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Knowledge is Discipline
BJNP
Learning with the Speed of Mumbai and the Tradition of Kota

Max Marks: 200 **Date: 08.08.2022**

JB 2 MR BATCH
CHEMISTRY: PART TEST
Topic: States of Matter + S-Block

1. Equal amounts of two gases of molecular weight 4 and 40 are mixed. The pressure of the mixture is 1.1 atm. The partial pressure of the light gas in this mixture is

   (a) 0.55 atm (b) 0.11 atm (c) 1 atm (d) 0.12 atm

2. Kinetic energy of molecules is highest in

   (a) Gases (b) Solids (c) Liquids (d) Solutions

3. A volume of 1 m^3 is equal to

   (a) 1000 cm^3 (b) 100 cm^3 (c) 10dm^3 (d) 10^6 cm^3

4. Rate of diffusion of a gas is

   (a) Directly proportional to its density
   (b) Directly proportional to its molecular mass
   (c) Directly proportional to the square root of its molecular mass
   (d) Inversely proportional to the square root of its molecular mass

5. Which of the following gas will have highest rate of diffusion

   (a) NH_3 (b) N_2 (c) CO_2 (d) O_2

6. Pressure of a gas in a vessel can be measured by

   (a) Barometer (b) Manometer (c) Stalgometer (d) All the above

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7. Which one of the following statements is wrong for gases

(a) Gases do not have a definite shape and volume

(b) Volume of the gas is equal to the volume of the container confining the gas

(c) Confined gas exerts uniform pressure on the walls of its container in all directions.

(d) Mass of the gas cannot be determined by weighing a container in which it is enclosed.

8. N_2 is found in a litre flask under 100kPa pressure and O_2 is found in a another 3 litre flask under 320 kPa pressure. If the two flasks are connected, the resultant pressures is

(a) 310 kPa (b) 210 kPa (c) 420 kPa (d) 365 kPa

(e) 265 kPa

9. At constant temperature, in a given mass of an ideal gas

(a) The ratio of pressure and volume always remains constant

(b) Volume always remains constant

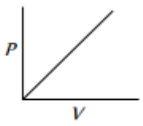
(c) Pressure always remains constant

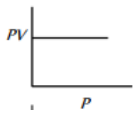
(d) The product of pressure and volume always remains constant

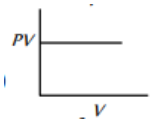
10. If 20 cm^3 gas at 1atm. Is expanded to 50 cm^3 at constant T, then what is the final pressure

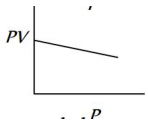
(a) $20 \times \frac{1}{50}$ (b) $50 \times \frac{1}{20}$ (c) $1 \times \frac{1}{20} \times 50$ (d) None of these

11. Which of the following graphs represent Boyle's law

(a) 

(b) 

(c) 

(d) 

12. At constant pressure, the volume of fixed mass of an ideal gas is directly proportional to

(a) Absolute temperature (b) Degree centigrade

(c) Degree Fahrenheit (d) None

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13. Use of hot air balloons in sports and meteorological observations is an application of
(a) Boyle's law (b) Newtonic law (c) Kelvin's law (d) Charle's law

14. NaH is an example of :
(a) Electron-rich hydride (b) Molecular hydride
(c) Saline hydride (d) Metallic hydride

15. The strength of 11.2 volume solution of H_2O_2 is : [Given that molar mass of H = 1 g mol^{-1} and O = 16 g mol^{-1}]
(a) 13.6% (b) 3.4% (c) 34% (d) 1.7%

16. The synonym for water gas when used in the production of methanol is :
(a) natural gas (b) laughing gas (c) syn gas (d) fuel gas

17. The temporary hardness of a water sample is due to compound X. Boiling this sample converts X to compound Y. X and Y, respectively, are
(a) $Ca(HCO_3)$ and CaO (b) $Mg(HCO_3)_2$ and $MgCO_3$
(c) $Mg(HCO_3)_2$ and $Mg(OH)_2$ (d) $Ca(HCO_3)_2$ and $Ca(OH)_2$

