

Class:- 8

IIT FOUNDATION PLUS.

Chemical Bonding

Valency - Kossel-Lewis Theory, Lewis Symbols

Teaching Task.

JEE Main Level Questions

Q1) Ans:- 2.

Solution:- For IV-A group elements valency, valence electrons are same.

For C & Si $\rightarrow$ valence = 4

valence electrons = 4.

Q2) Ans:- 3

Solution:- $\text{Na}_2\text{O} \rightarrow$ Valency of sodium = 1

$\text{Al}_2\text{O}_3 \rightarrow$ Valency of Al = 3.

$\text{Cl}_2\text{O}_7 \rightarrow$ Valency of Cl = 7.

$\text{SO}_3 \rightarrow$ Valency of sulphur = 6.

Highest valency = Cl $\rightarrow$ 7.

Q3) Ans:- 3.

Solution:- For peroxide, oxidation number = -1.

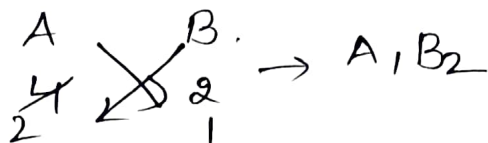
MO_2

$M + 2(-1) = 0$

$M = +2$

Q4) Ans:- 3.

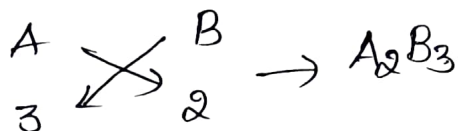
Solution:- A - Tetravalent, B $\rightarrow$ Divalent.



Q5) Ans:- 2.

Solution:- A $\rightarrow 2, 8, 3$ means valency $\rightarrow 3$.

B $\rightarrow 2, 6$ means valency $= 8 - 6 = 2$



Q6) Ans:- 1

Solution:- X = $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2$, valency = 2

Y = $1s^2 2s^2 2p^6 3s^2 3p^5$, valency $= 8 - 7 = 1$.



Q7) Ans:- 4.

Solution:- Sulphur exhibits variable valency $\rightarrow 2, 4 \text{ \& } 6$.

Q8) Ans:- 3.

Solution:- Short period means 2nd & 3rd

In 2nd & 3rd periods the valency 1st increases then decreases

Q9) Ans:- 4.

Solution:- Potassium sulphide (K_2S), Electrovalency of K = 1, S = 2

Sodium Bromide ($NaBr$), Na = 1, Br = 1, MgO, Mg = 2, O = 2

Aluminium nitride (AlN), Al = 3, N = 3

Q10) Ans:- 4.

Solution:- $RbBr$, $Rb^+ = 36$, $Br^- = 36$ (Isoelectronic)

$NaCl$, $Na^+ = 10$, $Cl^- = 18$

KBr , $K^+ = 18$, $Br^- = 36$.

LiF , $Li^+ = 2$, $F^- = 10$.

JEE Advanced Level Questions

Q11) Ans:- 1, 2.

Solution:- Common 81 group valency means

No. of v.e- till group number 4.

8- No. of valence e- after group number 4.

Q12) Ans:- 1, 2.

Solution:- Hydrogen $\rightarrow 1s^1$ $\rightarrow$ it will try to get the Configuration by gaining electron.

Lithium $\rightarrow 1s^2 2s^1$ $\rightarrow$ It will try to lose one electron.

Q13) Ans:- 1

Solution:- $Al = 13 \rightarrow 1s^2 2s^2 2p^6 \underline{3s^2 3p^1}$ (3 outer most e-)
.Al.

Q14) Ans:- 2.

Solution:-

Elements which lose electron are electropositive.

Elements which gain electron are electronegative.

Q15) Ans:- 1

Solution:- The electrovalency of an element equals the no. of electrons lost or gained by an atom during the formation of an ionic bond.

Q16) Ans:- 2.

Solution:- $\text{Mg} (Z=12) \rightarrow 1s^2 2s^2 2p^6 3s^2$

Valency = No. of outermost $e^- = 2$

Matrix Matching

Q17) Ans:- a) 2 b) 1 c) 4 d) 3.

Solution:-

a) Neon $\rightarrow$ 2) $:\ddot{\text{Ne}}:$

b) Nitrogen $\rightarrow$ 1) $\cdot\ddot{\text{N}}\cdot$

c) Boron $\rightarrow$ 4) $\cdot\text{B}\cdot$

d) Beryllium $\rightarrow$ 3) $\text{Be}:$

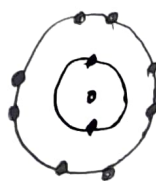
Integer Type.

Q18) Ans:- 10

Solution:- In a neutral atom

No. of $e^- = \text{No. of 'p'} = 'Z'$

Total no. of $e^- = 10$.



Q19) Ans:- 1

Solution:- $\text{Li} (Z=3) \rightarrow 1s^2 2s^1 \rightarrow \text{valency} = 1$.

Learner's Task.

Q1) Ans:- 1

Solution:- Combining capacity of an element is called Valency.

Q2) Ans:- 1

Solution:- For Noble gas, outmost shell fully filled.

