Classification Of Elements And Periodicity In Properties

Question1

The correct decreasing order of atomic radii (pm) of Li, Be, B and C is

[NEET 2024 Re]

Options:

A.

Be > Li > B > C

B.

Li > Be > B > C

C.

C > B > Be > Li

D.

Li > C > Be > B

Answer: B

Solution:

As the atomic number in a period increases, the effective nuclear charge also increases hence, atomic radii along the period decreases.

Correct order of atomic radii

Li > Be > B > C

Question2

Identify the correct answer from the options given below :

	List-I (Atom/Molecule)		List-II (Property)
A.	Nitrogen atom	I.	Paramagnetic
B.	Fluorine molecule	II.	Most reactive element in group 18
C.	Oxygen molecule	III.	Element with highest ionisation enthalpy in group 15
D.	Xenon atom	IV.	Strongest oxidising agent

[NEET 2024 Re]

Options:

A.

A-III, B-I, C-IV, D-II

B.

A-I, B-IV, C-III, D-II

C.

A-II, B-IV, C-I, D-III

D.

A-III, B-IV, C-I, D-II

Answer: D

Solution:

(Atom/Molecule)	(Property)
Nitrogen atom	Element with highest ionisation enthalpy in group 15
Fluorine molecule	Strongest oxidising agent
Oxygen molecule	Paramagnetic in nature
Xenon atom	Most reactive element in group 18

Question3

Arrange the following elements in increasing order of first ionization enthalpy:

Li, Be, B, C, N

Choose the correct answer from the options given below:

[NEET 2024]

Options:

A.

Li < Be < B < C < N

B.

Li < B < Be < C < N

C.

Li < Be < C < B < N

D.

Li < Be < N < B < C

Answer: B

Solution:

Increasing order of first ionization enthalpy is Li < B < Be < C < N

Element	First ionization enthalpy ($\Delta_i H/kJmol^{-1}$)
Li	520
Be	899
B	801
C	1086
N	1402

Question4

Arrange the following elements in increasing order of electronegativity:

N, O, F, C, Si

Choose the correct answer from the options given below:

[NEET 2024]

Options:

A.

Si < C < N < O < F

B.

Si < C < O < N < F

C.

O < F < N < C < Si

D.

F < O < N < C < Si

Answer: A

Solution:

Electronegativity increases across the period on moving left to right. It decreases on moving down the group.

The correct option is Si < C < N < O < F

Question5

The element expected to form largest ion to achieve the nearest noble

gas configuration is

[NEET 2023]

Options:

A.

F

B.

N

C.

Na

D.

O

Answer: B

Solution:

For isoelectronic species, as the charge on anion increases, ionic size increases

So, N forms $N3^{-}$ anion with largest ionic size

Question6

Which of the following is correctly matched?

[NEET 2023 mpr]

Options:

A.

Basic oxides ⇒ In_2O_3, K_2O, SnO_2

B.

Neutral oxides ⇒ CO, NO_2, N_2O

C.

Acidic oxides ⇒ Mn_2O_7, SO_2, TeO_3

D.

Amphoteric oxides ⇒ BeO, Ga_2O_3, GeO

Answer: C

Solution:

Mn_2O_7, SO_2, TeO_3 are acidic oxides.

Question7

The correct sequence given below containing neutral, acidic, basic and amphoteric oxide each, respectively, is

[NEET 2023 mpr]

Options:

A.

NO, ZnO, CO_2, CaO

B.

ZnO, NO, CaO, CO_2

C.

NO, CO_2, ZnO, CaO

D.

