1. Which of the following is correctly matched? **(2023)**
   (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

2. The correct sequence given below containing neutral, acidic, basic and amphoteric oxide each, respectively, is: **(2023)**
   (a) NO, ZnO, CO_2, CaO
   (b) ZnO, NO, CaO, CO_2
   (c) NO, CO_2, ZnO, CaO
   (d) NO, CO_2, CaO, ZnO

3. The correct order of first ionization enthalpy for the given four elements is: **(2022)**
   (a) C < F < N < O
   (b) C < N < F < O
   (c) C < N < O < F
   (d) C < O < N < F

4. Decreases in size from left to right in actinoid series is greater and gradual than that in lanthanoid series due to **(2022)**
   (a) 5f orbitals have greater shielding effect
   (b) 4f orbitals are penultimate
   (c) 4f orbitals have greater shielding effect
   (d) 5f orbitals have poor shielding effect

5. Fluorine is a stronger oxidising agent than chorine because:
   (A) F-F bond has a low enthalpy of dissociation.
   (B) Fluoride ion (F^-) has high hydration enthalpy.
   (C) Electron gain enthalpy of fluorine is less negative than chlorine.
   (D) Fluorine has a very small size.
   Choose the most appropriate answer from the options given: **(2022)**
   (a) B and C only
   (b) A and B only
   (c) A and C only
   (d) A and D only

6. If first ionization enthalpies of elements X and Y are 419 kJ mol^{-1} and 590 kJ mol^{-1}, respectively and second ionization enthalpies of X and Y are 3069 kJ mol^{-1} and 1145 kJ mol^{-1}, respectively. Then correct statement is: **(2022)**
   (a) Both X and Y are alkaline earth metals
   (b) X is an alkali metal and Y is an alkaline earth metal
   (c) X is an alkaline earth metal and Y is an alkali metal
   (d) Both X and Y are alkali metals

7. The IUPAC name of an element with atomic number 119 is **(2022)**
   (a) ununennium
   (b) unnilennium
   (c) unununnium
   (d) ununoctium

8. Gadolinium has a low value of third ionisation enthalpy because of **(2022)**
   (a) small size
   (b) high exchange enthalpy
   (c) high electronegativity
   (d) high basic character

9. From the following pairs of ions which one is **not** an iso-electronic pair? **(2021)**
   (a) Na^+, Mg^{2+}
   (b) Mn^{2+}, Fe^{3+}
   (c) Fe^{2+}, Mn^{2+}
   (d) O^{2-}, F^-

10. Identify the incorrect match **(2020)**

	Name		IUPAC Official Name
A.	Unnilunium	(i)	Mendelevium
B.	Unniltrium	(ii)	Lawrencium
C.	Unnilhexium	(iii)	Seaborgium
D.	Ununnunium	(iv)	Darmstadtium

   (a) B-(ii)
   (b) C-(iii)
   (c) D-(iv)
   (d) A-(i)

11. For the second period elements the correct increasing order of first ionization enthalpy is : **(2019)**
   (a) Li < Be < B < C < N < C < F < Ne
   (b) Li < B < Be < C < O < N > F < Ne
   (c) Li < B < Be < C < N < O < F < Ne
   (d) Li < Be < B < C < O < N < F < Ne

12. The element Z = 114 has been discovered recently. It will belong to which of the following family group and electronic configuration? **(2017-Delhi)**
    (a) Nitrogen family, $[Rn]5f^{14}6d^{10}7s^27p^6$
    (b) Halogen family, $[Rn]5f^{14}6d^{10}7s^27p^5$
    (c) Carbo family, $[Rn]5f^{14}6d^{10}7s^27p^2$
    (d) Oxygen family, $[Rn]5f^{14}6d^{10}7s^27p^4$

13. In which of the following options the order of arrangement does not agree with the variation of property indicated against it? **(2016-I)**
    (a) Li < Na < K < Rb (increasing metallic radius)
    (b) $Al^{3+} < Mg^{2+} < Na^+ < F^-$ (increasing ionic size)
    (c) B < C < N < O (increasing first ionization enthalpy)
    (d) I < Br < Cl < F (increasing electron gain enthalpy)

