Chemistry

10th Periodic classification of Elements

Solutions :

Level 1 :

1) (d)

Advantages of classificat^{n} of elements are to study the elements in a systematic manner, to correlate the properties of elements & to know the type of different compounds that diff. elements can form.

2) (d)

3) (d)

4) (a)

Ca	Sr	Ba
x	777	727

$$\frac{x+727}{2} = 777$$

$$\therefore x + 727 = 1554$$

$$\therefore x = 1554 - 727$$

$$\therefore x = 827^{\circ}C$$

5) (c)
The Sum of the average atomic mass of first and last element is not equal to the mass of the middle element.

6) (a)

7) (b)

8) (c) - Newland's Table ended with Thorium

9) (c)
According to Newland, Every 8th element will have similiar properties as that of 1st element.

10) (c)
Acc. to Newland, Every 8th element will have Similiar properties as that of 1st element.

11) (b)
Newlands law of Octaves was applicable only till Calcium.

12) (d)
Newlands law of octaves was valid upto Calcium.

13) (b)

14) (a)
Mendeleev arranged elements in increasing atomic mass.

15) (d) - Mendeleev's table was divided into subgroups A and B ie. Oxides and Hydrides.

16) (b)

17) (b)

18) (d)

19) (b)
chlorine comes under the 7th group ie. R_2O_7.
So, the oxide of chlorine is Cl_2O_7.

20) (b)

21) (d)
Gallium comes under the 3rd group. ie. R_2O_3
So, the oxide of gallium is Ga_2O_3

22) (c)
Valency depends on group number.

23) (d)
Argon is a noble gas and all noble gases donot come under representative elements.

24) (b)

25) (d)

26) (b)

27) (b)
All three elements have one electron in last outermost shell.

28) (a)

29) (b) - All 'B' group elements comes under Transition element group.

30) (c)

31) (b)

32) (d)

33) (c)
5th Period of modern periodic table ends with Xe.

34) (a)

35) (a)

Level 2 :

1) (a)
Electronic Configuration 2, 8, 18, 18, 7 signifies that a given element have 5 shells.

Atomic no of element = 2 + 8 + 18 + 18 + 7
= 53

2) (c)
The trend of valency is
1, 2, 3, 4, 3, 2, 1, 0.

3) (a)
As Atomic number increases, valence electrons also increase.

4) (a)

5) (a)
p Subshell can accomodate 6 electrons.

6) (d) - If we go from left to right, Atomic size decreases.

7) (c) - Nuclear charge remains same from up to down.

8) (a) - From left to right, atomic size decreases.

9) (b)

10) (c)
Na^+; The charge on ion denotes sodium have donated one electron.

11) (b)
Greater Nuclear charge means more attraction of electrons towards nucleus which results in smaller size.

12) (b)
Solution same as 11th mcq.

13) (a)
If we go from up to down, metallic characteristic increases.

14) (b)

15) (d)
Fluorine is most non-metallic in nature as Non-metallic characteristics increases from left to right

16) (d)

17) (b)
Electronegativity increases as atomic radius decreases.

18) (d)

19) (d)

20) (d).

21) (d)
Nitrogen has highest ionization potential so 14.5 eV will be the first ionization enthalpy of Nitrogen.
Also,
The first ionization potential of Carbon is 11.3 V. The four consecutive elements are B, C, N and O. We know that the first ionization potential of N is higher than the first ionizatial of O as in case of N, the electron is to be removed from stable half-filled 2P orbital.

22) (c)
O > F > N > C

23) Nitrogen: [He] $2s^2 2p^3$
Oxygen: [He] $2s^2 2p^4$
Fluorine: [He] $2s^2 2p^5$
Carbon: [He] $2s^2 2p^2$

After removing one electron:
Nitrogen: [He] $2s^2 2p^2$ - After removal of one more electron, it will have only one electron in its outermost p subshell.

Oxygen: [He] $2s^2 2p^3$ - After removal of one more electron, it will have two electrons in p subshell which makes it very unstable. So have very high IP.

Fluorine: [He] $2s^2 2p^4$ - After removal of one more electron, it will occupy stable half filled configuration.

Carbon: [He] $2s^2 2p^1$ - After removal of one more electron, it will occupy ideal gas configuration. Hence, it will easily give away second electron having very low second IP.

23) (b)
After removal of an electron Sodium acquires stable noble gas configuration. It is difficult to remove electron from stable noble gas configuration species. Therefore, Second ionization potential of Mg is less than that of Na.

24) (a)

25) (b)

26) (b)
IP_1, IP_2, IP_3, IP_4 and IP_5 of an element are 7.1, 14.3, 34.5, 46.8, 162.2 eV respectively. The element is likely to be Si. The jump in IP values exist in IP_5 and thus, removal of fifth electron occurs from inner shell. Thus, the element contains four electrons in its valence shell.
The electronic configuration of silicon is [Ne] $3s^2, 3p^2$. These 4 electrons need lesser IP than the fifth electron which has to be released from $2p^6$, requires very high IP.

27) (b)

The ionization energy of a multivalent atom increases with the consecutive removal of the electron. This is due to an increase in effective nuclear charge on the valence electron that makes it difficult to ionize a cation.

Therefore, $IE_1 < IE_2 < IE_3$ and so on.

thus maximum amount of energy is required for $M^{2+}_{(g)} \longrightarrow M^{3+}_{(g)} + e^-$.

28) (c)

29) (c)

30) (a)

$S > O > N$

Electron affinity increases as we add more Valence electron. That puts oxygen as having more electron affinity than N. So, $O > N$.

Electron affinity would typically decrease as you move down the periodic table.

But there is a factor in the second period of elements due to the close distance or the orbital from the nucleus so that repulsion of any electron from each other reduce electron affinity.