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# QUESTION BANK

## Career Point,

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# CHEMISTRY

Q.1. In an atom, an electron is moving with a speed of 600 m/s with an accuracy of 0.005%. Certainity with which the position of the electron can be located is position of the electron can be located is position of the electron can be located (h =6.6× $10^{-34} kg m^2 s^{-1}$, mass of the electron, $e_m$= 9.1× $10^{-31} kg$)

(a) 1.52× $10^{-4} m$ (b) 5.10 × $10^{-3}$m

(c)1.92 × $10^{-3} m$ (d)3.84 × $10^{-3} m$

Q.2. Calculate the wavelength (in nanometer) associated with a proton moving at 1.0× $10^3 ms^{-1}$(Mass of proton = 1.67 × $10^{-27}$kg $h = 6.63 \times 10^{-34}$Js.)

(a) 0.032 nm (b) 0.40 nm

(c) 2.5 nm (d) 14.0 nm

Q.3. Which of the following sets of quantum number is correct?

(a) $n = 5, l = 4, m = 0, s = +\frac{1}{2}$

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

(c)$n = 6, l = 0, m = +1, s = -\frac{1}{2}$

(d)$n = 4, l = 2, m = +2, s = 0$

Q.4.The correct set of four quantum numbers for outer most electron of potassium (Z = 19) is

(a) 4, 1, 0,$\frac{1}{2}$ (b)3, 1, 0, $\frac{1}{2}$

(c) 4, 0, 0,$\frac{1}{2}$ (d) 3, 0, 0, $\frac{1}{2}$

Q.5. A body of mass x kg is moving with a velocity is 100 $ms^{-1}$. Its de-Broglie wavelength is 6.62× $10^{-35}$m. Hence, x is (h =6.62× $10^{-34} Js$)

(a) 0.1 kg (b) 0.25 kg

(c) 0.15 kg (d) 0.2 kg

Q.6. The number of photons emitted per second by a 60 W source of monochromatic light of wavelength 663 nm is (h = 6.63 × $10^{-34}$Js)

(a)4× $10^{-20}$ (b) 1.5 × $10^{20}$

(c) 3× $10^{-20}$ (d)2× $10^{20}$

(e)1 × $10^{-20}$

Q.7. The ionization enthalpy of hydrogen atom is 1.312× $10^6$ J $mol^{-1}$. The energy required to excite the electron in the atom from n = 1 to n = 2 is

(a) 8.51× $10^5 J mol^{-1}$

(b) 6.56× $10^5 J mol^{-1}$

(c) 7.56× $10^5 J mol^{-1}$

(d) 9.84× $10^5 J mol^{-1}$

Q.8. Time period of a wave is 5×$10^{-3}$ s, what is the frequency?

(a) 5×$10^{-3}$ $s^{-1}$ (b) 2×$10^2$ $s^{-1}$

(c) 23×$10^3$ $s^{-1}$ (d) 5×$10^2$ $s^{-1}$

Q.9. Splitting of spectrum lines in magnetic field is

(a) Stark effect (b) Raman effect

(c) Zeeman effect (d) Rutherford effect

Q.10. An electron from one Bohr stationary orbit can go to next higher orbit

(a) by emission of electromagnetic radiation

(b) by absorption of any electromagnetic radiation

(c) by absorption of electromagnetic radiation of particular frequency

(d) without emission or absorption of electromagnetic radiation

Q.11. What is the lowest energy of the spectral line emitted by the hydrogen atom in the Lyman series?

($h$ = Planck's constant, $c$ = velocity of light, $R$ = Rydberg's constant).

(a) $\frac{5hcR}{36}$ (b) $\frac{4hcR}{3}$

(c) $\frac{3hcR}{4}$ (d) $\frac{7hcR}{144}$

Q.12. The values of four quantum number of valence electron of an element are $n = 4$, $l = 0, m = 0$ and $s = +\frac{1}{2}$. The element is

(a) K (b) Ti
(c) Na (d) Sc

Q.13. An isobar of $_{20}Ca^{40}$ is

(a) $_{18}Ar^{40}$ (b) $_{20}Ca^{38}$
(c) $_{20}Ca^{42}$ (d) $_{18}Ar^{38}$

Q.14. The presence of unpaired electrons in phosphorus atom is explained by which principle?

(a) Aufbau principle
(b) Pauli's exclusion principle
(c) Hund's rule
(d) Heisenberg's principle

Q.15. If a cricket ball having mass of 200 g is thrown with a speed of $3\times10^3$ cm/s then calculate the wavelength related to it.