18. Hydrogen peroxide in its reaction with KIO_4 and NH_2OH respectively, is acting as a
(a) reducing agent, oxidizing agent (b) reducing agent, reducing agent
(c) oxidizing agent, oxidizing agent (d) oxidizing agent, reducing agent

19. Hydrogen molecule differs from chlorine molecule in which of the following respect?
(a) Hydrogen molecule is non-polar but chlorine molecule is polar
(b) Hydrogen molecule is polar while chlorine molecule is non-polar
(c) Hydrogen molecule can form intermolecular hydrogen bonds but chlorine molecule does not
(d) Hydrogen molecule cannot participate in coordination bond formation but chlorine molecule can

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20. Which of the following explanation is best for not placing hydrogen with alkali metals or halogen?
(a) The ionization energy of hydrogen is high for group of alkali metals or halogen.
(b) Hydrogen can form compounds.
(c) Hydrogen is a much lighter element than the alkali metals or halogens.
(d) Hydrogen atom does not contain any neutron.

21. When electric current is passed through an ionic hydride in the molten state
(a) Hydrogen is liberated at the anode
(b) Hydrogen is liberated at the cathode
(c) No reaction takes place
(d) Hydride ion migrates towards cathode

22. Which statement is not correct for ortho and para hydrogen ?
(a) They have different boiling points
(b) Ortho-forms is more stable than para-form at low temperature.
(c) They differ in their nuclear spin
(d) The ratio of ortho to para hydrogen changes with change in temperature

23. HCl is added to the following oxides which one would give H_2O_2?
(a) MnO_2 (b) PbO_2 (c) BaO_2 (d) None of these

24. The reaction of $H_2S + H_2O_2 \rightarrow S + 2H_2O$ manifests
(a) Acidic nature of H_2O_2
(b) Alkaline nature of H_2O_2
(c) Oxidising nature of H_2O_2
(d) Reducing action of H_2O_2

25. Which of the following is not true?
(a) Hardness of water depends on its behaviour towards soap.
(b) The temporary hardness is due to the presence of Ca and Mg bicarbonates.
(c) Permanent hardness is due to the presence of soluble Ca and Mg sulphates, chlorides and nitrates.
(d) Permanent hardness can be removed by boiling the water.

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MATHEMATICS : PART TEST

Topics: Complex Number, Logarithm and It's Applications

26. If $z^2 = -24 - 18i$, then z =

(a) $\pm \sqrt{3}(i + 3i)$ (b) $\pm \sqrt{3}(3 - i)$ (c) $\pm \sqrt{3}(1 - 3i)$ (d) $\pm \sqrt{3}(3 + i)$

27. The roots of the equation $x^4 - 1 = 0$ are

(a) 1, 1, i, –1 (b) 1, –1, i, –i (c) 1, –1, ω, ω^2 (d) None of these

28. If $x = 1 + 2i$, the value of $x^3 + 2x^2 - 3x + 5$ =

(a) 0 (b) –15 (c) 25 (d) –19

29. The modulus and amplitude of $\frac{1+2i}{1-(1-i)^2}$ are

(a) $\sqrt{2}$ and $\frac{\pi}{6}$ (b) 1 and 0 (c) 1 and $\frac{\pi}{3}$ (d) 1 and $\frac{\pi}{4}$

30. $\frac{1+7i}{(2-i)^2}$ =

(a) $\sqrt{2}\left(\cos\frac{3\pi}{4} + i\sin\frac{3\pi}{4}\right)$ (b) $\sqrt{2}\left(\cos\frac{\pi}{4} + i\sin\frac{\pi}{4}\right)$

(c) $\left(\cos\frac{3\pi}{4} + i\sin\frac{3\pi}{4}\right)$ (d) $\left(\cos\frac{\pi}{4} - i\sin\frac{\pi}{4}\right)$

31. $\left(\frac{1+i}{\sqrt{2}}\right)^8 + \left(\frac{1-i}{\sqrt{2}}\right)^8$ =

