**Exercise 4 (Extra-edge)**

1. The energies, $E_1$ and $E_2$ of two radiations are 25 eV and 50 eV respectively. The relation between their wavelengths i.e., $\lambda_1$ and $\lambda_2$ will be

a) $\lambda_1 = \frac{1}{2}\lambda_2$ b) $\lambda_1 = \lambda_2$

**c) $\lambda_1 = 2\lambda_2$** d) $\lambda_1 = 4\lambda_2$

2. For Balmer series in the spectrum of atomic hydrogen, the wave number of each line is given by $\bar{\nu} = R_H\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$ where of the following statement is are correct?

1. As wavelength decreases, the lines in the series converge.

2. The integer $n_1$ is equal to 2.

3. The ionisation energy of hydrogen can be calculated from the wave number of these lines.

4. The lines of longest wavelength corresponds to $n_2$=3 **(Kerala CEE 2011)**

a) 1,2 and 3 b) 2,3 and 4

**c) 1,2 and 4** d) 2 and 4 only

e) 2 only

3. In which one of the following pairs the two species are both isoelectronic and isotopic?

( Atomic numbers: Ca=20,Ar=18,K=19,Mg=12,Fe=26,Na=11) **(Kerala CEE 2011)**

(a) $^{40}Ca^{2+}$ and $^{40}Ar$ **(b) $^{39}K^{+}$ and $^{40}K^{+}$**

(c) $^{24}Mg^{2+}$ and $^{25}Mg$ (d) $^{23}Na$ and $^{24}Na^{+}$

(e) $^{56}Fe^{3+}$ and $^{57}Fe^{2+}$

4. Calculate the velocity of an electron having wavelength of 0.15 nm. Mass of an electron is $9.109 \times 10^{-28}$ g.

(h = $6.626 \times 10^{-27}$ erg-s) **(Guj. CET 2011)**

**(a)$4.85 \times 10^{8}$ $cms^{-1}$** (b) $2.062 \times 10^{-15}$ $cms^{-1}$

(c) $2.068 \times 10^{-10}$ $cms^{-1}$ (d) $4.85 \times 10^{-8}$ $cms^{-1}$

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5. The total number of atomic orbitals in fourth energy level of an atom is **(CBSE AIPMT 2011)**

(a) 4 (b) 8

**(c) 16** (d) 32

6. If n = 6, the correct sequence of filling of electron will be **(CBSE AIPMT 2011)**

(a) ns→ np→(n-1)d→(n-2) f

**(b) ns→(n-2)f→(n-1)d→np**

(c) ns→(n-1)d→(n-2)f→np

(d) ns→ (n-2)f→np→(n-1)d

7. Which one of the following sets of quantum numbers represents the highest energy level in an atom? **(KCET 2011)**

(a) n = 4, 1=0, m= 0, s=+$\frac{1}{2}$

(b) n = 3, 1=1, m= 1, s=+$\frac{1}{2}$

**(c) n = 3, 1=2, m= -2, s=+$\frac{1}{2}$**

(d) n = 3, 1=0, m= 0, s=+$\frac{1}{2}$

8. Which of the following is correct for number of electrons, number of orbitals and type of suborbits respectively in N-orbit? **(Guj. CET 2011)**

(a) 4,4 and 8 (b) 4,8 and 16

**(c) 32,16 and 4** (d) 4,16 and 32

9. when the electron of a hydrogen atom jumps from n =4 to n =1 state, the number of spectral lines emitted is **(AMU 2010)**

(a) 15 (b) 9

**(c) 6** (d) 3

10. The wave number of the spectral line in the emission spectrum of hydrogen will be equal to $\frac{8}{9}$ times the Rydberg's constant if the electron jumps from **(KCET 2010)**

**(a) n =3 to n =1** **(b) n =10 to n = 1**

(c) n =9 to n = 1 (d) n =2 to n =1

11. The wavelength of which series lie towards the ultraviolet region? (**RPMT 2010)**

**(a) Lyman** (b) Balmer

(c) Paschen (d) None of these

12. The statement that does not belong to Bohr's model of atom, is **(CMC Ludhiana 2010)**

(a) the energy of the electrons in the orbit is quantised

(b) the electron in the orbit nearest to the nucleus is in lowest energy state.