Q3) Ans:- 4

Solution:- Valency generally express as combining capacity of an element.

Q4) Ans:- 2.

Solution:- Valency is according to valence shell configuration

For $Z=7 \rightarrow 1s^2 2s^2 2p^3$

maximum valency = 5.

Q5) Ans:- 3

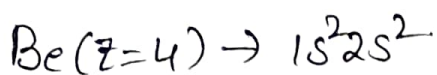
Solution:- In H_2SO_4 , sulphur for 6 covalent bonds with neighbour's. So Sulphur valency = 6.

Q6) Ans:- 2

Solution:- Sulphur in VI-A group. So, it will have a maximum covalency of '6'.

Q7) Ans:- 4.

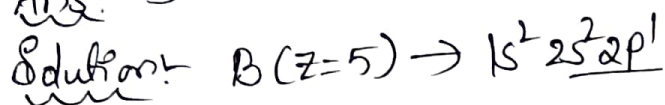
Solution:- Duplet configuration means 2 electrons.



Q8) Ans:- 1

Solution:- In Lewis structure, valence electrons are represented by dots.

Q9) Ans:- 3.



Q10) Ans:- 2.

Solution:- The Lewis dot structure represents valence electrons of an atom using dots around the element's symbol. It helps in understanding bonding capabilities.

JEE Main Level Questions

Q1) Ans:- 4

Solution:- Lewis electron dot diagrams only show electrons in the outermost orbital of an atom because only outer shell electrons can be involved in chemical bonds.

Q2) Ans:- 1.

Solution:- In H-Cl

H attains He Configuration.

Cl attains Ar Configuration.

Q3) Ans:- 4.

Solution:- $\cdot \ddot{X} \cdot \rightarrow 6$ valence electrons

$O(Z=8) \rightarrow 1s^2 2s^2 2p^4 \rightarrow 6$ valence electrons

Q4) Ans:- 1

Solution:- $Li(Z=3) \rightarrow Li \cdot$
 $\downarrow$
 $1s^2 2s^1$

Q5) Ans:- 2

Solution:- $\cdot \ddot{X} \cdot$

$Al(Z=13) \rightarrow 1s^2 2s^2 2p^6 3s^2 3p^1 \rightarrow \cdot \ddot{Al} \cdot$

Q6) Ans:- 1

Solution:- $Br(Z=35) \rightarrow 1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$

7 outermost electrons

$:\ddot{Br} \cdot$

Q7) Ans:- 2.

Solution:- The formula of the stable fluoride ion, if stability were attained with 6 e^- rather than 8 e^- , would be F^+ .

Q81

Ans:- 4.

Solution:-

- Chemical bond involves both attractive & repulsive forces
- The Electronic Theory of valency explains that atoms combine to complete their valence shell.
- Group 18 elements valency zero.

Q91

Ans:- 2.

Solution:- $B (Z=5) \rightarrow 1s^2 2s^2 2p^1 \rightarrow \cdot \dot{B} \cdot$

Q101

Ans:- 2.

Solution:- $O (Z=8)$

$$O^{2-} = 8 + 2 = 10$$

$1s^2 2s^2 2p^6 \rightarrow$ '8' valence electrons.

JEE Advanced Level Questions

Q111

Ans:- 3, 4.

Solution:-

Valency of Be, Mg = 2

Valency of Na = 1.

Valency of Li = 1, Mg = 2

Valency of He = 2, Cl = 1.

Q121

Ans:- 1, 2, 3, 4.

Solution:- No. of e^- transferred or shared is called Covalency.

Covalency of C = 4, Covalency of Na = 1.

Q13) Ans:- 1

Solution:- Valency is the combining capacity, same group have the same combining capacity.

Q14) Ans:- 2

Solution:- Valency of $H=1s^1 \rightarrow 1$.

Valency of $Na=1s^2 2s^2 2p^6 3s^1 \rightarrow 1$.

Q15) Ans:- 1, 2.

Solution:- Valency is

No. of valence e^- till group 4.

18 - no. of valence e^- after group number 4.

Q16) Ans:- 1

Solution:- Mg & Ca belongs to IIA group. So valency = 2

Matrix Matching

Q15) Ans:- a) 2 b) 1 c) 4 d) 3.

Solution:-

Atomic Number

Valency.

a) 10 ($1s^2 2s^2 2p^6$) $\rightarrow$ 2) 0

b) 13 ($1s^2 2s^2 2p^6 3s^2 3p^1$) $\rightarrow$ 1) 3

c) 8 ($1s^2 2s^2 2p^4$) $\rightarrow$ 4) $8-6=2$

d) 29

$1s^2 2s^2 2p^6 3s^2 3p^6 4s^1 3d^{10} \rightarrow$ 3) 1

Integer Type.

Q16) Ans:- 1

Solution:- Cl ($Z=17$) $\rightarrow 1s^2 2s^2 2p^6 3s^2 3p^5$

$$\text{Valency} = 8 - 7 = 1.$$

Q17) Ans:- 6.

Solution:- Mn has multiple valencies 2, 3, 4, 5, 6 & 7.