NO, CO_2, CaO, ZnO

Answer: D

Solution:

NO → neutral CaO → Basic

CO_2 → Acidic ZnO → Amphoteric

Question8

The correct order of first ionization enthalpy for the given four elements is:
[NEET Re-2022]

Options:

A. C < F < N < O

B. C < N < F < O

C. C < N < O < F

D. C < O < N < F

Answer: D

Solution:

$C \rightarrow 1s^2, 2s^2 2p^2$

$N \rightarrow 1s^2, 2s^2 2p^3$(more stable EC)

$O \rightarrow 1s^2, 2s^2 2p^4$

$F \rightarrow 1s^2, 2s^2 2p^5$

$\therefore$ order of first IE is C < O < N < F

Question9

From the following pairs of ions which one is not an iso- electronic pair? [NEET 2021]

Options:

A. O^{2-}, F^-

B. Na^+, Mg^{2+}

C. Mn^{2+}, Fe^{3+}

D. Fe^{2+}, Mn^{2+}

Answer: D

Solution:

Solution:
• Isoelectronic species have some number of electrons.
•

Species	Number of electrons
Fe^{2+}	$26-2=24$
Mn^{2+}	$25-2=23$
O^{2-}	$8+2=10$
F^-	$9+1=10$
Na^+	$11-1=10$
Mg^{2+}	$12-2=10$
Fe^{3+}	$26-3=23$

Question10

Identify the incorrect match.

Name	IUPAC OfficialName
(A) Unnilunium	(i) Mendelevium
(B) Unniltrium	(ii) Lawrencium
(C) Unnilhexium	(iii) Seaborgium
(D) Unununnium	(iv) Darmstadtium

[2020]

Options:

A. (B), (ii)

B. (C), (iii)

C. (D), (iv)

D. (A), (i)

Answer: C

Solution:

Solution:
(c) Unununium (Z = 111), it is Roentgenium (Rg) not Darmstadtium.

Question11

Match the following :

Oxide	Nature
(A) CO	(i) Basic
(B) BaO	(ii) Neutral
(C) Al_2O_3	(iii) Acidic
(D) Cl_2O_7	(iv) Amphoteric

Which of the following is correct option? [2020]

Options:

A. (A) (B) (C) (D)
(ii) (i) (iv) (iii)

B. (iii) (iv) (i) (ii)

C. (iv) (iii) (ii) (i)

D. (i) (ii) (iii) (iv)

Answer: A

Solution:

Solution:
CO : Neutral oxide
BaO : Basic oxide
Al_2O_3: Amphoteric oxide
Cl_2O_7: Acidic oxide

Question12

For the second period elements the correct increasing order of first ionization enthalpy is (NEET 2019)

Options:

A. Li < Be < B < C < O < N < F < Ne

B. Li < Be < B < C < N < O < F < Ne

C. Li < B < Be < C < O < N < F < Ne

D. Li < B < Be < C < N < O < F < Ne

Answer: C

Solution:

As we move across a period, ionisation enthalpy increases, because of increased nuclear charge and decrease in atomic radii. However, abnormal values are observed for Be, N and Ne due to extra stability of half filled and fully filled orbitals. Thus, the actual order is, Li < B < Be < C < O < N < F < Ne

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Question13

Match the oxide given in column I with its property given in column II.

Column I	Column II
(i) Na_2O	A. Neutral
(ii) Al_2O_3	B. Basic
(iii) N_2O	C. Acidic
(iv) Cl_2O_7	D. Amphoteric

Which of the following options has all correct pairs? (Odisha NEET 2019)

Options:

A. (i)-B, (ii)-A, (iii)-D, (iv)-C

B. (i)- C, (ii)-B, (iii)-A, (iv)-D

C. (i)-A, (ii)-D, (iii)-B, (iv)-C

D. (i)-B, (ii)-D, (iii)-A, (iv)-C

Answer: D

Question14

Which of the following oxides is most acidic in nature? (NEET 2018)

Options:

A. MgO

B. BeO

C. BaO

D. CaO

Answer: B

Solution:

Solution:
In metals, on moving down the group, metallic character increases, so basic nature increases hence most acidic will be BeO.

Question15

The correct order of atomic radii in group 13 elements is (NEET 2018)

Options:

A. B < Al < In < Ga < Tl

B. B < Al < Ga< In < Tl

C. B < Ga < Al < Tl < In

D. B < Ga < Al < In < Tl

Answer: D

Solution:

Solution:
Atomic and ionic radii of group 13 elements are lower than those of alkaline earth metals of group 2 primarily due to greater nuclear charge of group 13 elements as compared to group 2 elements. On moving down the group the atomic radius of Ga is slightly lower than that of Al. This is due to the presence of d - electrons in Ga which do not shield the nucleus effectively. As a result, the electrons in Ga experience greater force of attraction by the nucleus than in Al and hence the atomic radius of Ga 135pm is slightly less than that of Al 143pm. Thus, the increasing order of atomic radii of group 13 elements is B < Ga < Al < In < Tl.

