INDIAN SCHOOL MUSCAT

CHEMISTRYIIT- JEE

STRUCTURE OF THE ATOM

1. Find the ratio of radius of the fifth orbits of $He^{+}$and Li^{+}

    a. 1:2
    b. 3:2
    c. 1:3
    d. 2:3

2. What is the maximum number of electrons that can be associated with the following set of quantum numbers ?n=3,l=1 an m=-1
    a. 10
    b. 6
    c. 2
    d. 4

3. The number of nodal planes in a p_x orbital is

    a. 1
    b. 2
    c. 3
    d. 4

4. The frequency of light emitted for the transition n=4 to n=2 of the He+ is equal to the transition in H atom corresponding to which of the following
    a. n=2 to n=1
    b. n=3 to n=2
    c. n=4 to n=3
    d. n=3 to n=1

5. If travelling at same speeds,which of the following matter waves have the shortest wavelength?
    a. Electron
    b. Alpha particle
    c. Neutron
    d. Proton

6. Which quantum number is not related with Schrodinger equation
    a. Principal
    b. Azimuthal
    c. Magnetic
    d. Spin

7. The ratio of the energy of a photon of2000 A wavelength radiation to that of4000 A

radiation is

a. 1/4
b. 4
c. 1 / 2
d. 2

8. If the nitrogen atom had electronic configuration Is^7, it would have energy lower that of normal ground state configuration $1\ s^2\ 2s^2\ 2p^3$, because the electrons would be closer to the nucleus. Yet $1\ s^7$ is not observed because it violates :-

a. Heisenberg uncertainity principle
b. Hunds rule
c. Pauli's exclusion principle
d. Bohr postulate of stationary orbits

9. Which electronic level would allow the hydrogen atom to absorb a photon but not to emit a photon

a. 3s
b. 2p
c. 2s
d. Is

10. The wavelength associated with a golf weighing 200g and moving at a speed of 5m/h is of the order

a. 10^{-10}m
b. 10^{-20}m
c. 10^{-30}m
d. 10^{-40}m

11. The Planck's constant has a unit of

a. Work
b. Linear momentum
c. Energy
d. Angular momentum

12. The maximum probability of finding an electron in d_{xy}orbital is

a. Along the x axis
b. Along the y axis
c. At an angle 45^0 from the x and y axes
d. At an angle 90^0 from the x and y axes

13. The number of vacant d orbitals in completely excited chlorine atom is

a. 2
b. 3
c. 1
d. 4

14. If the speed of the electron in the Bohrs first orbit is X,the speed of theelectron in the 3^{rd} orbit is

a. X/9
b. X/3
c. 3X
d. 9X

15. Who modified Bohr's theory by introducing the concept of elliptical path for electrons.
    a. Hund
    b. Thomson
    c. Rutherford
    d. Sommerfield
16. The species having more electrons than neutrons is
    a. F
    b. Na^+
    c. Mg^{2+}
    d. O^{2-}
17. If uncertainty in position of an electron is zero,the uncertainty in its momentum would Be
    a. Zero
    b. h/4π
    c. h/π
    d. infinite
18. In hydrogen spectrum,most energetic transition of electrons are found in the following series
    a. Balmer series
    b. LymanSeries
    c. Pfund series
    d. Brackett series
19. The maximum energy is present in any electron at
    a. Nucleus
    b. Ground stae
    c. First excited state
    d. Infinite distance from the nucleus
20. When an electron of charge and mass m,, moves with velocity v , about the nuclear charge Ze in the circular orbit of radius r,the potential energy of the electron is given by
    a. Ze^2/r
    b. $-Ze^2/r$
    c. Ze^2/r^2
    d. mv^2/r
21. The dissociation energy of H2 is 430.53 kJ mol–1. If H2 is dissociated by illumination with radiation of wavelength 253.7 nm. The fraction of the radiant energy which will be converted into kinetic energy is given by :-
    a) 8.86%
    b) 2.33%
    c) 1.3%
    d) 90%

22. In the Schrodinger wave equation Ψ represents
    a) Orbit
    b) Wave
    c) Wave function

d) Radial probability

23. The number of spectral lines obtained in Bohr spectrum of hydrogen atom when an electron is excited from ground state to fifth orbit is
    a) 10
    b) 5
    c) 8
    d) 15

24. Which of the following relates to photons both as wave motion and as stream of particles

    a. Interference
    b. $E=mc^2$
    c. Diffraction
    d. $E=h\nu$

25. The values of four quantum numbers of valence electron of an element are n=4, l=0, m=0 and s=+1/2. The element is

    a. K
    b. Ti
    c. Na
    d. Sc

26. **The total spin and magnetic moment for the atom with atomic number 7 are:**
    a. $\pm 3, \sqrt{3}$ BM
    b. $\pm 1, \sqrt{8}$ BM
    c. $\pm \frac{3}{2} \sqrt{15}$ BM
    d. $0, \sqrt{8}$ BM

27. Energy of electron -52.53kilo joule per mole is for
    a. first orbit of hydrogen
    b. second orbit of hydrogen
    c. third orbit of hydrogen
    d. fifth orbit of hydrogen