(c) the electron revolve in different orbits around the nucleus.

**(d) the electron emit energy during revolution due to the presence of Coulombic forces of attraction**

13. If a species has 16 protons, 18 eletrons and 16 neutrons, find the species and it charge.

**(WB JEE 2010)**

(a)$S^{1-}$ (b) $Si^{2-}$

(c)$S^{3-}$ **(d) $s^{2-}$**

14. which of the following pairs is isoelectronic? **(VMMC 2010)**

(a)Ne, Cl (b) $Ca^{2+}$, $F^{-}$

(c)$Mg^{2+}$ **(d) $N^{3-}$, $Na^{+}$**

15. The ratio between the neutrons in C and Si with respect to atomic masses 12 and 28 is

**(BVP 2010)**

(a) 2:3 (b) 3:2

**(c) 3:7** (d) 7:3

16. Calculate the wave length of light required to break the band between two chlorine atoms in a chlorine molecule. The CI-CI bond energy is 243 KJ $mol^{-1}$. (h=6.6 x $10^{-34}$ $mol^{-1}$)

**(DUMET 2010)**

**(a)4.91 x $10^{-7}$ m** (b) 4.11 x $10^{-6}$ m

(c) 8.81 x $10^{-31}$ m (d) 6.26 x $10^{-21}$ m

17. Who gave uncertainly principle? **(MP PMT 2010)**

(a) Einstein **(b) Heisenberg**

(c) Rutherford (d) Thomson

18. The relation between wave motion of photons and stream of particle is

(**MP PMT 2010)**

(a) interference (b) $E = mc^2$

(c) diffraction **(d) E = hv**

19. The mass of a photon with wavelength 3.6 Å is **(RPMT 2010)**

(a) $6.135 \times 10^{-19}$ (b) $5.6135 \times 10^{-33}$

(c) $6.100 \times 10^{-19}$ **(d) $6.135 \times 10^{-33}$**

20. A particle having a mass of 1.0 mg has a velocity of 3600 km/h. Calculate the wavelength of the particle.

(h= $6.626 \times 10^{-27}$ erg-s) **(Guj. CET 2010)**

(a) $6.626 \times 10^{-28}$ cm **(b) $6.626 \times 10^{-29}$ cm**

(c) $6.626 \times 10^{-30}$ cm (d) $6.626 \times 10^{-31}$ cm

21. In Sommerfeld's modification of Bohr's theory, the trajectory of an electron in a hydrogen atom is **(WB JEE 2010)**

(a) a perfect ellipse.

**(b) a closed ellipse- like curve, narrower at the perihelion position and flatter at the aphelion position.**

(c) a closed loop on spherical surface.

(d) a rosette.

22. What is the frequency of a light wave whose period is $2.0 \times 10^{-10}$ s? **(VMMC 2010)**

(a) $5 \times 10^{9}$ s (b) $4 \times 10^{9}$ s

**(c) $5 \times 10^{9}$ $s^{-1}$** (d) $5 \times 10^{9}$ $s^{-1}$

23. The set of quantum number that represents the highest energy of an atom is

**(AMU 2010)**

(a) n = 4, l=0, m= 0, s=+$\frac{1}{2}$

**(b) n = 3, l=2, m= 1, s=+$\frac{1}{2}$**

(c) n = 3, l=1, m= 1, s=+$\frac{1}{2}$

(d) n = 3, l=0, m= 0, s=+$\frac{1}{2}$

24. which of the following sets of quantum numbers represents the 19th electron in chromium? (z = 24 for Cr) **(AMU 2010)**