Question16

The element Z = 114 has been discovered recently. It will belong to which of the following family/group and electronic configuration? (NEET 2017)

Options:

A. Carbon family, $[Rn]5f^{14}6d^{10}7s^27p^2$

B. Oxygen family, $[Rn]\ 5f^{14}6d^{10}7s^27p^4$

C. Nitrogen family, $[Rn]\ 5f^{14}6d^{10}7s^27p^6$

D. Halogen family, $[Rn]\ 5f^{14}6d^{10}7s^27p^5$

Answer: A

Solution:

Solution:
The electronic configuration of the element with Z = 114 (Flerovium) is $[Rn]5f^{14}6d^{10}7s^27p^2$
Hence, it belongs to carbon family which has the same outer electronic configuration.

Question17

In which of the following options the order of arrangement does not agree with the variation of property indicated against it? (NEET - I 2016)

Options:

A. I < Br < Cl < F (increasing electron gain enthalpy)

B. Li < Na < K < Rb (increasing metallic radius)

C. $Al^{3+} < Mg^{2+} < Na^{+} < F^{-}$ (increasing ionic size)

D. B < C < N < O (increasing first ionisation enthalpy)

Answer: D

Solution:

Solution:
The correct order of increasing negative electron gain enthalpy is : I < Br < F < Cl and the correct order of increasing first ionisation enthalpy is B < C < O < N

Question18

The species Ar, K^{+} and Ca^{2+} contain the same number of electrons. In which order do their radii increase? (2015 Cancelled)

Options:

A. $Ca^{2+} < K^{+} < Ar$

B. $K^{+} < Ar < Ca^{2+}$

C. $Ar < K^{+} < Ca^{2+}$

D. $Ca^{2+} < Ar < k^{+}$

Answer: A

Solution:

Solution:
In case of isoelectronic species, radius decreases with increase in nuclear charge.

Question19

Which of the following orders of ionic radii is correctly represented? (2014)

Options:

A. $H^- > H^+ > H$

B. $Na^+ > F^- > O^{2-}$

C. $F^- > O^{2-} > Na^+$

D. $Al^{3+} > Mg^{2+} > N^{3-}$

E. None

Answer: E

Solution:

(None): Cations lose electrons and are smaller in size than the parent atom, whereas anions add electrons and are larger in size than the parent atom.
Hence, the order is $H^- > H^+ > H$.
For isoelectronic species, the ionic radii decreases with increase in atomic number i.e. nuclear charge.
Hence, the correct orders are
$O^{2-} > F^- > Na^+$ and $N^{3-} > Mg^{2+} > Al^{3+}$

Question20

Which one of the following arrangements represents the correct order of least negative to most negative electron gain enthalpy for C, Ca, Al , F and O? (Karnataka NEET 2013)

Options:

A. Al < Ca < O < C < F

B. Al < O < C < Ca < F

C. C < F < O < Al < Ca

D. Ca < Al < C < O < F

Answer: D

Solution:

Solution:
Electron gain enthalpy becomes less negative from top to bottom in a group while it becomes more negative from left to right within a period.

Question21

Identify the wrong statement in the following (2012)

Options:

A. Amongst isoelectronic species, smaller the positive charge on the cation, smaller is the ionic radius

B. Amongst isoelectronic species, greater the negative charge on the anion, larger is the ionic radius

C. Atomic radius of the elements increases as one moves down the first group of the periodic table.

D. Atomic radius of the elements decreases as one moves across from left to right in the 2nd period of the periodic table.

Answer: A

Solution:

Solution:
As positive charge on the cation increases, effective nuclear charge increases. Thus atomic size decreases.