28. Quantum numbers are
    a. arithmetical values
    b. numerical values
    c. geometric values
    d. logical values

29. Lines which are present in atomic emission spectrum are
    a. brown
    b. dark
    c. bright
    d. translucent

30. Energy of electron is zero

   a. near nucleus
   b. at infinity
   c. in first orbit
   d. in last orbit

31. New element formed by reaction of alpha particles with Beryllium is

   a. nitrogen
   b. hydrogen
   c. carbon
   d. zinc

32. Continuous spectrum is characteristic of matter which is present in

   a. independent units
   b. bulk
   c. space
   d. gases

33. Neutron is splitted into proton, electron and

   a. anti neutrino
   b. positron
   c. neutrino
   d. none of these

34. Line spectrum is actually characteristic of

   a. liquids
   b. gases
   c. atom
   d. plasma

35. When target element used has more atomic number it produce X rays with

   a. large wavelength
   b. small wavelength
   c. zero wavelength
   d. none

36. When electron jumps from infinity orbit to n1 in Lyman series line developed is called

a. extended line
b. limiting line
c. series line
d. parallel lines

37. Splitting of spectral lines because of electric effect is known as

a. Zeeman effect
b. electromagnetic effect
c. Stark effect
d. molecular effect

38. Spectrum of X Rays include

a. c series
b. f series
c. K series
d. B series

39. Wave equation on hydrogen atom was given by

a. Dirac
b. Schrodinger
c. Heisenberg
d. Rutherford

40. Direction of three orbitals of p-sub shell is

a. parallel
b. perpendicular
c. congruent
d. both A and B

41. Uncertainty principle can be easily understandable with help of

a. Dalton's effect
b. Compton's effect
c. electron effect
d. rhombic effect

42. Quantum number is measure of size of electronic shell, which is

a. qualitative
b. quantitative
c. Both A and B
d. basic

43. Orbital angular momentum depends on
(a) l
(b) n and l
(c) n and m
(d) m and s

44. For the electrons of oxygen atom, which of the following statements is correct?

a. Zeff for an electron in a 2s orbital is the same as Zeff for an electron in a 2p
b. An electron in the 2s orbital has the same energy as an electron in the 2p
c. Zeff for an electron in Is orbital is the same as Zeff for an electron in a 2s orbital.
d. The two electrons present in the 2s orbital have spin quantum numbers ms but of opposite.

45. If the threshold wavelength (λ_0) for ejection of electron from metal is 330 nm, then work function for the photoelectric emission is

a. 1.2×10^{-18} J b. 1.2×10^{-20} J
c. 6×10^{-29} J d. 6×10^{-12} J

46. If velocity of an electron in 1st orbit of H atom is V, what will be the velocity in 3rd orbit of Li^{2+}?

a. V b. $\frac{V}{3}$ c. $3V$ d. $9V$

47. The energy of an electron in the first Bohr orbit of H atom is −13.6 eV. The possible energy value(s) of the excited state (s) for electrons in Bohr orbits of hydrogen is (are)

a. −3.4 eV b. −4.2 eV c. −6.8 eV d. +6.8 eV

48. If wavelength is equal to the distance travelled by the electron in one second, then

a. $\lambda = h/p$ b. $\lambda = h/m$ c. $\lambda = \sqrt{h/p}$ d. $\lambda = \sqrt{h/m}$

49. A photon of frequency n causes photoelectric emission from a surface with threshold frequency ν_0. The de Broglie wavelength λ of the photoelectron emitted is given as

a. $\Delta n = \frac{h}{2m\lambda}$

b. $\Delta n = \frac{h}{\lambda}$

c. $\left[\frac{1}{\nu_0} - \frac{1}{\nu}\right] = \frac{mc^2}{h}$

d. $\lambda = \sqrt{\frac{h}{2m\,\Delta n}}$

50. The ratio of kinetic energy and potential energy of an electron in a Bohr orbit of a hydrogen-like species is

a. 1/2 b. −1/2 c. 1 d. −1

51. The shortest and longest wave number in H spectrum of Lyman series is (R = Rydberg constant)

a. $\frac{3}{4}R, R$

b. $\frac{1}{R}, \frac{4}{3}R$

c. $R, \frac{4}{3}R$

d. $R, \frac{3}{4}R$

52. The velocities of two particles A and B are 0.05 and 0.02 ms^{-1} respectively. The mass of B is five times the mass of A. The ratio of their de-Broglie's wavelength

2:1

1:4

1:1

4:1

53. The wavelength (in Å) of an emission line obtained for Li^{2+} during electronic transition from $n_2 = 2$ to $n_1 = 1$ is

a) 4/3R

b) 27R/4

c) 3R/4

d) 4/27R

54. The wavelength associated with a golf ball weighing 200 g and moving at a speed of 5 m/hour is of the order of:

a) 10^{-10} m
b) 10^{-20} m
c) 10^{-30} m
d) 10^{-40} m

55. The wavelengths of electron waves in two orbits is 3 : 5. The ratio of kinetic energy of electron will be

a) 25:9
b) 5:3
c) 9:25
d) 3:5

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