Speed Test-31

1. **(d)**

2. **(d)** The additional π-molecular electron in O_2^- is added to the less stable antibonding orbital. Hence, it is easy to remove that electron from O_2^- ion. Thus I.E. (I.P.) of O_2^- is lowest.

3. **(a)** Continuous increase as no. of shells increases down the group.

4. **(b)**

5. **(b)** Closed shell (Ne), half filled (P) and completely filled configuration (Mg) are the cause of higher value of I.E.

6. **(d)**

7. **(b)** Cu, Ag and Au are coinage metals. They belong to group IB (*d*-block) of periodic table.

8. **(d)** In fourth period filling up of 3*d* orbital becomes energetically favourable before the 4*p* orbital is filled.

9. **(b)** $K^+ \rightarrow K^{2+} + e^-$. Since e^- is to be removed from stable configuration.

10. **(a)** For isoelectronic species ionic radii decreases as the charge on ion decreases. Further on moving down in a group ionic radii increases. Hence the correct order is

$$O^{2-} < N^{3-} < S^{2-} < P^{3-}$$

11. **(c)** On moving down a group atomic radii increases.

12. **(a)** Incoming electrons occupies the smaller n = 2 shell, also negative charge on oxygen (O^-) is another factor due to which incoming electron feel repulsion.

    Hence electron repulsion outweigh the stability gained by achieving noble gas configuration.

13. **(c)**

14. **(b)** It is electronic configuration of alkali metal. Hence it will form basic oxide.

15. **(b)** The right sequence of $I.E_1$ of $Li < B < Be < C$.

16. **(c)** Al ($3s^2 p^1$) and Mg ($3s^2$). Lower energy is required to remove $3p^1$ electron than $3s^1$ electron (penetrating effect is $s > p > d > f$). Secondly Mg has stable electronic configuration than Al

17. **(c)** I represents Li, II represents K

    III represents Br, IV represents I

    V represents He

    So, amongst these, II represents most reactive metal and V represents least reactive non-metal.

18. **(c)**

19. **(c)** Generally, the ionization enthalpies or energy increases from left to right in a period and decreases from top to bottom in a group. Several factor such as atomic radius, nuclear charge, shielding effect are responsible for change of ionization enthalpies.

    Here, Ist ionization enthalpy of *A* and *B* is greater than group I (Li 520 kJmol^{-1} to Cs374 kJmol^{-1}), which means element *A* and *B* belong to group –2 and all three given ionization enthalpy values are less for element *B* means *B* will come below *A*.

20. **(b)** For dissolution, Hydration energy > Lattice energy.

    $BaSO_4$ is sparingly soluble in water because its hydration energy is lesser than the lattice energy and thus ions are not separated from each other.

21. **(c)** The anomalous behaviour of first member of a group in the *s*- and *p*-block element is due to their small size, large charge/radius ratio and high electronegativity.

22. **(c)** In $3d^6 4s^2$ the differentiating electron enters d sub shell, Hence it represents transition metal, Fe.

23. **(b)** In the isoelectronic species, all isoelectronic anions belong to the same period and cations to the next period.

24. **(b)** On passing from left to right in a period acidic character of the normal oxides of the elements increases with increase in electronegativity.

25. **(a)** The electronic configuration clearly suggests that it is a d-block element (having configuration $(n-1)\,d^{1-10}\,ns^{0-2}$) which starts from III B and goes till II B. Hence with d^3 configuration it would be classified in the group.

26. **(b)** Correct order of increasing basic strength is $NH_3 > PH_3 > AsH_3 > SbH_3 > BiH_3$

27. **(c)** Electron affinity of ^9F is less than that of ^{17}Cl

28. **(c)** $ns^2\,np^1$ is the electronic configuration of III A period. Al_2O_3 is amphoteric oxide

29. **(d)** P^{5+} has more effective nuclear charge and smaller size than P^{3+}.

30. **(a)** For isoelectronic species, size of anion increases as negative charge increases. Thus the correct order is

$$\underset{(1.71)}{N^{3-}} > \underset{(1.40)}{O^{2-}} > \underset{(1.36)}{F^-}$$

31. **(a)** Hydrogen bonding increases the boiling point. Hydrogen bonds are formed in compounds having F or O or N with hydrogen. S, Se, Te cannot undergo hydrogen bond formation because of their larger size and lower electronegativity values.

32. **(b)** A. $Li^+ < Al^{2+} < Mg^{2+} < K^+$

The cation with the greater positive charge will have a smaller radius because of the greater attraction of the electrons to the nucleus. Anion with the greater negative charge will have the larger radius.

$$\text{Positive charge} \propto \frac{1}{\text{ionic radius}}$$

$$\text{Negative charge} \propto \text{ionic radius}$$

B. Greater positive charge, increases effective nuclear charge in case of isoelectronic species. While for same group elements effective nuclear charge decreases down the groups.

C. $Cl > F > Br > I$

electron affinity of Cl is highest in halogen family.

D. $F > Cl > Br > I$

electronegativity of fluorine (F) is higher than Cl, Br and I.

33. **(a)** Because Al is amphoteric in nature so it dissolve in both acid and base.

34. **(b)** Pb^{2+} ($5d^{10}\,6s^2$), has the most stable +2 oxidation state because here the *d*-orbital is completely filled and is more stable than Fe^{2+} ($3d^6$). Again Ag^+ ($4d^{10}$) is more stable as here again the *d*-orbital is completely filled and Ag^{2+} is not easily obtained. Pb^{2+} is more stable compared to Sn^{2+} ($4d^{10}\,5s^2$) because of its large size.

35. **(b)**

36. **(a)** Iodine with lower atomic weight than that of tellurium (Group VI) was placed in Group VII along with fluorine, chlorine, bromine because of similarities in properties.

37. **(c)** Covalent radius is radius of an atom in its bound state i.e., in fluorine it is half of distance between two covalently bonded fluorine atoms; van der Waal radii is one-half of the distance between the nuclei of two identical non-bonded isolated atoms. These atoms are attracted toward each other through weak van der Waal's force hence van der Waal radii are very large.

38. **(c)** According to Dobereneir's triad the atomic mass of Br will be average of the atomic masses of Cl & I

$$= \frac{35.5 + 127}{2} = 81.25$$

39. **(b)** $\because$ For $Na \longrightarrow Na^+ + e^-$ $IE_1 = 5.1$ eV

$\therefore$ For $Na^+ + e^- \longrightarrow Na$ $EF = -5.1$ eV

(because the reaction is reverse)

40. **(b)** N has half filled atomic orbital, which is more stable.

41. **(d)** Number of moles $= \frac{1}{35.5}$

Given, 1 eV = 23.06 kcal mol^{-1}

3.7 eV = 3.7 × 23.06 kcal mol^{-1}

i.e. 1 mole realease energy

= 3.7 × 23.06 kcal

$\therefore$ Energy released

$$= \frac{1}{35.5} \times 3.7 \times 23.06 \text{ kcal} = 2.4 \text{ kcal}$$

42. **(a)**

43. **(a)** O^- ion exerts a force of repulsion on the incoming electron. The energy is required to overcome it.

44. **(d)** Oxides of Eka-Aluminium = Ga_2O_3

Oxides of Eka-Silicon = SiO_2

Melting point of Eka-Aluminium = Low (302 K)

Melting point of Eka-Silicon = High (1231 K)

45. **(b)** In case of halogens covalent radius is considered this bond is formed by overlapping of electron clouds; while noble gases remain monoatomic, in this case only way to obtain radius is through van der Waal radii.