Unit 1 – Atomic Structure

1.1 Atomic models

1) Nucleous charge of oxygen is,
1) 1.602×10^{-19} C 2) 128.16×10^{-22} C
3) 25.632×10^{-19} C 4) 6.408×10^{-19}
5) None of the above (1981)

2) The scientist who worked hard to put forward an atomic nucleous moddele is,
1) Thomson 2) Marsden 3) Millikan
4) Becquerel 5) Einstein (1981)

3) The atomic nucleous consists of,
1) Only protons 2) Only neutrons
3) Protons and neutrons only 4) Proton, neutron and other elementry particles
5) Equal amounts of neutrons, protons and electrons. (1981)

4)

Cathode rays are going to get deflected by magnetic fields.	Cathode rays consist of positively charge particles (1981)

5) The atomic nucleus radius approximately is,
1) 10^{-8} cm 2) 10^{-4} cm 3) 10^{-16}cm 4) 10^{-12} cm 5) 10^{-5} cm (1982)

6) A sample of chlorine has a mixture of isotopes with bath mass numbers 35 and 37. (The atomic number is 17 and relative atomic mass is 35.5) The conclusion / conclusions can be made by using the data given above is/are,
(a) ^{35}Cl is radioactive.
(b) Natural sample of chlorine contains move ^{35}Cl than ^{37}Cl.
(c) Both isotopes have the same electronic arrangement.
(d) Atoms with mass numbers 35 and 37 respectively have 17 and 19 neutrons in each. (1982)

7) The gold leaf experiment done by Rutherford using α– particles explains that,
(a) the atom consistof electrons.
(b) the mass of the atom is concentrated into a point and the volume of it is very small.
(c) Atom are building units of matter.
(d) Neutrons are found in atoms. (1982)

8)

Cathode rays can penitrate a thin layer of aluminium foil.	Cathode rays are made up of α particles. (1983)

9) The false statement regarding the following statements is/are
1) Every atom in an element has an equal number of electrons in each of them.
2) Every atom in an element has an equal number of neutrons.
3) Every atom in an element has an equal number of protons.
4) Every atom in an element has an equal number of nucleons
5) In an element, the atomic number is equal to the number of electron it has in an atom. (1983)

10) The true statement/s regarding α– particles is/are,
(a) α– particles have a higher penitration power than β – particles.
(b) α– particles have a higher ionisation power than that of β
(c) Helium gas is produced by α– particles
(d) α – particles do not get deflected by magnetic fields. (1984)

11) The atom was first articulated to the world by,
1) Canisaro 2) Dalton 3) Debenner 4) Avagadro 5) Mendeleev (1985)

12) Rutherford's Gold Leaf experiment revealed that
(a) quite a large space of matter is empty.
(b) the positive charge is concentrated as nucleus.
(c) only a thin layer can radiate α particles
(d) the electrons move in quantized energy levels. (1986)

13) The mass of an electron is
1) $\frac{1.008}{1840}$ g 2) $\frac{1.008}{96490} \times \frac{1}{1840}$ g 3) 9.107×10^{-28} g
4) $\frac{96490}{6.022 \times 10^{23}}$ g 5) $\frac{1.008}{6.022 \times 10^{23}}$ g (1987)

14)

The path of α particles is not going to change by a magnetic field.	α particles move at the speed of light (1987)

15)

γ rays radiate from thin metal foils.	A large amount of matter in metal atoms exist as positive mass points. (1987)

16) The true statement /s regarding α particle is/ are
(a) α particles take up electrons to make Helium molecules.
(b) The penitration power of α particles is very small.
(c) The ionisation power of α particles is very small
(d) α particles move towards N - pole in a magnetic field (1988)

17) The new standard use to express the relative atomic mass is,
1) oxygen 2) $^{16}_{8}O$ 3) $^{1}_{1}H$ 4) $^{12}_{6}C$ 5) none of the above. (1989)

18)

The path of α rays is not changed by a magnetic field.	The penitration power of α rays is very high. (1989)

19) The quantity of the electronic charge was experimentally shown by,
1) Crooks. 2) Millikan 3) Rutherford 4) Mosley 5) Faraday (1990)

20)

The penitration power of alpha particles is greater than that of beta particles.	The mass of the alpha particles is very much greater than the mass of the beta particles. (1990)

21) Which of the following statements / statement are / is true ?
(a) In a strong magnetic field, beta rays are attracted towards the N magnetic pole.
(b) In a strong magnetic field, beta rays are attracted towards the S magnetic pole.
(c) In an electric field, α rays are repelled by the positively charged plate
(d) In an electric field, gamma rays are not attracted towards the negatively charged plate. (1991)

22) The isotopes of a given element
(a) have the same number of neutrons (b) have the same number of protons.
(c) have the same number of electrons (d) have the same number of nucleons (1991)

23) Which one of the following statements/ concerning a beam of electrons is true ?
1) It is attracted towards the cathode
2) It is attracted towards in N – magnetic pole
3) It is attracted towards in S – magnetic pole
4) It is deflected away from the anode
5) All of the above statements are false (1992)

24) The e/m value for the electron was experimentally determined accurately by,
1) Millikan 2) Crookes 3) Rutherford
4) Marsden 5) none of the above (1992)

25) The charge that can exist on a cathode ray particle was quantitively determined by,
1) Moseley 2) Rutherford 3) Thomson
4) Marsden 5) none of the above (1993)

26) Which of the following statements/ statement concerning alpha, beta and gamma rays are/ is correct ?
(e) The path of the alpha rays is changed by magnetic fields
(f) The path of the beta rays is changed by electric fields
(g) The ionizing power of gamma rays very high
(h) The penetrating power of alpha rays is very high (1993)