14. The formation of the oxide ion, O^{2-} (g) from oxygen atom requires first and exothermic and then an endothermic step as shown below:
    $O(g) + e^- \rightarrow O^-(g); \Delta_f H° = -141\ kJ\ mol^{-1}$
    $O^-(g) + e^- \rightarrow O^{2-}(g); \Delta_f H° = +780\ kJ\ mol^{-1}$
    Thus, process of formation of O^{2-} in gas phase is unfavorable even through O^{2-} is isoelectronic with neon. It is due to the fact that,
    (a) O^- ion has comparatively smaller size than oxygen atom
    (b) Oxygen is more electronegative
    (c) Addition of electron in oxygen results in larger size of the ion
    (d) Electron repulsion outweighs the stability gained by achieving noble gas configuration

15. The number of d-electrons in Fe^{2+} (Z = 26) is not equal to the number of electrons in which one of the following? **(2015)**
    (a) p-electrons in Cl (Z = 17)
    (b) d-electrons in Fe (Z = 26)
    (c) p-electrons in Ne (Z = 10)
    (d) s-electrons in Mg (Z = 12)

16. The species Ar, K^+, Ca^{2+} contain the same number of electrons. In which order do their radii increase? **(2015)**
    (a) $Ca^{2+} < Ar < K^+$
    (b) $Ca^{2+} < K^+ < Ar$
    (c) $K^+ < Ar < Ca^{2+}$
    (d) $Ar < K^+ < Ca^{2+}$

17. Be^{2+} is isoelectronic with which of the following ions? **(2014)**
    (a) Li^+
    (b) Na^+
    (c) Mg^{2+}
    (d) H^+

18. Which of the following orders of ionic radii is correctly represented? **(2014)**
    (a) $Na^+ > F^- > O^{2-}$
    (b) $O^{2-} > F^- > Na^+$
    (c) $Al^{3+} > Mg^{2+} > N^{3-}$
    (d) $H^- > H^+ > H$

19. Identify the wrong statement in the following: **(2012 Pre)**
    (a) Atomic radius of the elements decreases as one moves across from left to right in the 2nd period of the periodic table
    (b) Amongst isoelectronic species, smaller the positive charge on the carbon, smaller is the ionic radius
    (c) Amongst isoelectronic species, greater the negative charge on the anion, larger is the ionic radius
    (d) Atomic radius of the elements increases as one moves down the first group of the periodic table

S1. Ans. (c)

S2. Ans. (d)

S3. Ans. (d)

S4. Ans. (d)

S5. Ans. (b)

S6. Ans. (b)

S7. Ans. (a)

S8. Ans. (b)

S9. Ans. (c)

S10. Ans. (c)

S11. Ans. (b)

S12. Ans. (c)

S13. Ans. (c/d)

S14. Ans. (d)

S15. Ans. (a)

S16. Ans. (b)

S17. Ans. (a)

S18. Ans. (b)

S19. Ans. (b)

S1. Ans. (c)

Mn_2O_7, SO_2, TeO_3 are acidic oxides.

S2. Ans. (d)

NO ⟶ Neutral

CaO ⟶ Basic

CO_2 ⟶ Acidic

ZnO ⟶ Amphoteric

S3. 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

S4. 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.

S5. 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

S6. 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.

S7. Ans. (a)

IUPAC name of element : 119 : ununennium

S8. 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.

S9. 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

S10. Ans.(c)

Ununnunnium is the element that has Atomic number = 111

IUPAC official name of Unununium: Roentgenium

Thus option (c) is correct.

S11. 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

S12. Ans.(c)

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

S13. Ans.(c, d)

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

Electron gain enthalpy: I < Br < F < Cl

S14. 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.

S15. 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

S16. Ans.(b)

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

S17. Ans.(a)

Be^{2+} = $2e^-$

Li^+ = $2e^-$

Isoelectronic species means ions with same number of electron.

S18. 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+}

S19. Ans.(b)

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