Question22

What is the value of electron gain enthalpy of Na^+ if IE_1 of Na=5.1eV ? (2011 Mains)

Options:

A. - 5.1 eV

B. -10.2 eV

C. +2.55 eV

D. +10.2 eV

Answer: A

Solution:

$Na \rightarrow Na^+ + e^-; \Delta H = 5.1eV$
$Na^+ + e^- \rightarrow Na; \Delta H = -5.1eV$

Question23

Among the following which one has the highest cation to anion size ratio?
(2010 March)

Options:

A. CsI

B. CsF

C. LiF

D. NaF

Answer: B

Solution:

Solution:
The cation to anion size ratio will be maximum when the cation is of largest size and the anion is of smallest size.Among the given species, Cs^{+} has maximum size among given cations and F^{-} has smallest size among given anions, thus CsF has highest $\frac{r_c}{r_a}$ ratio

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Question24

Among the elements Ca, Mg, P and Cl, the order of increasing atomic radii is
(2010 March)

Options:

A. Mg < Ca < Cl < P

B. Cl < P < Mg < Ca

C. P < Cl < Ca < Mg

D. Ca < Mg < P < Cl

Answer: B

Solution:

The atomic radii decrease on moving from left to right in a period, thus order of sizes for Cl, P and Mg is Cl < P < Mg.
Down the group size increases.
Thus overall order is : Cl < P < Mg < Ca

Question25

The correct order of the decreasing ionic radii among the following isoelectronic species is
(2010)

Options:

A. $Ca^{2+} > K^{+} > S^{2-} > Cl^{-}$

B. $Cl^{-} > S^{2-} > Ca^{2+} > K^{+}$

C. $S^{2-} > Cl^{-} > K^{+} > Ca^{2+}$

D. $K^{+} > Ca^{2+} > Cl^{-} > S$

Answer: C

Solution:

Solution:
$S^{2-} > Cl^{-} > K^{+} > Ca^{2+}$
Among isoelectronic species, ionic radii increases with increase in negative charge. This happens because effective nuclear charge (Z_{eff}) decreases.
Similarly, ionic radii decreases with increase in positive charge as Z_{eff}

Question26

Which one of the following arrangements represents the correct order of electron gain enthalpy (with negative sign) of the given atomic species
(2010)

Options:

A. S < O < Cl < F

B. Cl < F < S < O

C. F < Cl < O < S

D. O < S < F < CI

Answer: D

Solution:

Cl-atom has the highest electron affinity in the periodic table. F being a member of group 17 has higher electron gain enthalpy than S which belongs to group 16 . This in turn is higher than the electron affinity of O -atom. Thus,
$Cl > F > S > O$
It is worth noting that the electron gain enthalpy of oxygen and fluorine, the members of the second period, have less negative values than the elements sulphur and chlorine of the third period.
This is due to small size of the atoms of oxygen and fluorine. As a result, there is a strong interelectronic repulsion when extra electron is added to these atoms, i.e., electron density is high and the addition of an extra electron is not easy.

Question27

Amongst the elements with following electronic configurations, which one of them may have the highest ionisation energy?
(2009)

Options:

A. $Ne[3s^2 3p^2]$

B. $Ar[3d^{10} 4s^2 4p^3]$

C. $Ne[3s^2 3p^1]$

D. $Ne[3s^2 3p^3]$

Answer: D

Solution:

Solution:
Among options (a), (c) and (d), option (d) has the highest ionisation energy because of extra stability associated with half-filled 3p-orbital. In option (b), the presence of $3d^{10}$ electrons offers shielding effect, as a result the $4p^3$ electrons do not experience much nuclear charge and hence the electrons can be removed easily

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Question28

Which one of the following arrangements does not give the correct picture of the trends indicated against it?
(2008)

Options:

A. $F_2 > Cl_2 > Br_2 > I_2$: Bond dissociation energy

B. $F_2 > Cl_2 > Br_2 > I_2$: Electronegativity

C. $F_2 > Cl_2 > Br_2 > I_2$: Oxidizing power

D. $F_2 > Cl_2 > Br_2 > I_2$: Electron gain enthalpy

Answer: D

Solution:

In case of diatomic molecules (X_2) of halogens the bond dissociation energy decreases in the order : $Cl_2 > Br_2 > F_2 > I_2$
The oxidising power, electronegativity and reactivity decrease in the order : $F_2 > Cl_2 > Br_2 > I_2$
Electron gain enthalpy of halogens follows the given order :
$Cl_2 > F_2 > Br_2 > I_2$
The low value of electron gain enthalpy (electron enthalpy) of fluorine is probably due to small size of fluorine atom.