27) Which one of the following statements concerning alpha rays is not true ?
1) The penetrating power of alpha rays is low
2) The ionizing power of alpha rays is high
3) Alpha rays travel with a velocity which is almost equal that of light
4) The path of alpha rays is changed by electric fields
5) The path of alpha rays is changed by magnetic fields (1995)

28) Which of the following statements/ statement concerning gamma rays are/ is true ?
(a) Gamma rays travel with a velocity of 95% of the velocity of light
(b) The ionizing power of gamma rays is very high
(c) The penetrating power of gamma rays is very high
(d) The path of gamma rays is not altered by magnetic fields (1996)

29) The size of the atomic nucleus was first determined by,
1) making use of α– particle scattering 2) making use of β– particle scattering
3) using high speed electrons 4) using neutron beams
5) making use of α– particle scattering (1997)

30) Which of the following statements/ statement are/ is true ?
(a) Electric fields do not affect the path of cathode rays
(b) Magnetic fields do not affect the path of cathode rays
(c) Electric fields do not affect the path of fast moving neutrons
(d) Magnetic fields do not affect the path of fast moving neutrons (1997)

31) Which one of the following statements concerning the particles used by Geiger and Marsden in the experiment that provided the basis for the nuclear model of the atom is most appropriate ?
1) Accelerated particles were used by Geiger and Marsden
2) Cathode rays were used by Geiger and Marsden
3) Accelerated cathode ray particles were used by Geiger and Marsden
4) Accelerated neutrons were used by Geiger and Marsden
5) All of the above statements are incorrect (1998)

32) Cathode ray particles,
(a) are negatively charged
(b) travel in straight lines
(c) are attached towards the N – magnetic pole
(d) are attached towards the S – magnetic pole (1998)

33) Which of the following statements are/ is true ?
(a) α– particles are attracted towards the atomic nucleus
(b) Cathode rays are not attracted towards S– pole of a magnet
(c) Positive rays are not attracted towards the N– pole of a magnet
(d) The velocity of α– rays is greater than the velocity of X– rays (1999)

34) Which of the following statements/ statement concerning electrons is/ are true ?
(a) Electrons bend to move in a curved path in a magnetic field
(b) Electrons have both particle and wave properties
(c) Electrons cannot be added to or received from an atom
(d) The speed of electrons is equal to the speed of light (2000)

35)

Chemical and physical properties of isotopes are similar	Isotopes have the same number of protons but a different number of neutrons (2000)

36) Which of the following gets (deflect) when moving across a magnetic field ?
(a) neutron (b) cathode rays (c) proton (d) helium atoms (2001)

37) A certain sample of CO has only $^{14}C_6$ and $^{16}O_8$ isotopes. Another sample of CO has $^{12}C_6$ and $^{18}O_8$ isotopes only. The property that shows a significant difference between the two sample is,
1) chemical reactivity 2) molar mass 3) molar volume
4) density of S. T. P 5) percentage compositions of C and O by mass (2002)

38) Which of the following statements is/ are true an atom of $^{118}_{50}Sn$?
(a) It has 50 electrons
(b) It has 50 protons
(c) It has a total number of 118 electrons and protons
(d) It has 68 neutrons (2003)

14)

The emission spectrum of the H atom and the emission spectrum of the Li atom are very closely similar	H and Li atoms have only one electron in each of their outermost energy levels (1999)

15) Which of the following statements is correct regarding the atomic emission spectrum of hydrogen ?

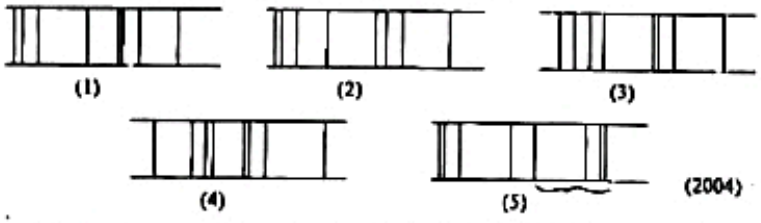
1) The radiation corresponding to the n = 2 to n = 1 transition has the longest wavelength.
2) The n = 3 to n = 2 transition corresponds to the H_α line
3) The first series of lines (Lyman) occurs in the infra – red region
4) In a given series, the separation between adjacent lines increases in the direction of increasing energy
5) Emission of radiation occurs when electrons undergo transition to highest levels from lower levels (2002)

16) Which of the following statements are not true regarding the atomic spectrum of hydrogen ?

(a) The transition from n = 5 to n = 2 corresponds to H_β line
(b) The energy difference between n = ∞ and n = 1 levels is the ionization energy of hydrogen
(c) Each line in the spectrum corresponds to an energy level of the H^- atom
(d) The energy difference between n = 2 and n = 1 levels is smaller than the energy difference between n = 3 and n = 2 levels

1) (a) and (b) 2) (b) and (c) 3) (c) and (d)
4) (a) and (c) 5) (b), (c) and (d) (2003)

17) Which of the following correctly represent the arrangement of the emission lines in two consecutive series in the atomic spectrum of hydrogen ?

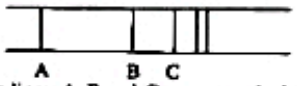


(2004)

18) Which one of the following column 1 to 5 correctly matches the name of each scientist in the column with the activities in the activity column

Column					Activity
1	2	3	4	5	
Bohr	Rutherford	Rutherford	Bohr	Thompson	Proposed the nuclear model of the atom
Rutherford	Bohr	Thompson	Thompson	Bohr	interpreted the atomic spectrum of hydrogen
Thompson	Thompson	Milicon	Milicon	Faraday	Determine the change to mass ratio of the electron (2004)

19) The emission lines of the Balmer series of the atomic spectrum of hydrogen are shown below.



The colours of the lines A, B and C are respectively.

1) red, green, blue 2) blue, green, red 3) green, red, blue
4) blue, red, green 5) red, blue, green (2005)

20) The colour imparted on the Bunsen flame by metal atoms from the light energy released when the electrons return to the ground state (energy = ϵ_0) from the 1st excited state (energy = ϵ_1). The flame colours of some atoms are given below.

