JEE MAIN ANSWER KEY & SOLUTIONS

SUBJECT :- CHEMISTRY
CLASS :- 11th **PAPER CODE :- CWT-3**
CHAPTER :- PREODIC TABLE

ANSWER KEY

1.	(C)	**2.**	(B)	**3.**	(D)	**4.**	(B)	**5.**	(D)	**6.**	(C)	**7.**	(D)
8.	(B)	**9.**	(C)	**10.**	(B)	**11.**	(C)	**12.**	(C)	**13.**	(D)	**14.**	(C)
15.	(C)	**16.**	(A)	**17.**	(D)	**18.**	(A)	**19.**	(A)	**20.**	(A)	**21.**	6
22.	4	**23.**	6	**24.**	125	**25.**	36	**26.**	80	**27.**	8	**28.**	1
29.	3	**30.**	8										

SOLUTIONS

1. (C)
Sol. It is factual.

2. (B)
Sol. Since in d-orbital maximum 10 electrons can be filled.

3. (D)
Sol. For isoelectronic species, as Z increases, Z_{eff} increases (and vice versa).

4. (B)
Sol. $Sn^{4+} > In^{+} > Sn > In$

5. (D)

6. (C)
Sol. BiI_5 does not exists because of I^- being very strong reducing agent. So it reduces Bi^{5+} to Bi^{3+} and forms BiI_3.

7. (D)
Sol. All are isoelectronic species and thus Na^+ has smallest ionic radius because of high effective nuclear charge (i.e., 11 No. of protons as compared to 9, 8 and 7 in F, O and N respectively).

8. (B)
Sol. O^+ is smaller than parent atom while anion is bigger than parent atom. O^{2-} and N^{3-} are isoelectronic species. So ionic size $\propto \frac{1}{\text{nuclear charge}}$. Hence the correct order is $O^+ < O^{2-} < N^{3-}$.

9. (C)

10. (B)
Sol. Half filled electron configuration has extra stability. Hence the removal of electron from outer most orbit requires higher energy.

11. (C)
Sol. As size of atom increases, the distance between nucleus and outer most electrons increases. So the attraction between the nucleus and outer most electron decreases. As a result the ionisation energy decreases.

12. (C)
Sol. Electron affinity is the measure of the ease with which an atom receives the additional electron in its valence shell in gaseous phase.
Generally down the group, the electron affinity decreases due to increase in atomic size.

13. (D)
Sol. In chlorine, the addition of additional electron to larger 3p-subshell experiences less electron-electron repulsion than smaller 2p-subshell of fluorine. Phosphorus has very low electron affinity because there is high electron repulsion when the incoming electron enters an orbital that is already half filled.

14. (C)
Sol. According to Mulliken's, the electronegativity = $\frac{\text{Ionisation energy} + \text{Electron affinity}}{2}$

15. (C)
Sol. Eelctronegativity values are as given below N = 3.0; C = 2.5; Si = 1.8; P = 2.1

16. (A)
Sol. Halogens have valence shell electron configuration ns^2np^5. They have highest electronegative values in their respective period.

17. (D)

18. (A)
Sol. Due to stable half filled electronic configuration of outer most shell of N, it has higher ionisation energy than O which has partially filled electron configuration of outer most shell.

19. (A)

Sol. Atomic radii of zero group elements are expressed as their vander Waal's radii.

$r_{\text{van der Waal's}} > r_{\text{covalent}}$.

20. (A)

Sol. For isoelectronic species, as Z increases, Z_{eff} increases (and vice versa).

21. 6

22. 4

Sol. Ni $\rightarrow 1s^2\ 2s^2 2p^6\ 3s^2 3p^6\ 3d^8 4s^2$

Grouping

$$\rightarrow \underbrace{(1s)^2}_{(n-3)}\ \underbrace{(2s2p)^8}_{(n-2)}\ \underbrace{(3s3p)^8\ (3d)^8}_{(n-1)}\ \underbrace{(4s)^2}_{n}$$

$\sigma = 10 \times 1 + 16 \times 0.85 + 1 \times 0.35 = 23.95$

$Z_{eff} = Z - \sigma$

$= 28 - 23.95 = 4.05 \simeq 4$]

23. 6

Sol. $\Delta X = EN_{(B)} - EN_{(A)} = 3.5 - 2.0 = 1.5$

% Ionic character $= 16\Delta X + 3.5 (\Delta X)^2$

$$\% \text{ Ionic character} = \frac{\mu_{exp}}{\mu_{theo}} \times 100$$

$16(1.5) + 3.5 (1.5)^2$

$$= \frac{\mu_{exp} \times \frac{1}{3} \times 10^{-29}}{1.6 \times 10^{-19} \times 3.92 \times 10^{-10}} \times 100$$

$\mu_{exp} = 5.99$ approximate 6]

24. 125

Sol. Possible subshells are present in 9th period

9s 8d 7f 6g 9p

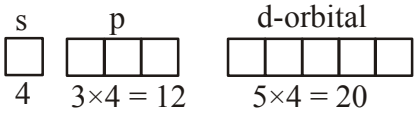
Total electron 5 + 25 + 35 + 45 + 15 = 125

Ans.]

25. 36

Sol. Each orbital contain 4-electron

3rd shell number of electron



Total electron = 4 + 12 + 20 = 36 **Ans.**]

26. 80

Sol. $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^{10}\ 4s^1$

$$\frac{2+1=3}{6e^-}\quad \frac{3+0}{2e^-}\quad \frac{l=2}{10e^-}$$

8 electron

$n + l = 3 = 8$ electron

$l = 2 = 10$ electron

$8 \times 10 = 80$]

27. 8

Sol. $Br^- \longrightarrow 1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 3d^{10}, 4s^2, 4p^6$

Electron of m $= +1 \rightarrow 0 + 0 + 2 + 0 + 2 + 2 + 0 + 2 \Rightarrow 8$]

28. 1

Sol. $19.5 = 16\ \Delta + 3.5\ \Delta^2$

$\therefore\ \Delta = 1$]

29. 3

Sol. 83 79 42 64 37 54 34

p-block d d f s p p

Total p-block element = 0003]

30. 8

Sol. $_{25}Mn \rightarrow 1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^5\ 4s^2$

Electrons in s-subshell = 8]