Question29

Which one of the following ionic species has the greatest proton affinity to form stable compound?
(2007)

Options:

A. NH_2^-

B. F^-

C. I^-

D. HS^-

Answer: A

Solution:

Solution:
In going from left to right across a period in the periodic table, the basicity (i.e. proton affinity) decreases as the electronegativity of the atom possessing the lone pair of electrons increases. Hence basicity of $NH_2^-$is higher than F^- In moving down a group, as the atomic mass increases, basicity decreases. Hence F^- is more basics than I^- and HO^- is more basics than HS^-.Hence among the given ionic species, NH_2^- has maximum proton affinity.

Question30

With which of the following electronic configuration an atom has the lowest ionisation enthalpy?
(2007)

Options:

A. $1s^2 2s^2 2p^3$

B. $1s^2 2s^2 2p^5 3s^1$

C. $1s^2 2s^2 2p^6$

D. $1s^2 2s^2 2p^5$

Answer: B

Solution:

The larger the atomic size, smaller is the value of the ionisation enthalpy. Again higher the screening effect, lesser is the value of ionisation potential. Hence option (b) has lowest ionisation enthalpy.

Question31

Identify the correct order of the size of the following (2007)

Options:

A.

$Ca^{2+} < K^{+} < Ar < Cl^{-} < S^{2-}$

B.

$Ar < Ca^{2+} < K^{+} < Cl^{-} < S^{2-}$

C.

$Ca^{2+} < Ar < K^{+} < Cl^{-} < S^{2-}$

D.

$Ca^{2+} < K^{+} < Ar < S^{2-} < Cl^{-}$

Answer: A

Solution:

Solution:
Among isoelectronic ions, ionic radii of anions is more than that of cations. Further size of the anion increases with increase in negative charge and size of the cation decreases with increase in positive charge.

Question32

Which one of the following orders is not in accordance with the property stated against it? (2006)

Options:

A. $F_2 > Cl_2 > Br_2 > I_2$: bond dissociation energy

B. $F_2 > Cl_2 > Br_2 > I_2$: oxidising power

C. $HI > HBr > HCl > HF$: acidic property in water

D. $F_2 > Cl_2 > Br_2 > I_2$: electronegativity

Answer: A

Solution:

Solution:

X - X bond	F - F	Cl - Cl	Br - Br	I - I
Bond dissociation energy (Kcal/mol)	38	57	45.5	35.6

The lower value of bond dissociation energy of fluorine is due to the high inter-electronic repulsion between non-bonding electrons in the 2p-orbitals of fluorine. As a result F - F bond is weaker in comparison to Cl - Cl and Br - Br bonds.

Question33

Ionic radii are
(2004)

Options:

A. inversely proportional to effective nuclear charge

B. inversely proportional to square of effective nuclear charge

C. directly proportional to effective nuclear charge

D. directly proportional to square of effective nuclear charge.

Answer: A

Question34

The ions O^{2-}, F^-, Na^+, Mg^{2+} and Al^{3+} are isoelectronic. Their ionic radii show
(2003)

Options:

A. a significant increase from O^{2-} to Al^{3+}

B. a significant decrease from O^{2-} to Al^{3+}

C. an increase from O^{2-} to F^{-} and then decrease from Na^{+} to Al^{3+}

D. a decrease from O^{2-} to F^{-} and then increase from Na^{+} to Al^{3+}

Answer: B

Solution:

Amongst isoelectronic ions, ionic radii of anions is more than that of cations. Further size of the anion increases with increase in -ve charge and size of cation decreases with increase in +ve charge. Hence, correct order is
$O^{2-} > F^{-} > Na^{+} > Mg^{2+} > Al^{3+}$

Question35

Which of the following order is wrong? (2002)

Options:

A. $NH_3 < PH_3 < AsH_3$ - acidic

B. $Li < Be < B < C - 1^{st} IP$

C.