(a) $2.2\times10^{-27}$ cm
(b) $1.104\times10^{-32}$ cm
(c) $1.104\times10^{-27}$ cm
(d) $1.104\times10^{-33}$ cm

Q.16. Which of the following sets of quantum numbers represents the highest energy of an atom?

(a) $n = 3, l = 1, m = 1, s = +1/2$
(b) $n = 3, l = 2, m = 1, s = +1/2$
(c) $n = 4, l = 0, m = 0, s = +1/2$
(d) $n = 3, l = 0, m = 0, s = +1/2$

Q.17. The energy of second Bohr orbit of the hydrogen atom is $-328$ kJ mol$^{-1}$; hence the energy of fourth Bohr orbit would be

(a) $-41$ kJ mol$^{-1}$ (b) $-1312$ kJ mol$^{-1}$
(c) $-164$ kJ mol$^{-1}$ (d) $-82$ kJ mol$^{-1}$

Q.18. The wavelength of the radiation emitted, when in a hydrogen atom electron falls from infinity to stationary state 1, would be (Rydberg constant = $1.097\times10^7$ m$^{-1}$)

(a) 91 nm (b) 192 nm
(c) 406 nm (d) $9.1\times10^{-8}$ nm

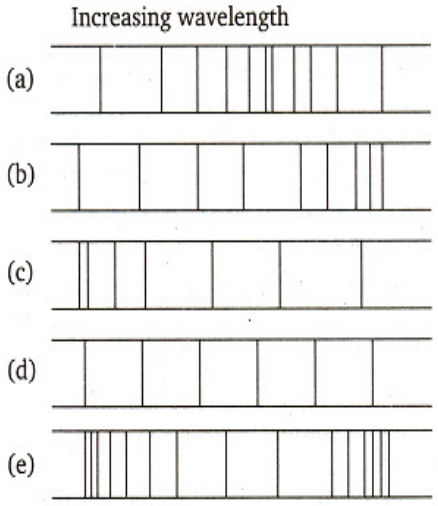
Q.19. The orbital angular momentum of an electron in a *d*-orbital is

(a) $\sqrt{6}\frac{h}{2\pi}$ (b) $\sqrt{2}\frac{h}{2\pi}$
(c) $\frac{h}{2\pi}$ (d) $\frac{2h}{2\pi}$

Q.20. The radius of the first Bohr orbit of hydrogen atom is 0.520 Å. The radius of the third orbit of $H^+$ will be

(a) 8.46 Å (b) 0.705 Å
(c) 1.59 Å (d) 4.29 Å
(e) 2.38 Å

Q.21. Which diagram best represents the appearance of the line spectrum of atomic hydrogen in the visible region?




Q.22. Which of the following make up an isotonic traid?

(a) $^{78}_{32}Ge$, $^{77}_{33}As$, $^{74}_{31}Ga$ (b) $^{40}_{18}Ar$, $^{40}_{19}K$, $^{40}_{20}Ca$
(c) $^{233}_{92}U$, $^{232}_{90}Th$, $^{239}_{90}Pu$ (d) $^{13}_{6}C$, $^{12}_{7}C$, $^{14}_{7}N$
(e) $^{14}_{6}C$, $^{16}_{8}O$, $^{15}_{7}N$

Q.23. Which one of the following sets of ions represents a collection of isoelectronic species?

(a) $K^+, Cl^-, Ca^{2+}, Sc^{3+}$ (b) $Ba^{2+}, Sr^{2+}, K^+, S^{2-}$

(c) $N^{3-}, O^{2-}, F^-, S^{2-}$ (d) $Li^+, Na^+, Mg^{2+}, Ca^{2+}$

Q.24. Uncertainty in the position of an electron (mass $= 9.1\times10^{-31}$ kg) moving with a velocity 300 $ms^{-1}$, accurate upon 0.001% will be ($h = 6.63\times10^{-34}$ Js)

(a) $19.2\times10^{-2}$ m (b) $5.76\times10^{-2}$ m

(c) $1.92\times10^{-2}$ m (d) $3.84\times10^{-2}$ m

Q.25. According to Bohr's theory, the angular momentum of an electron in 5th orbit is

(a) $25\frac{h}{\pi}$ (b) $1.0\frac{h}{\pi}$

(c) $10\frac{h}{\pi}$ (d) $2.5\frac{h}{\pi}$

Q.26. If the energy difference between the ground state of an atom and in excited state is $4.4\times10^{-4}$ J, the wavelength of photon required to produce the transition is