**(a) 4, 0, 0,$\frac{1}{2}$** (b) 4, 1, -1,$\frac{1}{2}$

(c) 3, 2, 2,$\frac{1}{2}$ (d) 3, 2, -2, $\frac{1}{2}$

25. The set of quantum number for the outermost electron for copper in its ground state is

**(KCET 2010)**

(a) 4, 1, 1, $+\frac{1}{2}$ (b) 3, 2, 2, $+\frac{1}{2}$

**(c) 4, 0, 0, $+\frac{1}{2}$** (d) 4, 2, 2, $+\frac{1}{2}$

26. Principal, azimuthal and magnetic quantum numbers are respectively related to

**[RPMT 2010]**

(a)size, orientation and shape

**(b)size, shape and orientation**

(c)shape, size and orientation

(d)None of the above

27. Pauli's exclusion principle states that **[RPMT 2010]**

(a)the number of an atom is negatively charged

(b)electrons revolve around the nucleus in circular orbits

(c)electrons enter into lowest energy orbitals

**(d)no two electrons in an atom can have all the four quantum numbers identical**

28. The number of nodal planes that `5d' orbital has is

**[RPMT 2010]**

(a)zero

(b)one

**(c)two**

(d)three

29. The electrons identified by quantum number n and l

(a)n=4, l=1

(b)n=4, l=0

(c)n=3, l=2

(d)n=3, l=1

can be placed in order of increasing energy from the lowest to highest as

**[Manipal 2010]**

**(a)(iv) < (ii) < (iii) < (i)**

(b)(ii) < (iv) < (i) < (iii)

(c)(i) < (iii) < (ii) < (iv)

(d)(iii) < (i) < (iv) < (ii)

30. Nitrogen has the electronic configuration $1s^2, 2s^2, 2p_x^1, 2p_y^1, 2p_z^1$ and not $1s^2, 2s^2, 2p_x^2, 2p_y^1, 2p_z^0$, which is determined by

**[Haryana PMT 2010]**

(a)Pauli exclusion principle

(b)Aulbau principle

**(c)Hund's rule**

(d)Uncertainty principle

31. Which of the following orbitals will have zero probability of finding the electron in the yz plane?

**(a) $p_x$** (b) $p_y$ (c) $p_z$ (d) $d_{yz}$ **[WB JEE 2010]**

32. Magnetic quantum number specifies

**[VMMC 2010]**

(a)size of orbitals

(b)shape of orbitals

**(c)orientation of orbitals**

(d)nuclear stability

33. For n=2, the correct set of azimuthal and magnetic quantum numbers are

**[OJEE 2010]**

(a)$l = 2; m = -2, -1, 0, +1, +2$

(b)$l = 1; m = -2, -1, 0, +1, +2$

(c)$l = 0; m = -1, 0, +1$

**(d)$\boldsymbol{l = 1; m = -1, 0, +1}$**

34. Assertion In Lyman series of H-spectra, the maximum wavelength of lines is 121.65nm

Reason Wavelength is maximum if there is transition from the very next level

**(a) If both Assertion and Reason are true and Reason is the correct explanation of the Assertion**
**(b)** If both Assertion and Reason are true but the Reason is not the correct explanation of the Assertion
**(c)** If Assertion is true but Reason is false
**(d)** If both Assertion and Reason are false

35. The radius of the first Bohr orbit of the H atom is r. Then, the radius of the first orbit of $Li^{2+}$ will be

**[AMU 2009]**

(a)r/9

**(b)r/3**

(c)3r

(d)9r

36. Arrange in decreasing order, the energy of 2s orbitals in the following atoms

H, Li, Na, K **[AMU 2009]**

**(a)** $\boldsymbol{E_{2\times(H)} > E_{2\times(Li)} > E_{2\times(Na)} > E_{2\times(K)}}$

(b) $E_{2\times(H)} > E_{2\times(Na)} > E_{2\times(Li)} > E_{2\times(K)}$

(c) $E_{2\times(H)} > E_{2\times(Na)} = E_{2\times(K)} > E_{2\times(Li)}$

(d) $E_{2\times(K)} < E_{2\times(Na)} < E_{2\times(Li)} < E_{2\times(H)}$

37. Number of spectral lines of Lyman series of electron when it jumps from 6 to first level (in Lyman series), is **[CPMT 2009]**