Li – red, Cu – green, Na – yellow, K – violet

The correct order of $\epsilon_1 - \epsilon_0$, for the atoms is,

1) Li > Cu > Na > K 2) Na > Li > K > Cu 3) Cu > Li > Na > K
4) K > Cu > Na > Li 5) Na > K > Li > Cu (2006)

21) Which of the following pairs of lines has/ have a difference(s) between them which is equal to that between the 3rd(H_γ) and 4th(H_δ) lines of the Lyman series of the atomic spectrum of hydrogen ?

(a) 3rd and 4th lines of Balmer series (b) 1st and 2nd lines of Paschen series
(c) 2nd and the 3rd line of Balmer series (d) 3rd and 4th lines of Pascheri series (2008)

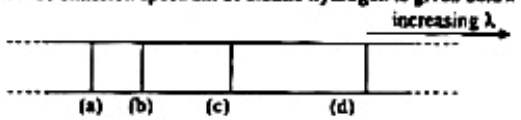
22)

Electron behave sometimes as particles and sometimes as waves	Electrons have both particle and wave properties (2008)

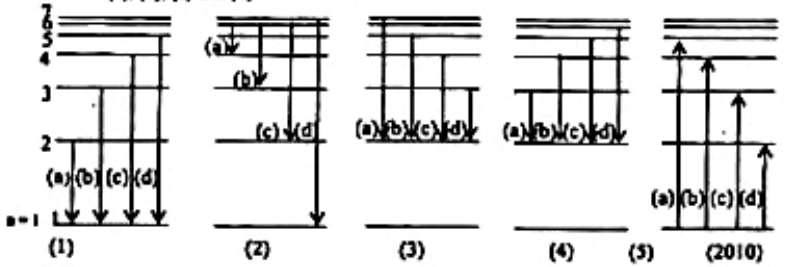
23) A sample of H atoms excited in a flurine has electrons distributed in n = 1, 2, 3, 4 and 5 energy levels. How may different wavelengths of radiation are emitted by the sample according to Bohr theory ?

1) 4 2) 5 3) 8 4) 10 5) 15 (2009)

24) A part of the emission spectrum of atomic hydrogen is given below



Which of the following diagrams represents the electronic transition corresponding to the lines labelled as (a), (b), (c) and (d) ?



(2010)

25) The number of subshells (sub energy levels), orbitals and the maximum number of electrons that could be present in the main energy level described by the principal quantum number, n = 3 are respectively.
1) 9, 3 and 8 2) 3, 9 and 18 3) 3, 6 and 32
4) 2, 9 and 18 5) 3, 4 and 18 (2011)

26) Which of the following statements is incorrect with regard to the arrangement of electrons among main energy levels and orbitals?
1) When orbitals of equal energy are available, they first fill singly (one electron in each orbital) with electron spins parallel.
2) No two electrons in an atom can have the same four quantum numbers.
3) Electrons occupy orbitals in such a way as to minimize the energy of the atom.
4) The maximum number of electrons in a main energy level described by the principal quantum number, n, is equal to $2n^2$.
5) The energy of an atom is minimized by filling completely the principal energy levels in succession. (2011)

27) The identify of an electron in an atom can be expressed using four quantum numbers (n, l, m_l, m_s) Identify which set of numbers given below is not acceptable as a set of quantum numbers for an electron in an atom.
1) $\left(4,2,0,+\frac{1}{2}\right)$ 2) $\left(3,1,-1,+\frac{1}{2}\right)$ 3) $\left(3,2,-3,+\frac{1}{2}\right)$
4) $\left(2,1,1,+\frac{1}{2}\right)$ 5) $\left(4,0,0,-\frac{1}{2}\right)$ (2012 N)

28) The number of atomic orbitals possible for which the quantum numbers n = 3 and $m_l = -1$ is,
1) 1 2) 2 3) 3 4) 4 5) 5 (2013)

29)

All molecules end up at n = 1 for the Balmer series in the hydrogen spectrum	The Bohr model is used to explain the origin of the hydrogen spectrum.

(2013)

30) The maximum number of electrons having quantum numbers n = 3 and $l = 2$ in an atom are
1) 2 2) 4 3) 6 4) 8 5) 10 (2014)

31) Which of the following statements is/are true for an electron that has quantum numbers n = 3 and $m_l = -2$?
(a) The electron is in the third main energy level.
(b) The electron is in a *d* orbital.
(c) The electron is in a *p* orbital.
(d) The electron must have a spin quantum number $m_s = +1/2$ (2015)

32) Green light of wave length 4.42×10^{-7} m is observed in the emission spectrum of hydrogen. The energy of one photon of this green light is,
1) 4.5×10^{-19} kJ 2) 2×10^{-19} kJ 3) 1.5×10^{-19} kJ
4) 4.5×10^{-22} kJ 5) 19.9×10^{-26} kJ (2016)

33) Which one of the following atoms in its gaseous state will liberate the largest amount of energy when it gains an electron?
1) S 2) P 3) Na 4) Mg 5) Ne (2016)

34) The sets of quantum numbers associated with the last two electrons of an atom in an element are (3, 0, + ½) and (3, 0, 0, – ½). The element is,
1) Li 2) Na 3) Mg 4) Al 5) K (2016)

1.4 Electronic Configurations.

1) The electronic configuration of an atom with atomic number 35 can be classified as,
1) s^2p^3 2) s^2d^3 3) s^2d^5 4) s^2p^5 5) $s^2p^6d^7$ (1980)

