Solutions

S1. Ans.(a)

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

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

S2. Ans.(d)

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

S3. Ans. (c)

Mn_2O_7, SO_2, TeO_3 are acidic oxides.

S4. Ans. (d)

NO ⟶ Neutral

CaO ⟶ Basic

CO_2 ⟶ Acidic

ZnO ⟶ Amphoteric

S5. Ans. (d)

- Generally, on moving left to right in a period. First ionization enthalpy of elements increases due to increase in effective nuclear charge.
- Due to more stable half-filled outer electronic configuration ($2s^2 2p^3$) of N, its first ionization enthalpy is more than O.

So, correct order of IP is: C < O < N < F

S6. Ans. (d)

Due to more diffused nature of 5f orbitals as compared to 4f orbitals the shielding effect of 5f is poor, resulting in the decrease in size from left to right in actinoid series which is greater and gradual than that in lanthanoid series.

S7. Ans. (b)

Fluorine is a stronger oxidising agent than chlorine due to

(i) Low dissociation enthalpy of F-F bond

(ii) High hydration enthalpy of F^- ion

S8. Ans. (b)

As it can be observed from given data of question, in case of element 'X' there is huge difference between IP_1 and IP_2 hence, it will have one electron in outermost shell and will be alkali metal.

While for 'Y' difference is not that high hence, it will be alkaline earth metal.

S9. Ans. (a)

IUPAC name of element : 119 : ununennium

S10. Ans. (b)

Electronic configuration of Gadolinium

Gd: [Xe] $4f^7\ 5d^1\ 6s^2$

In case of 3rd ionization enthalpy electron will be removed from 5d and resultant configuration will be [Xe] $4f^7$ that is stable electronic configuration as it will have high exchange energy, hence less energy will be required to remove 3rd electron.

S11. Ans.(c)

$_{26}F \rightarrow 3d^6 4s^2, Fe^{+2} \rightarrow 3d^6$ 24

$_{25}Mn \rightarrow 3d^5 4s^2, Mn^{+2} \rightarrow 3d^5$ 23

S12. Ans.(c)

Ununnnium is the element that has Atomic number = 111
IUPAC official name of Unununium: Roentgenium
Thus option (c) is correct.

S13. Ans.(b)

'Be' and 'N' have comparatively more stable valence sub-shell than 'B' and 'O'.
Generally Ionisation energies increases across a period.
Thus, correct increasing order of first ionization enthalpy is :
Li < B < Be < C < O < N < F < Ne

S14. Ans.(c)

Carbon family: $[Rn]5f^{14}6d^{10}7s^{2}7p^{2}$

S15. Ans.(c, d)

Increasing first ionization enthalpy will be B < C < O < N.

Electron gain enthalpy: I < Br < F < Cl

S16. Ans.(d)

There is a lot of repulsion when similar charges approach each other as O^- (g) and e^- are both negatively charged. To add an electron under such situation, the force of repulsion is to be overcome by applying external energy.

S17. Ans.(a)

Number of d electrons in Fe^{2+} (26) = 6
Number of p electron in Cl (Z = 17) = 11
Number of s electron in Mg (Z = 12) = 6
Number of p electron in Ne = 6

S18. Ans.(b)

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

S19. Ans.(a)

$Be^{2+} = 2e^-$
$Li^+ = 2e^-$
Isoelectronic species means ions with same number of electron.

S20. Ans.(b)

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

S21. Ans.(b)

Among isoelectronic species the ion with the maximum positive charge will have the smallest radius.