHEMATICS : PART TEST
Topic: Trigonometry

26. If $\tan A = \frac{a}{a+1}$ and $\tan B = \frac{a}{2a+1}$, then the value of A + B is

(a) 0 (b) $\frac{\pi}{2}$ (c) $\frac{\pi}{3}$ (d) $\frac{\pi}{4}$

27. If tan A – tan B = x and cot B – cot A = y, then cot (A – B) =

(a) $\frac{1}{x}+y$ (b) $\frac{1}{xy}$ (c) $\frac{1}{x}-\frac{1}{y}$ (d) $\frac{1}{x}+\frac{1}{y}$

28. $\cos^2 48^\circ - \sin^2 12^\circ =$

(a) $\frac{\sqrt{5}-1}{4}$ (b) $\frac{\sqrt{5}+1}{8}$ (c) $\frac{\sqrt{3}-1}{4}$ (d) $\frac{\sqrt{3}+1}{2\sqrt{2}}$

29. $\sin 10^\circ + \sin 20^\circ + \sin 30^\circ + \ldots + \sin 360^\circ$ is equal to

(a) 0 (b) 1 (c) –1 (d) $\frac{1}{2}$

30. $\cos 1^\circ + \cos 2^\circ + \cos 3^\circ + \ldots + \cos 180^\circ =$

(a) 0 (b) 1 (c) –1 (d) 2

31. If $\text{tna}A = \frac{1}{2}, \tan B = \frac{1}{3}$, then cos 2A =

(a) sin B (b) sin 2B (c) sin 3B (d) –sin 2B

32. If ABCD is a cyclic quadrilateral, then cos A + cos B is equal to

(a) 0 (b) cos C + cos D (c) – (cos C + cos D) (d) cos C – cos D

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33. The value of $\sin^2\frac{\pi}{8}+\sin^2\frac{3\pi}{8}+\sin^2\frac{5\pi}{8}+\sin^2\frac{7\pi}{8}$ is

(a) 1 (b) 2 (c) $\frac{3}{8}$ (d) $\frac{1}{8}$

34. $\cos 20^\circ \cos 40^\circ \cos 80^\circ =$

(a) $\frac{1}{2}$ (b) $\frac{1}{4}$ (c) $\frac{1}{6}$ (d) $\frac{1}{8}$

35. $\sqrt{2+\sqrt{2+2\cos 4\theta}} =$

(a) $\cos\theta$ (b) $\sin\theta$ (c) $2\cos\theta$ (d) $2\sin\theta$

36. If $\tan\beta = \cos\theta\tan\alpha$, then $\tan^2\frac{\theta}{2} =$

(a) $\frac{\sin(\alpha+\beta)}{\sin(\alpha-\beta)}$ (b) $\frac{\cos(\alpha-\beta)}{\cos(\alpha+\beta)}$ (c) $\frac{\sin(\alpha-\beta)}{\sin(\alpha+\beta)}$ (d) $\frac{\cos(\alpha+\beta)}{\cos(\alpha-\beta)}$

37. If $x+\frac{1}{x}=2\cos\theta$, then $x^3+\frac{1}{x^3}=$

(a) $\cos 3\theta$ (b) $2\cos 3\theta$ (c) $\frac{1}{2}\cos 3\theta$ (d) $\frac{1}{3}\cos 3\theta$

38. $\sin(45^\circ + A)\sin(45^\circ - A) =$

(a) $\cos A$ (b) $\frac{1}{2}\cos 2A$ (c) $\cos 2A$ (d) $\frac{1}{2}\cos A$

39. $\sin 18^\circ \sin 70^\circ + \sin 16^\circ \sin 36^\circ =$

(a) $\frac{1}{8}$ (b) $\frac{1}{16}$ (c) $\frac{\sqrt{3}}{8}$ (d) $\frac{\sqrt{3}}{16}$

40. The value of $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ$ is equal to

(a) $\frac{1}{16}$ (b) $\frac{3}{16}$ (c) $\frac{\sqrt{3}}{16}$ (d) $\frac{\sqrt{3}}{32}$