(a) 1 (b) 2 (c) 4 (d) 8

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32. The value of $\frac{1}{1+\omega}+\frac{1}{1+\omega^2}=$

(a) 0 (b) 1 (c) –1 (d) 2

33. If ω is a complex cube root of unity, then $(1+\omega-2\omega^2)^4+(4+\omega+4\omega^2)^4=$

(a) 0 (b) –81 (c) 81 (d) –1

34. If α and β are imaginary cube roots of unity, then the value of $\alpha^4+\beta^{28}+\frac{1}{\alpha\beta}$ is

(a) 1 (b) –1 (c) 0 (d) 2

35. If ω is an imaginary cube root of unity, then the value of $\sin\left[(\omega^{10}+\omega^{23})\pi-\frac{\pi}{4}\right]$ is

(a) $-\sqrt{3}/2$ (b) $-1/\sqrt{2}$ (c) $1/\sqrt{2}$ (d) $\sqrt{3}/2$

36. The value of $\frac{1+2\log_3 2}{(1+\log_3 2)^2}+(\log_6 2)^2$ is

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

37. If $\log_4 5 = a$ and $\log_5 6 = b$, then $\log_3 2$ is equal to

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

38. If $\log_{10} 2 = a$, $\log_{10} 3 = b$ then $\log_{0.72}(9.6)$ in terms of a and b is equal to

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

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39. The value of $\frac{\log_2 24}{\log_{96} 2} - \frac{\log_2 192}{\log_{12} 2}$ is

(a) 3 (b) 0 (c) 2 (d) 1

40. If $a^4 \cdot b^5 = 1$, then the value of $\log_a (a^5 b^4)$ equals

(a) 9/5 (b) 4 (c) 5 (d) 8/5

41. The value of $3^{\log_4 5} - 5^{\log_4 3}$ is

(a) 0 (b) 1 (c) 2 (d) None of these

42. If $2^{x+y} = 6^y$ and $3^{x-1} = 2^{y+1}$, then the value of $(\log 3 - \log 2)/(x - y)$ is

(a) 1 (b) $\log_2 3 - \log_3 2$ (c) $\log (3/2)$ (d) None of these

43. The value of x satisfying $\sqrt{3}^{-4+2\log_{\sqrt{5}} x} = 1/9$ is

(a) 2 (b) 3 (c) 4 (d) None of these

44. If $\log_2 x + \log_x 2 = \frac{10}{3} = \log_2 y + \log_y 2$ and $x \neq y$, then $x + y =$

(a) 2 (b) 65/8 (c) 37/6 (d) None of these

45. If $\log_{10}\left[\frac{1}{2^x + x - 1}\right] = x[\log_{10} 5 - 1]$, then $x =$

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

46. If $\log_3\{5 + 4\log_3 (x - 1)\} = 2$, then x is equal to

(a) 2 (b) 4 (c) 8 (d) $\log_2 16$

47. If $2x^{\log_4 3} + 3^{\log_4 x} = 27$, then x is equal to

(a) 2 (b) 4 (c) 8 (d) 16

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48. The number of roots of the equation $\log_{3\sqrt{3}} x + \log_{3x} \sqrt{x} = 0$ is

(a) 1 (b) 2 (c) 3 (d) 0

49. The set of all x satisfying the equation

$x^{\log_3 x^2 + (\log_3 x)^2 - 10} = 1 / x^2$ is

(a) {1, 9} (b) {1, 9, 1/81} (c) {1, 4, 1/81} (d) {9, 1/8}

50. If $xy^2 = 4$ and $\log_3 (\log_2 x) + \log_{1/3} (\log_{1/2} y) = 1$, then x equals

(a) 4 (b) 8 (c) 16 (d) 64

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CHEMISTRY: PART TEST ANSWER KEY
Topic: States of Matter + S-Block

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

MATHEMATICS : PART TEST ANSWER KEY
Topics: Complex Number, Logarithm and It's Applications

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