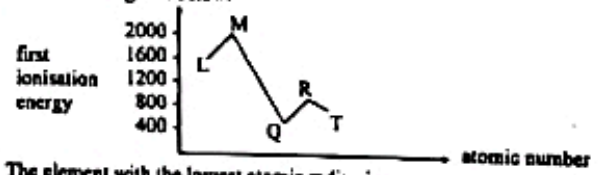
2) The element with the atomic number 33 can be specified as,
1) s^1d^4 2) s^2d^3 3) s^2p^3 4) s^1p^4 5) p^2d^3 (1981)

3) The 2nd ionisation energy of element A at gaseous state is,
1) The energy needed to remove two moles of electron from one mole of A atoms.
2) The energy needed to remove one mole of electrons from one mole of A^+ atoms
3) The energy needed to remove one mole of electrons from one mole of A^{2+} atoms
4) The energy need to accept one mole of electrons one mole of A^+ ions.
5) The energy need to accept one mole of electrons to one mole of A^{2+} ions. (1981)

4) The isoelectronic structure of fluoride ion is,
(a) Chloride ion (b) Oxygen atom
(c) O^{2-} ion (d) Ne atom (1981)

• Using the headings given below, which of the following can be used as best discribed to answer the questions from 5 to 8 listed below.
1) L 2) M 3) Q 4) R 5) T (1981)

The first ionisation energy variation for L, M, Q, R and T consecutive elements from the periodic table are given below.



5) The element with the largest atomic radius is, (1981)

6) The element that gives a specific colour to the flame in the flame test is, (1981)

7) The element that gives an amphoteric oxide is, (1981)

8) The element that shows the electronic configuration of $s^2 p^3$ is, (1981)

9) The element that shows the electronic configuration of $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^{10}, 4s^1$ is,
1) Br 2) K 3) Cu 4) Ni 5) Zn (1982)

10) The electronic configuration of atomic number 34 can be specified as,
1) $d^6s^2p^8$ 2) $d^{10}s^2p^4$ 3) s^2p^6 4) $d^{10}s^2$ 5) $d^8s^2p^3$ (1982)

11) Zn^{2+} ion is isoelectronic with,
1) Cu^{2+} 2) Ni 3) As^{3+} 4) Co 5) Se^{4+} (1983)

12) From the following elements given below the element with the lowest first ionisation energy value is,
1) Be 2) B 3) N 4) Cl 5) F (1984)

13) O^{2-} ion is isoelectronic with,
1) S^{2-} 2) N^{3-} 3) Li^+ 4) Be^{2+} 5) B^{3+} (1984)

14) The element with one electron in the outermost energy level is,
1) Hg 2) Cl 3) C 4) Cs 5) Mg (1984)

15) The electronic configuration of the element with the atomic number 48 can be specified as,
1) $d^{10}s^2$ 2) p^6d^{10} 3) p^6d^2 4) $d^{10}s^1$ 5) s^2p^1 (1984)

16)

Among noble gases helium has the highest 1st ionisation energy.	Helium has only one electron in 1s (1984)

17) The electronic configuration of molibdinum is 42. The outermost electronic configuration of Mo^{3+} ion is,
1) $4d^3\,5s^0$ 2) $4d^2\,5s^1$ 3) $4d^1\,5s^2$ 4) $5s^2\,5p^3$ 5) $4d^5\,5s^1$ (1986)

18) Easy to remove three electrons out of the atom from Be, B, C, Al and Ca is,
1) Be 2) B 3) C 4) Al 5) Ca (1989)

19) The number of electrons in the outermost energy level of the di positive cation which is made from atomic number 29 is,
1) 19 2) 18 3) 17 4) 9 5) none of the above (1988)

20) The atom that exhibits the highest 4th ionisation energy is,
1) B 2) Al 3) C 4) Ne 5) Ti (1988)

21) The atom that consist of only one electron in the outer most energy level is,
1) B 2) N 3) Cl 4) Cr 5) Zn (1989)

22) X atom forms an anion. The highest number of electron that ocupy in the last sub energy level of this ion is,
1) 6 2) 8 3) 10 4) 16 5) none of the above (1990)

23) In which one of the following is the first ionization energy highest?
1) Be 2) Mg 3) F 4) Ne 5) He (1991)

24) The number of electron in the first sub – energy level of an atom of the element of atomic number 40 is,
1) 12 2) 10 3) 4 4) 2 5) none of the above (1992)

25) The number of electron is the first sub energy level of the +3 cation formed by the element of atomic number 42 is,
1) 1 2) 2 3) 3 4) 4 5) 5 (1993)

26) In which one of the following is the first ionization energy lowest ?
1) Li 2) Be 3) B 4) K 5) Fr (1995)

27) The first seven successive ionization energies of an element are respectively as follows 1018, 1910, 2919, 4972, 6280, 21276 and 25403 kJ mol^{-1}. This element,
1) belong to group 2 of periodic table 2) belong to group 3 of periodic table
3) belong to group 4 of periodic table 4) belong to group 5 of periodic table
5) belong to group 6 of periodic table (1997)

28) The number of electron in the last sub energy level of the +4 cation formed from the element of atomic number 43 is,
1) 1 2) 2 3) 3 4) 4 5) 5 (1998)

29) In which one of the following atoms will be the first ionization be the highest ?
1) Na 2) Be 3) Ne 4) Xe 5) F (1999)

30) Assume that the element of atomic number 25 formst a gaseous of charge +1
1) 1 2) 2 3) 5 4) 6 5) 7 (1999)

31) Which of the following elements has the highest second ionization energy ?
1) Na 2) Mg 3) Al 4) Si 5) Ar (2000)

32) Which of the following statements/ statement are/ is true regarding Ca^{2+} (Z= 20) and Zn^{2+} (Z= 30) ions ?
(a) Both ions have 6 electrons each in the outermost p – subshell
(b) Both ions have 18 electrons each in the outermost shell
(c) Ca^{2+} ion has 8 electrons in the outermost shell and Zn^{2+} ion has 18 electrons in the outermost shell
(d) Both ion have 8 electrons each in the outermost shell (2000)