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41. $\frac{1+\sin A-\cos A}{1+\sin A+\cos A}=$

(a) $\sin\frac{A}{2}$ (b) $\cos\frac{A}{2}$ (c) $\tan\frac{A}{2}$ (d) $\cot\frac{A}{2}$

42. If $\alpha = 22^{o}30'$, then $(1 + \cos \alpha)(1 + \cos 3\alpha)(1 + \cos 5\alpha)(1 + \cos 7\alpha)$ equals

(a) $\frac{1}{8}$ (b) $\frac{1}{4}$ (c) $\frac{1+\sqrt{2}}{2\sqrt{2}}$ (d) $\frac{\sqrt{2}-1}{\sqrt{2}+1}$

43. If tan A and tan B are the roots of the equation $x^2 - ax + b = 0$, then the value of $\sin^2 (A + B)$ is

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

44. If $\frac{\cos(A+B)}{\cos(A-B)}=\frac{\sin(C+D)}{\sin(C-D)}$, then tab A tan B tan C + tan D =

(a) 0 (b) –1 (c) $\sqrt{3}$ (d) 1

45. If cos A = m cos B, then

(a) $\cot\left(\frac{A+B}{2}\right)=\frac{m+1}{m-1}\tan\left(\frac{B-A}{2}\right)$ (b) $\tan\left(\frac{A+B}{2}\right)=\frac{m+1}{m-1}\cot\left(\frac{B-A}{2}\right)$

(c) $\cot\left(\frac{A+B}{2}\right)=\frac{m+1}{m-1}\tan\left(\frac{A-B}{2}\right)$ (d) None of these

46. If $x\cos\theta = y\cos\left(\theta+\frac{2\pi}{3}\right)=z\cos\left(\theta+\frac{4\pi}{3}\right)$, then the value of $\frac{1}{x}+\frac{1}{y}+\frac{1}{z}$ is equal to

(a) 1 (b) 2 (c) 0 (d) $3\cos\theta$

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47. If $\sqrt{x} + \frac{1}{\sqrt{x}} = 2\cos\theta$, then $x^6 + x^{-6} =$

(a) $2 \cos 6\theta$ (b) $2 \cos 12\theta$ (c) $2 \cos 3\theta$ (d) $2 \sin 3\theta$

48. The value of $\cos^3\theta + \cos^3(\theta + 120^\circ) + \cos^3(\theta - 120^\circ)$ is

(a) $\frac{\sqrt{3}}{2}\cos 3\theta$ (b) $\frac{3}{4}\sec^3\theta$ (c) $\frac{3}{2}\tan^3\theta$ (d) $\frac{3}{4}\cos 3\theta$

49. If $\tan\alpha = \frac{1}{5}$, $\tan\beta = \frac{1}{259}$, then the value of $\tan(4\alpha - \beta)$ is

(a) 0 (b) –1 (c) 1 (d) 2

50. The maximum value of the expression $\frac{1}{\sin^2\theta + 3\sin\theta\cos\theta + 5\cos^2\theta}$ is

(a) 2 (b) 3 (c) 4 (d) 6

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CHEMISTRY: PART TEST ANSWER KEY
Topic: Periodic + Mole Concept

1.	(b)	2.	(c)	3.	(d)	4.	(a)	5.	(c)
6.	(a)	7.	(d)	8.	(b)	9.	(c)	10.	(a)
11.	(d)	12.	(b)	13.	(b)	14.	(b)	15.	(c)
16.	(a)	17.	(a)	18.	(a)	19.	(d)	20	(b)
21.	(b)	22.	(c)	23.	(c)	24.	(a)	25.	(c)

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MATHEMATICS : PART TEST ANSWER KEY
Topic: Trigonometry

26.	(d)	27.	(d)	28.	(b)	29.	(a)	30.	(c)
31.	(b)	32.	(c)	33.	(b)	34.	(d)	35.	(c)
36.	(c)	37.	(b)	38.	(b)	39.	(a)	40.	(a)
41.	(c)	42.	(a)	43.	(a)	44.	(a)	45.	(a)
46.	(c)	47.	(b)	48.	(d)	49.	(c)	50.	(a)