(a)9

(b)12

**(c)15**

(d)18

38. In hydrogen atomic spectrum, a series limit is found at 12186.3 $cm^{-1}$. Then, its belongs to

**(Kerala CEE 2009)**

(a) Lyman series (b) Balmer series

**(c) Paschen series** (d) Brackett series

(e) Plund series

39. Number of unpaired electrons in $Mn^{3+}$ is **(OJEE 2009)**

(a) 2 (b) 3 **(c) 4** (d) 5

40. For the paschen series the value of $n_1$ and $n_2$ in the expression, $\Delta E = R_n hc \left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$

(a) $n_1 = 1$ , $n_2 = 2,3,4...$ (b) $n_1 = 2$ , $n_2 = 3,4,5...$

**(c) $n_1 = 3$ , $n_2 = 4,5,6...$** (d) $n_1 = 4$ , $n_2 = 5,6,7...$

41. The de-Broglie wavelength of helium atom at room temperature is **[AIIMS 2009]**

(a) $6.6 \times 10^{-34}$ m (b) $4.39 \times 10^{-10}$ m

**(c) $7.34 \times 10^{-11}$ m** (d) $2.335 \times 10^{-20}$ m

42. Probability of finding an electron at the nodal surface is **[AMU 2009]**

(a) unity (b)low

(c)high **(d) zero**

43. A body of mass x kg is moving with a velocity of 100 $ms^{-1}$, Its de- Broglie wavelength is $6.62 \times 10^{-35}$m. Hence x is (h=$6.62 \times 10^{-34}$ JS) **[KCET 2009]**

(a) 0.25 kg (b) 0.15 kg

(c) 0.2 kg **(d) 0.1 kg**

44. The velocity of particle A is 0.1 $ms^{-1}$ and that of particle B is 0.05 $ms^{-1}$. If the mass of the particle B is five times that of particle A, the ratio of de-Broglie wavelengths associated with the particles A and B is **[Kerala CEE 2009]**

(a) 2:5 (b)3:4

(c) 6:4 (d)4:3

**(e) 5:2**

45. The wavelengths of electron waves in two orbits is 3:5. The ratio of kinetic energy of electrons will be **[EAMCET 2009]**

**(a) 25:9** (b) 5:3

(c) 9:25 (d) 3:5

46. Electrons with a kinetic energy of 6.023 x $10^4$ J/mol are evolved from a surface of a metal, when it is exposed to radiation of wavelength 600 nm. The minimum amount of energy required to remove an electron from the metal atom is
[**EAMCET 2009**]

**(a) 2.3125 x $10^{-19}$ J** (b) 3 x $10^{-19}$ J

(c) 6.02 x $10^{-19}$ J (d) 6.62 x $10^{-34}$ J

47. The uncertainty in the position of an electron (mass = 9.1 x $10^{-28}$ g) moving with a velocity of 3.0 x $10^4$ $cms^{-1}$ accurate up to 0.011% will be **[Manipal 2009]**

(a) 1.92 cm (b) 7.66 cm

**(c) 0.175 cm** (d) 3.84 cm

48. If uncertainty in position and velocity are equal then uncertainty in momentum will be

**[Manipal 2009]**

**(a)** $\frac{1}{2}\sqrt{\frac{mh}{\pi}}$ (b) $\frac{1}{2}\sqrt{\frac{h}{\pi m}}$

(c) $\frac{h}{4\pi m}$ (d) $\frac{mh}{4\pi}$

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49. If the de-Broglie wavelength of a particle of mass m is 100 times its velocity then its value in terms of its mass (m) and Planck's constant (h) is **(J&K CET 2009)**