$Al_2O_3 < MgO < Na_2O < K_2O -$
basic

D. $Li^{+} < Na^{+} < K^{+} < Cs^{+} -$ ionic radius.

Answer: B

Solution:

Solution:
Li, Be, B, C - these elements belong to the same period. Generally the value of 1^{st} ionisation potential increases in moving from left to right in a period, since the nuclear charge of the elements also increase in the same direction. But the ionisation potential of boron ($B \rightarrow 2s^2 2p^1$) is lower than that of beryllium ($Be \rightarrow 2s^2$), since in case of boron, $2p^1$ electron has to be removed to get B^{+} while in case of Be ($2s^2$)s -electron has to be removed to get Be^{+} ($2s^1$) $\cdot$ p electron can be removed more easily than s electron so the energy required to remove electron will be less in case of boron. The order will be
$Li < B < Be < C$

Question36

Correct order of 1^{st} ionisation potential among following elements Be, B, C, N , O is (2001)

Options:

A. $B < Be < C < O < N$

B. $B < Be < C < N < O$

C. $Be < B < C < N < O$

D. $Be < B < C < O < N$

Answer: A

Solution:

Solution:
The energy required to remove the most loosely bound electron from an isolated gaseous atom is called the ionisation energy. The ionisation potential decreases as the size of the atom decreases. Atoms with fully or partly filled orbitals have high ionisation potential.

Question37

Which statement is wrong?
(2000)

Options:

A. Bond energy of $F_2 > Cl_2$

B. Electronegativity of $F > Cl$

C. F is more oxidising than Cl

D. Electron affinity of $Cl > F$

Answer: A

Solution:

Solution:
Due to more repulsion in between non-bonding electron pair (2p) of two fluorines (due to small size of F-atom) in comparison to non-bonding electron pair (3p) in chlorine, the bond energy of F_2 is less than Cl_2.
$B.E.(F_2) = 158.5\,kJ/mole$ and
$B.E.(Cl_2) = 242.6\,kJ/mole$

Question38

Which of the following elements has the maximum electron affinity?
(1999)

Options:

A. I

B. Br

C. Cl

D. F

Answer: C

Solution:

Solution:
Among the halogens the electron affinity value of ' F ' should be maximum. But due to small size the 7 -electrons in its valence shell are much more crowded, so that it feels difficulty in entry of new electrons. Thus, the E.A. value is slightly lower than chlorine and the order is
$I < Br < F < Cl$

Question39

The first ionization potentials (eV) of Be and B respectively are (1998)

Options:

A. 8.29,8.29

B. 9.32,9.32

C. 8.29,9.32

D. 9.32, 8.29

Answer: D

Solution:

Solution:
$_4Be \rightarrow 1s^2 2s^2$, $_5B \rightarrow 1s^2 2s^2 2p^1$
Due to stable fully-filled 's'-orbital arrangement of electrons in 'Be' atom, more energy is required to remove an electron from the valence shell than 'B'-atom. Therefore 'Be' has higher ionisation potential than ' B ?

Question40

Which one of the following is correct order of the size of iodine species? (1997)

Options:

A. $I^+ > I^- > I$

B. $I^- > I > I^+$

C. $I > I^- > I^+$

D. $I > I^+ > I^-$

Answer: B

Solution:

Solution:
Positive ion is always smaller and negative ion is always larger than the parent atom.

Question41

Which of the following ion is the largest in size? (1996)

Options:

A. K^+

B. Ca^{2+}

C. Cl^-

D. S^{2-}

Answer: D

Solution:

Solution:
since all of these ions contain 18 electrons each, so these are isoelectronic. For isoelectronic ions, smaller the positive charge, greater is the size of the ion.

Question42

Which of the following has the smallest size? (1996)

Options:

A. Al^{3+}

B. F^{-}

C. Na^{+}

D. Mg^{2+}

Answer: A

Solution:

Solution:
These are isoelectronic ions (ions with same number of electrons) and for isoelectronic ions, greater the positive charge, greater is the force of attraction on the electrons by the nucleus and the smaller is the size of the ion. Thus, Al^{3+} has the smallest size.

