DPP

DAILY PRACTICE PROBLEMS

Class : XIth
Date :

Solutions

Subject : CHEMISTRY
DPP No. : 3

Topic :- Classification of Elements & Periodicity in Properties

1 **(d)**

$_{22}$Ti :$3s^2$, $4s^2 \xrightarrow{IE_1} 3d^2, 4s^1$

$_{23}$V :$3d^3$, $4s^2 \xrightarrow{IE_1} 3d^3, 4s^1$

$_{24}$Cr :$3d^5$, $4s^1 \xrightarrow{IE_1} 3d^5 \xrightarrow[\text{half filled}]{IE_2 \text{ from}}$ maximum

$_{25}$Mn :$3d^5$, $4s^2 \xrightarrow{IE_1} 3d^5, 4s^1$

2 **(c)**

In transition elements, penultimate shell electrons also participate in bonding.

3 **(a)**

With the discovery of inert gases (group zero in Mendeleef's Periodic Table), the law of octaves lost its original significance since, it was now the ninth element which had properties similar to the first one.

4 **(b)**

Na belongs to IA group and Mg belongs to IIA group. On moving from left to right in a period, first ionisation energy increases, thus, IE of Mg is greater than the IE of Na.

IE order

$Mg > Na$

5 **(a)**

Oxides
Basic

Decreases in a period →

↓ Increases in a group

basic nature of oxides $Al_2O_3 < MgO < Na_2O < K_2O$

7 **(c)**

Total energy required for the conversion of one Mg atom into $Mg^{2+}$is $= IE_1 + IE_2$

$= 7.646 + 15.035$ eV

$= 22.681$ eV

$= 2188.6$ kJ mol^{-1}

Moles of Mg $= \frac{12 \times 10^{-3}}{24}$

$= 0.5 \times 10^{-3}$

$\therefore$ The energy required to convert 0.5×10^{-3} mol Mg into

$Mg^{2+} = 0.5 \times 10^{-3} \times 2188.6$

$= 1.09 \approx 1.1$

8 **(a)**

The size of isoelectronics decreases with increase in atomic number.

9 **(c)**

Since, the IVth IE is very high, *ie*, electron is to be removed from stable configuration, thus it has 3 valence electrons

10 **(b)**

These are facts.

11 **(a)**

The ionisation energy increases when we move from left to right in a period. But this increase is not regular. The members of second group have greater ionisation potential as compared to third group due to stable configuration.

Ionisation potential has following order

$$Na < Mg > Al < Si$$

12 **(c)**

Both SO_4^{2-} and BF_4^- have sp^3-hybridization and are tetrahedral.

13 **(d)**

First IP of Be > B because of stable ns^2 configuration

14 **(c)**

The correct order according to size is as

$O^{2-} > O^- > O$

15 **(a)**

Electron affinity generally increases in a period from left to right because size decreases and nuclear charge increases. But the electron affinity of nitrogen is very low due to extra stability of half-filled $2p$-orbital. Hence, the order of electron affinity is

$$B < C < O > N$$

16 **(c)**

Lithium is basic in nature and hence, it is not amphoteric.

17 **(c)**

Ions are held in NaCl by coulombic forces and thus, possess no velocity.

18 **(c)**

The jump in ionisation energy occurs when valence shell changes during removal of electron.

19 **(d)**

The correct order of ionic radii of these ions is

$$S^{2-} > Cl^- > K^+ > Ca^{2+}.$$

20 **(a)**

Nitrogen has more ionisation potential than carbon and oxygen because its outermost orbit is half-filled. So the order is C < N > O

ANSWER-KEY										
Q.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
A.	**D**	**C**	**A**	**B**	**A**	**D**	**C**	**A**	**C**	**B**
Q.	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
A.	**A**	**C**	**D**	**C**	**A**	**C**	**C**	**C**	**D**	**A**