33) X, Y and Z are those consecutive elements in the same period of the periodic table. Z is a gas under standard oxidation. The first standard ionization enthalpy (ΔH_i°) of these elements in the order X< Y< Z. The electronic configuration of X is of the form,
1) ns^2np^1 2) ns^2np^2 3) ns^2np^3 4) ns^2np^4 5) ns^2np^5 (2001)

34) The valencies an element with electronic configuration ...ns^2np^4 can be,
1) 1 and 4 2) 2 and 1 3) 2 and 5 4) 2 and 6 5) 5 and 6 (2003)

35) The order of filling electrons into energy levels the atoms in the fourth period of the periodic table is,
1) 4s, 4p, 4d 2) 4s, 4d, 4p 3) 4s, 3d, 4p 4) 3s, 4p, 4d 5) 3d, 4s, 4p (2003)

36) The valence shell electronic configuration of an element showing the valancies 2 and 4 only in its compounds is,
1) $2d^4 4s^2$ 2) $2s^2 2p^6$ 3) $2s^2 2p^2$ 4) $3s^2 3p^4$ 5) $3s^2 3p^1$ (2006)

37) The energy released in the process.
$X_{(g)} + e \longrightarrow X^-_{(g)}$ is lowest when X is
1) Li 2) Be 3) B 4) C 5) F (2006)

38) The correct increasing order of the first ionization energy of the elements Na, Mg, K, N, P and F is
1) K < Na < Mg < N < P < F 2) K < Na < Mg < P < N < F
3) K < Na < < P < Mg < N < F 4) Na < Mg < K < N < P < F
5) Mg < K < Na < N < P < F (2007)

39) Which one of the following statements is not true?
1) Radius of H^- ion is larger than that of He atom.
2) He has the highest 1^{st} ionization energy of all elements
3) F does not show positive oxidation states.
4) $O^-_{(g)} + e \longrightarrow O^{2-}_{(g)}$ is an endothermic process
5) $Na_{2(s)}$ shows metallic properties. (2007)

40) The correct increasing order of the first ionization energies of the elements from Li to F is,
1) Li < B < Be < C < O < N < F
2) Li < Be < B < C < N < O < F
3) Li < Be < B < C < O < N < F
4) Li < Be < B < O < C < N < F
5) Li < B < Be < O < C < N < F (2009)

41)

The first ionization energy of oxygen is lower than that of nitrogen	Less energy is required to form $O^{2-}(g)$ from $iO(g)$ than $N^{2-}(g)$ from N(g). (2010)

1.5 Periodic Patteras of Elements.

1) Which one has the smallest radius?
1) Si 2) S^{2-} 3) P 4) Ga 5) Al^{3+} (1980)

2) The most electronegative one is,
1) Magnesium 2) Lithium 3) Sulphur 4) Bromine 5) Iodine (1980)

3) The reason why that sodium does not show the +2 oxidation state is,
2) The first ionisation potential is high.
3) The ionic radius is big.
4) Having high electronegativity.
5) Having high electro affinity
6) The second ionisation potential is high. (1981)

4) The atomic radius is close to
1) 10^{-8} cm 2) 10^{-4} cm 3) 10^{-10} cm 4) 10^{-8} cm 5) 10^{-13} cm (1981)

5) M^{2+} ion is formed from element M. The similarity in both M^{2+} ion and M element is,
1) Nueclear charge 2) Chemical properties
3) Electron attinity 4) The volume 5) The solubility (1981)

6) The electronic configuration of X elemment is given below,
$1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^2\ 4p^3$ The one that chemically similar to X is,
1) Nitrogen (7) 2) Boron (5) 3) Chlorine (17)
4) Fe (26) 5) Zn (30) (1981)

7)

The first ionisation energy of Cs is less than that of K.	The nuclear charge of Cs is more than that of K. (1981)

8) The one that iso electronic with Ca^{2+} is,
1) K^+ 2) Fe^{2+} 3) Al^{3+} 4) Mg^{2+} 5) Br (1982)

9) The three positive $^{27}_{13}Al$ cation contains,
1) 10 electrons and 14 neutrons.
2) 13 electrons and 14 neutrons.
3) 10 electrons and 15 neutrons.
4) 13 electrons and 15 neutrons.
5) 12 electrons and 14 neutrons. (1982)

10) The information given below describes the non metalic element W, X, Y and Z
$2Z^-(aq) + X_2(g) \longrightarrow Z_2(g) + 2X^-(aq)$
$2X^-(aq) + Y_2(g) \longrightarrow X_2(g) + 2Y^-(aq)$
$W^-(aq) + Y_2(g) \longrightarrow$ No reaction.
The correct order of the ability of removing electron from the above elements is,
1) W < Y < X < Z 2) X < W < Z < Y 3) Z < X < Y < W
4) Y < Z < X < W 5) Z < Y < W < X (1982)

11)

The cationic radius of Na^+ and K^+ are equal.	Since both Na and K belong to IA (1^{st}) in the periodic table. (1982)

12) From which of the following atoms is it most difficult to remove an electron,
1) H 2) C 3) Na 4) F 5) B (1983)

13) The element that has only one electron in its outermost orbital is,
1) Cd 2) Cr 3) Al 4) Mg 5) Cl (1985)

14) The ionic radius change of Li^+, Be^{2+} and Mg^{2+} correctly represented as
1) $Li^+ < Be^{2+} < Mg^{2+}$ 2) $Be^{2+} < Li^+ < Mg^{2+}$ 3) $Mg^{2+} < Be^{2+} < Li^+$
4) $Li^+ < Mg^{2+} < Be^{2+}$ 5) $Mg^{2+} < Li^+ < Be^{2+}$ (1985)

15) M forms M^{3+} cation with three unpared electrons. M atom consist of six unpaired electrons M element is,
1) Al 2) Cr 3) Fe 4) Co 5) S (1985)