(a) $2.26\times10^{-12}$ m (b) $1.13\times10^{-12}$ m

(c) $4.52\times10^{-16}$ m (d) $4.52\times10^{-12}$ m

Q.27. Energy of photon or visible light is

(a) 1 eV (b) 1 MeV

(c) 1 eV (d) 1 KeV

Q.28. The orbital angular momentum of an electron in 3*s* orbital is

(a) $\frac{1}{2}\cdot\frac{h}{2\pi}$ (b) $\frac{h}{2\pi}$

(c) $\frac{1}{3}\cdot\frac{h}{2\pi}$ (d) zero

Q.29. The orbital angular momentum of an electron revolving in a *p*-orbital is

(a) zero (b) $\frac{h}{\sqrt{2}\pi}$

(c) $\frac{h}{2\pi}$ (d) $\frac{1}{2}\frac{h}{2\pi}$

(e) $\frac{h}{2\sqrt{2}\pi}$

Q.30. Which one of the following sets of quantum numbers is not possible for electron in the ground state of an atom with atomic number 19?

(a) $n = 2, l = 0, m = 0$ (b) $n = 2, l = 1, m = 0$

(c) $n = 3, l = 1, m = -1$ (d) $n = 3, l = 2, M = +2$

(e) $n = 4, l = 0, m = 0$

Q.31. The number of radial nodes of 3*s* and 2*p* orbital are respectively

(a) 2, 0 (b) 0, 2

(c) 1, 2 (d) 2, 11

Q.32. Which of the following statements in relation to the hydrogen atom is correct?

(a) 3*s*, 3*p* and 3*d* orbital all have the same energy

(b) 3*s* and 3*p* orbitals are of lower energy than 3*d* orbital

(c) 3*p* orbital is lower in energy than 3*d* orbital

(d) 3*s* orbital is lower in energy than 3*p* orbital

Q.33. In a multi-electron atom, which of the following orbitals described by the three quantum numbers will have the same energy in the absence of magnetic and electric field?

(i) $n = 1, l = 0, m = 0$ (ii) $n = 2, l = 0, m = 0$

(iii) $n = 2, l = 1, m = 1$ (iv) $n = 3, l = 2, m = 1$

(v) $n = 3, l = 2, m = 0$

(a) (iv) and (v) (b) (iii) and (iv)

(c) (ii) and (iii) (d) (i) and (ii)

Q.34. For a Bohar atom momentum M of the electron is (n=0, 1, 2,…..)

(a) $\frac{nh^2}{4\pi}$ (b) $\frac{n^2h^2}{4\pi}$

(c) $\sqrt{\frac{nh^2}{4\pi}}$ (d) $\frac{nh}{2\pi}$

Q.35. The H-sepectrum show

(a) Heisenberg's uncertainty principle

(b) differaction

(c)polarisation

(d) presence of quantized energy level

Q.36. Which of the following statements does not form a part of Bohr's model of hydrogen atom?

(a) Energy of the electrons in the orbit is quantized

(b) The electron in the orbit nearest the nucleus has the lowest energy

(c)Electrons revolve in different orbits around the nucleus

(d) The position and velocity of the electrons in the orbit cannot be determined simultaneously

Q.37. Electrons will first enter into the set of quantum numbers n=5, l= 0 or n =3, l =2

(a) $n = 5, l = 0$ (b) both possible

(c) $n = 3, l = 2$ (d) data insufficient

Q.38. Which of the following is non-permissible?

(a) $n = 4, l = 3, m = 0$

(b) $n = 4, l = 2, m = 1$

$(c) n = 4, l = 4, m = 1$

(d) $n = 4, l = 0, m = 0$

Q.39. An isotone of $^{76}_{32}Ge$ is

(a) $^{76}_{32}Ge$ (b) $^{76}_{33}Ase$

(c) $^{76}_{34}Se$ (d) $^{78}_{36}Sc$

Q.40. The phenomenon of emission of visible light as a result of chemical change is known as

(a) chemiluminesscene

(b)florescence

(c) phosphorescence

(d) photosensitization

Q.41. The uncertainty in the momentum of an electron is $1.0\times 10^{-5}$kg $ms^{-1}$. The uncertainty in its position will be

(a) $1.50\times 10^{-28}$m (b) $1.0\times 10^{-2}$m

(c) $5.27\times 10^{-30}$m (d) $5.25.\times 10^{-28}$m

ANSWER KEY

| Q.NO | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| ANS | C | B | A | C | A | D | D | B | C | C |
| Q.NO | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| ANS | C | A | A | C | B | B | D | A | B | D |
| Q.NO | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 |
| ANS | C | E | A | C | D | D | A | D | B | D |
| Q.NO | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 |
| ANS | A | A | A | D | D | D | C | C | B | A |
| Q.NO | 41 | | | | | | | | | |
| ANS | C | | | | | | | | | |