(a) $\frac{1}{10}\sqrt{\frac{m}{h}}$ **(b) 10** $\sqrt{\frac{h}{m}}$

(c) $\frac{1}{10}\sqrt{\frac{h}{m}}$ (d) 10 $\sqrt{\frac{m}{h}}$

50. 1 mole of photon, each of frequency 2500 $s^{-1}$, would have approximately a total energy of

**(WB JEE 2009)**

(a) 1 erg (b) 1 J

(c) 1 eV **(d) 1 MeV**

51. Maximum number of electron in a subshell of an atom is determined by the following

**(CBSE AIPMT 2009)**

**(a) 4l + 2** (b) 1 J

(c) 4l – 2 (d) 2l + 1

52. Which of the following is not permissible arrangement of electrons in an atom?

**(CBSE AIPMT 2009)**

**(a) n = 3, l=2, m= -3, s=-$\frac{1}{2}$**

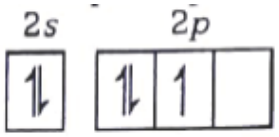
(b) n = 5, l=3, m= 0, s=+$\frac{1}{2}$

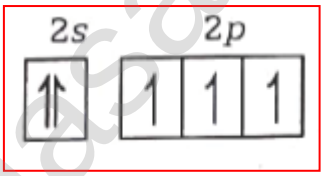
(c) n = 4, l=0, m= 0, s=-$\frac{1}{2}$

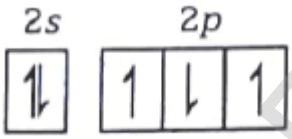
(d) n = 3, 1=2, m= -2, s=-$\frac{1}{2}$

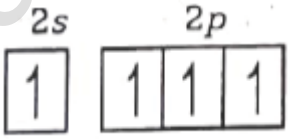
53. Which of the following orbital diagram violates Pauli's exclusion principle ?

**(AFMC 2009)**

(a) 


**(b)** 


(c) 


(d) 


54. The number of unpaired electron in ferrous ion is **(AFMC 2009)**

(a) 3 (b) 2

**(c) 4** (d) 5

55. n and l for some electrons are given. Which of the following is expected to have least energy? **(AIIMS 2009)**

(a) n=3, l=2 (b) n=3, l=0

**(c) n=2, l=1** (d) n=4, l=0

56. The correct set of quantum numbers for the unpaired electron of a chlorine atom is

**(DUMET 2009)**

(a) 2, 0, 0, +1/2 (b) 2, 1, -1, +1/2

**(c) 3, 1, -1, +1/2** (d) 3, 0, 0, -1/2

57. The correct set of four quantum numbers for outermost electron of potassium (z = 19) is **(KCET 2009)**

(a) 3, 1, 0, 1/2 **(b) 4, 0, 0, 1/2**

(c) 3, 0, 0, 1/2 (d) 4, 1, 0, ½

58. For f-orbital, the values of m are **(Manipal 2009)**

(a) -2,-1,0,+1,+2 **(b) -3,-2,-1,0,+1,+2,+3**

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

59. The number of radial nodes of 3s and 2p orbital are **(CG PMT,Haryana PMT 2009)**

**(a) 2, 0** (b) 0, 2 (c) 1, 2 (d) 2,1

60. The number of nodal planes in $p_x$ orbital is **(CG PMT,Haryana PMT 2009)**

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

61. The set of quantum numbers n = 4, l =0, m = 0 and s= $+\frac{1}{2}$ corresponds to the most loosely bound, ground state electron of which one of the following atom? **(J&k CET 2009)**

(a) Na (b) Cl **(c) Cr** (d) Rb