Question43

The electronic configuration of an element is $1s^2 2s^2 2p^6 3s^2 3p^3$. What is the atomic number of the element, which is just below the above element in the periodic table?
(1995)

Options:

A. 33

B. 34

C. 36

D. 49

Answer: A

Solution:

Solution:
Atomic no. of given element = 15, thus it belongs to VA group.
Now, atomic no. of the element below the above element = 15 + 18 = 33

Question44

Na^{+}, Mg^{2+}, Al^{3+} and Si^{4+} are isoelectronic.
The order of their ionic size is
(1993)

Options:

A. $Na^{+} > Mg^{2+} < Al^{3+} < Si^{4+}$

B. $Na^{+} < Mg^{2+} < Al^{3+} < Si^{4+}$

C. $Na^{+} > Mg^{2+} > Al^{3+} > Si^{4+}$

D. $Na^{+} < Mg^{2+} > Al^{3+} < Si^{4+}$

Answer: C

Solution:

Solution:
In isoelectronic ions, the size of the cation decreases as the magnitude of the positive charge increases.

Question45

If the atomic number of an element is 33, it will be placed in the periodic table in the
(1993)

Options:

A. first group

B. third group

C. fifth group

D. seventh group.

Answer: C

Solution:

Solution:
Electronic configuration of an element is $1s^2 2s^2 2p^6 3s^2 3p^6 3d^{10} 4s^2 4p^3$
Hence, it lies in V A or 15^{th} group.

Question46

In the periodic table from left to right in a period, the atomic volume (1993)

Options:

A. decreases

B. increases

C. remains same

D. first decrease then increases.

Answer: D

Solution:

Solution:
Atomic volume is the volume occupied by one gram of an element. Within a period from left to right, atomic volume first decreases and then increases.

Question47

Which electronic configuration of an element has abnormally high difference between second and third ionization energy? (1993)

Options:

A. $1s^2, 2s^2, 2p^6, 3s^1$

B. $1s^2, 2s^2, 2p^6, 3s^1, 3p^1$

C. $1s^2, 2s^2, 2p^6, 3s^2, 3p^2$

D. $1s^2, 2s^2, 2p^6, 3s^2$

Answer: D

Solution:

Solution:
Abnormally high difference between 2^{nd} and 3^{rd} ionisation energy means that the element has two valence electrons, which is a case in configuration (d).

Question48

One of the characteristic properties of non-metals is that they (1993)

Options:

A. are reducing agents

B. form basic oxides

C. form cations by electron gain

D. are electronegative.

Answer: D

Solution:

Solution:
Non-metals easily gain electrons and hence, they form negative ions, so they are electronegative in nature

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Question49

Pauling's electronegativity values for elements are useful in predicting (1989)

Options:

A. polarity of the molecules

B. position in the E.M.F. series

C. coordination numbers

D. dipole moments.

Answer: A

Solution:

Solution:
Pauling introduced the electronegativity concept. He introduced the idea that the ionic character of a bond varies with the difference in electronegativity. A large difference in electronegativity leads to a bond with high degree of polar character, i.e., the bond is predominantly ionic or vice versa.

Question50

The electronic configuration of four elements are given below. Which elements does not belong to the same family as others? (1989)

Options:

A. $[Xe]4f^{14}5d^{10}4s^2$

B. $[Kr]4d^{10}5s^2$

C. $[Ne]3s^23p^5$

D. $[Ar]3d^{10}4s^2$

Answer: C

Solution:

Solution:
Elements (a), (b) and (d) belong to the same group since each one of them has two electrons in valence shell. In contrast, element (c) has seven electrons in the valence shell, and hence it lies in other group.

Question51

In the periodic table, with the increase in atomic number, the metallic character of an element
(1989)

Options:

A. decreases in a period and increases in a group

B. increases in a period and decreases in a group

C. increases both in a period and the group

D. decreases in a period and the group.

Answer: A

Solution:

Solution:
Metallic character decreases in a period and increases in a group.