16)

Cl^- ion is bigger in size compared to Cl atom.	Nuclear charge reduces when Cl changes to from Cl^- ion. (1986)

17)

The first ionisation energy of Li is less than that of K.	Since Li has few electrons, electronic repulsion of it is less. (1986)

18) The correct statement/s regarding ionisatoin energy is/are
(a) The second ionisation energy of Na is less than that of K.
(b) The first ionisation energy variation of all the elements in the third period shows a sig zag variation.
(c) The first ionisation energy change of all the elements in the forth period shows a sig zag variation.
(d) The forth ionisation energy of Boron is more than the fifth ionisation energy of carbon. (1987)

19)

Eventhough sulphur makes S^{2-} ion chlorine does not make Cl^{2-} ions.	sulphur is more electronegative than chlorine. (1988)

20)

The radius of Sn^{4+} is more than that of Sn^{2+}.	The charge on the stanic is more than that of stannous. (1988)

21) The most difficult one to remove three electron out of Be, B, C, Al and Ca atom is,
1) Be 2) B 3) C 4) Al 5) Ca (1989)

22) Y^{2-} anion is made by element Y. The correct statement regarding Y is,
1) The 3rd ionisation energy is a lot more than the 2nd ionisation energy.
2) The 6th ionisation energy is a lot more than the 5th ionisation energy.
3) Y could be a transition element.
4) $Y(g) + 2e \longrightarrow Y^{2-}(g)$ is big exothermic reaction.
5) None of the above are correct. (1989)

23) Which statement is/are true regarding atoms and ions.
(a) Atomic radii vlaues in all the elements belong to the same range.
(b) Ionic radii values in all the element belong to the same range.
(c) All the atom are identical to each other in one element.
(d) The cationic radius in an element is more thant the atomic radius in the same element. (1989)

24) Cationic radius of Li, Be and Mg are,
1) $Ba^{2+} < Li^{+} < Mg^{2+}$ 2) $Mg^{2+} < Ba^{2+} < Li^{+}$ 3) $Ba^{2+} < Mg^{2+} < Li^{+}$
4) $Li^{+} < Ba^{2+} < Mg^{2+}$ 5) $Li^{+} < Mg^{2+} < Ba^{2+}$ (1990)

25) The maximum valency of the element of atomic number 32 is,
1) 2 2) 4 3) 5 4) 6 5) 7 (1991)

26)

The 3rd period of the long form of the Periodic Table contains 18 elements.	The 3rd quantum level may contain a maximum of 18 electrons. (1991)

27) Which one of the following statements concerning ionization energies is true ?
1) The first ionization energy of oxygen is greater than the first ionization energy of nitrogen
2) The second ionization energy of beryllium is greater than the second ionization energy of lithium
3) The first ionization energy of aluminium is less than the first ionization energy of magnesium
4) All of the above statements are true
5) All of the above statements are incorrect (1992)

28) In the series of elements Li, Be, B, C, N, O and F, the highest valency,
1) decreases from Li to F 2) increases from Li to F 3) is a maximum at C
4) is a maximum at N 5) is a maximum at O (1992)

29) Which of the following statements/ statement concerning ionization energy are/ is true?
(a) The 2nd ionization energy of Sr is greater than the 1st ionization energy of Rb
(b) The first ionization energies of the successive elements in the fourth period of the periodic tale do not show the characteristic zig – zag variation
(c) The first ionization energies of the successive elements in the second period of the periodic table do not show the characteristic zig – zag variation
(d) The 5th ionization energy of nitrogen is greater than the 4th ionization energy of boron (1993)

30) Which one of the following concerning the increase in atomic Sodium is true ?
1) B < C < Be < Li 2) Na < Al < Si < Mg 3) Si < Al < Mg < K
4) Si < Al < K < Mg 5) none of the above is true (1993)

31) The principal valancies of the element of atomic number 50 are,
1) 1 and 2 2) 2 and 3 3) 1 and 3 4) 2 and 4 5) 3 and 5 (1994)

32) The atom X forms the anion X^{2-}. The atom Y forms the anion Y^{3-}. The number of electrons is the last sublevel of these two anions are n_X and n_Y respectively. What is the relationship between n_X and n_Y ?
1) $n_X > n_Y$ 2) $n_Y > n_X$ 3) $n_Y - n_X = 1$
4) $n_X = n_Y = 8$ 5) $n_X = n_Y = 6$ (1994)

33)

In the long form of the periodic table the 4th period contains 18 elements	The 4th energy level can accommodate only 18 electrons (1994)

34) The atomic radii of sodium, magnesium and calcium
1) decrease in the order Ca > Na > Mg 2) decrease in the order Na > Ca > Mg
3) decrease in the order Ca > Mg > Na 4) decrease in the order Mg > Na > Ca
5) decrease in the order Na > Mg > Ca (1994)

35) In which one of the following is the radius smallest ?
1) Cl^{-} 2) Na 3) K 4) Mg^{2+} 5) Na^{+} (1995)

36) In the 5th period of the periodic table there are,
1) 18 elements 2) 32 elements 3) 36 elements
4) 50 elements 5) 54 elements (1995)

37)

Oxygen can exist as the oxidized state	There are substances more electronegative than oxygen (1995)

38) Which one of the following statements concerning ionization energies is true ?
1) The first ionization energy of Al is greater than the first ionization energy of Mg
2) The first ionization energy of Si is smaller than the first ionization energy of S
3) The fourth ionization energy of B is smaller than the fourth ionization energy of Al
4) The first ionization energy of Cl is greater than the first ionization energy of Ne
5) All of the above statements are false (1996)

39) Which of the following statements/ statement concerning the Periodic Table are/ is true ?
(a) Certain elements of group 4 form divalent compounds
(b) Certain non – transition elements of group 3 exhibit the +4 oxidation state
(c) Certain elements of group 4 exhibit the +7 oxidation state
(d) Certain non – transition elements of group 7 exhibit the +1 oxidation state. (1996)

40)

There are only 18 elements in the 4th period of the periodic table	Only 18 electrons can be accommodated in the 4s, 3d and 4p sub levels (1996)

41) The principal valances of the element of atomic number 34 are,
1) 2 and 4 2) 2 and 6 3) 1 and 3 4) 2 and 3 5) 3 and 5 (1997)

42) Which one of the following has the largest ionic radius ?
1) S^{2-} 2) Na^{+} 3) F^{-} 4) O^{2-} 5) Mg^{2+} (1997)

43) | Nitrogen gas cannot act as an oxidizing agent. | The electronegativity of nitrogen is less than the electronegativity of oxygen. (1997) |

44) | NO_2 cannot act as an oxidizing agent | NO_2 can be converted easily to HNO_3 (1997) |

45) Which one of the following statement concerning ionization energies is true ?
1) The first ionization energy of Al is greater than the first ionization energy of Mg
2) The third ionization energy of Mg is greater than the second ionization energy of Al
3) The first ionization energy of S is greater than the first ionization energy of P
4) The second ionization energy of Na is greater than the third ionization energy of Mg
5) None of the above statements is true (1998)

46) Which one of the following sets of values pertaining to the oxidation numbers exhibited by oxygen is most appropriate ?
1) -2, -1, 0, +2 and +3 2) -2, -1 and +2 3) -2, -1, 0 and +2
4) -2, -1 and 0 5) -2, 0 and +2 (1998)

47) In which one of the following atoms will the electronegatively be the highest ?
1) I 2) O 3) C 4) S 5) Si (1999)

48) The element having chemical properties most similar to Zn is,
1) Ca 2) Sr 3) Pb 4) Mg 5) Cd (2000)

49) The element which is not a number of the d– block in the periodic table is,
1) Cu 2) Mn 3) Fe 4) Se 5) Zn (2000)

50) The valancies of an element, whose outer electronic configuration is of the form $ns^2\ np^1$, are most likely to be,
1) 2 and 4 2) 2 and 5 3) 1 and 5 4) 3 and 5 5) 4 and 5 (2000)

51) | The radius of the H atom is equal to the radius of the He^{+} ion | The H atom and the He^{+} ion have one electron each (2000) |

52) The radius of the Br^{-} ion is 1.95 $\mathring{A}$. The inter–ionic distance of KBr(s) and KCl(s) are 3.28 $\mathring{A}$ and 3.14 $\mathring{A}$ respectively. The radius of the Cl^{-} ion is,
1) 2.09 $\mathring{A}$ 2) 1.95 $\mathring{A}$ 3) 1.90 $\mathring{A}$ 4) 1.84 $\mathring{A}$ 5) 1.81 $\mathring{A}$ (2000)

53) Under the same condition, which one of the following atoms will liberate the largest amount of energy when it gains an electron ?
1) Na(g) 2) Ar(g) 3) Li(g) 4) N(g) 5) Mg(g) (2001)

54) W, X, Y and Z are four non transition elements with consecutive atomic numbers. The first ionization enthalpies of W, X and Y are in the order W < X < Y . The oxide formed y Z is basic. The electronic configuration of the outermost shell of 2 is of the type
1) $ns^1\ np^6$ 2) $ns^2\ np^1$ 3) $ns^2\ np^2$ 4) $ns^2\ np^3$ 5) $ns^2\ np^4$ (2002)

55) Which is the smallest ion out of the following ions in the gaseous state ?
1) O^{2-} 2) F^{-} 3) Na^{+} 4) Mg^{2+} 5) N^{3-} (2002)

56) Which one of the following statements is not true regarding the ions N^{3-}, O^{2-} and F^{-}
1) They have the same electronic configuration.
2) Nuclear charge follows the order $N^{3-} < O^{2-} < F^{-}$
3) They have the same number of electrons as Ne
4) Their radii follow the order $N^{3-} < O^{2-} < F^{-}$
5) Compounds containing these ions are formed when Li reacts with the respective gases, N_2, O_2 and F_2 (2006)

57) Which period in the periodic table contains the highest number of non-metallic elements?
1) 1 2) 2 3) 3 4) 4 5) 5 (2008)

58) The two elements which are liquids at room temperature are,
1) Li and Be 2) Br and Be 3) Hg and Br
4) Hg and Xe 5) Se and Br (2008)

59) The correct decreasing order of the radii of the ions S^{2-}, Cl^{-}, K^{+} and Ca^{2+},
1) $S^{2-} > Cl^{-} > K^{+} > Ca^{2+}$ 2) $Cl^{-} > S^{2-} > K^{+} > Ca^{2+}$ 3) $S^{2-} > Cl^{-} > Ca^{2+} > K^{+}$
4) $Ca^{2+} > K^{+} > S^{2-} > Cl^{-}$ 5) $K^{+} > Ca^{2+} > Cl^{-} > S^{2-}$ (2008)

60) The number of elements that exist as gases at room temperature is,
1) 8 2) 9 3) 10 4) 11 5) 12 (2009)

61) Which of the following electronic configuration corresponds to the atom with the largest atomic radius among them ?
1) $1s^2\ 2s^2$ 2) $1s^2\ 2s^2\ 2p^6$ 3) $1s^2\ 2s^2\ 2p^6\ 3s^2$
4) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$ 5) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^5$ (2009)

62) The correct decreasing order of the ionic radii of the ions Al^{3+}, F^{-}, Mg^{2+}, Na^{+} and O^{2-},
1) $Al^{3+} > F^{-} > Na^{+} > Mg^{2+} > O^{2-}$ 2) $Al^{3+} > Mg^{2+} > O^{2-} > Na^{+} > F^{-}$
3) $O^{2-} > F^{-} > Na^{+} > Mg^{2+} > Al^{3+}$ 4) $Al^{3+} > Mg^{2+} > Na^{+} > F^{-} > O^{2-}$
5) $F^{-} > O^{2-} > Na^{+} > Al^{3+} > Mg^{2+}$ (2009)

63) Which of the following is the strongest reducing agent in the gas phase ?
1) Al 2) Na 3) Zn 4) H_2 5) F_2 (2009)

64) The periods in the periodic table that contain elements found in all three physical states (solid liquid and gas) at room temperature and atmospheric pressure are,
1) 2 and 4 2) 3 and 4 3) 3 and 6 4) 4 and 5 5) 4 and 6 (2010)

65) Which of the following statements, is/ are true regarding electronegativity of elements ?
(a) Electronegativity is defined as the tendency of an atom to attract electrons to itself.

(b) Electronegativity values of the elements within a group increases in going down the group.

(c) Electronegativity of atoms, with nearly filled outer most shell of electrons generally has higher values thin those with sparsely filled outer most shell of electrons.

(d) The ionic character of a covalent of a covalent bond increases when the difference between the electronegativities of the two atom forming the bond increases. (2010)

66) The number of elements that can exist in liquid state at room temperature (25 °C) and atmospheric pressure (1.0×10^5 Nm^{-2})
1) 1 2) 2 3) 3 4) 4 5) 5 (2012 N)

67) The correct increasing order of atomic radii of C, O, Al, P and Ca is,
1) O < C < Al < P < Ca 2) O < C < P < Al < Ca 3) C < O < P < Al < Ca
4) C < O < Al < P < Ca 5) C < O < Al < Ca < P (2012 N)

68) Which of the following statements is not true with regard to elements in the second period from Li to F?
1) The highest negative electron affinity is shown by F.
2) The highest positive electron affinity is shown by Be.
3) The highest oxidation state is exhibited by C.
4) Atomic radii decrease from Li to F.
5) The ability to form cations and to act as reducing agents decreases from Li to F.
(2012 N)

69) The increasing order of the first ionization energy of atoms N, Ne, Na, P, Ar and K is,
1) Na < K < P < N < Ar < Ne 2) Na < K < Ar < N < P < Ne
3) P < N < K < Na < Ne < Ar 4) K < Na < N < P < Ne < Ar
5) K < Na < P < N < Ar < Ne (2013)

70) The increasing order of atomic / ionic radii of B, O, S, S^{2-} and Cl is,
(1) B < O < Cl < S < S^{2-} (2) S < S^{2-} < O < B < Cl (3) O < B < Cl < S < S^{2-}
(4) O < B < S < S^{2-} < Cl (5) B < O < S < S^{2-} < Cl (2015)

71) Which of the following statements regarding properties of atoms is false?
1) The covalent radius of the iodine atom is smaller than its van der Waals radius.
2) The first electron affinity of O atom is greater than that of N atom.
3) The ionization energy of an atom is determined only by its nuclear charge and radius.
4) The nuclear charge felt by the valence electron in a Li atom is less than 3.
5) The electronegativity of C atom is the same as that of S atom in the Pauling scale.
(2015)

Answers

1.1 Atomic models

1)	5	2)	2	3)	4	4)	3	5)	4	6)	2
7)	5	8)	3	9)	2,4	10)	2	11)	2	12)	1
13)	3	14)	5	15)	4	16)	1	17)	5	18)	5
19)	2	20)	4	21)	3	22)	2*	23)	5	24)	5
25)	5	26)	1	27)	3	28)	3	29)	1	30)	3
31)	5	32)	1	33)	2	34)	1	35)	4	36)	2
37)	5	38)	5	39)	4	40)	2	41)	1	42)	3
43)	1	44)	4	45)	5	46)	1	47)	3	48)	2

1.2 Electro Magnetic Radiation

1)	3	2)	4	3)	3	4)	5				

1.3 Electronic Energy Levels

1)	4	2)	2	3)	3	4)	5	5)	1	6)	1
7)	3	8)	5	9)	5	10)	1	11)	1	12)	2
13)	4	14)	4	15)	2	16)	3	17)	1	18)	2
19)	1	20)	4	21)	2	22)	4	23)	4	24)	3
25)	2	26)	5	27)	3	28)	2	29)	4	30)	
31)	1	32)	4	33)	1	34)	3				

1.4 Electronic Configurations.

1)	4	2)	3	3)	2	4)	3	5)	3	6)	3
7)	5	8)	1	9)	3	10)	2	11)	2	12)	2
13)	2	14)	4	15)	1	16)	3	17)	1	18)	4
19)	3	20)	1	21)	4	22)	1	23)	5	24)	4
25)	3	26)	5	27)	4	28)	3	29)	3	30)	4
31)	1	32)	5	33)	1, 4	34)	4	35)	3	36)	3
37)	2	38)	2	39)	2	40)	1	41)	2		

1.5 Periodic Patterns of Elements.

1)	5	2)	4	3)	5	4)	4	5)	1	6)	1
7)	2	8)	1	9)	1	10)	1	11)	4	12)	4
13)	2	14)	2	15)	2	16)	3	17)	2	18)	5
19)	3	20)	4	21)	3	22)	5	23)	5	24)	5
25)	2	26)	4	27)	3	28)	4	29)	1	30)	3
31)	4	32)	5	33)	3	34)	1	35)	4	36)	1
37)	all	38)	2	39)	4	40)	all	41)	2	42)	1
43)	4	44)	4	45)	2	46)	3	47)	2	48)	5
49)	4	50)	4	51)	4	52)	5	53)	4	54)	1
55)	4	56)	3	57)	2	58)	3	59)	2	60)	4
61)	3	62)	3	63)	2	64)	5	65)	3	66)	2
67)	2	68)	3	69)	5	70)	3	71)	3		