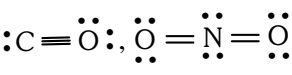
Lewis theory and formal charge

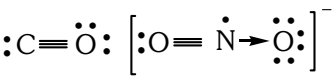
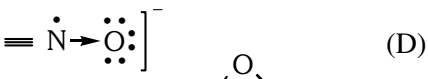
1. In ammonium ion, bond in between ammonia molecule and a proton is form by–

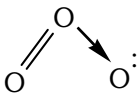
(A) Complete transfer of electron from NH_3 to H^+ (B) electrostatic attraction between NH_4^+ & H^+

(C) equal contribution of electrons by NH_3 & H^+ (D) One sided sharing of electrons

2. The correct structure of CO and NO_2^- are–

(A)  (B) 

(C)  (D) 

3. Lewis structure of O_3 is drawn as  : therefore formal charge on oxygen atoms are–

(A) 0, 0, 0 (B) 0, +1, –1 (C) 0, +1, +1 (D) –1, +1, –1

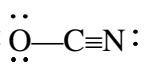
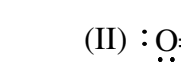
Paragraph for Q.4 to Q.5

The formal charge of an atom in a polyatomic molecule or ion may be defined as the difference between the number of valence electrons of that atom in an isolated or free state and the number of electrons assigned to that atom in the Lewis structure. It is

expressed as :

$$\boxed{\text{Formal charge [F.C.] on an atom in a Lewis structure}} = \left[\text{total number of valence electron in the free atom}\right] - \left[\text{total number of non bonding (lone pair) electrons}\right] - (1/2)\left[\text{total number of bonding shared electrons}\right]$$

4. Find the formal charge on "O" atom in given structure (I) & (II) respectively :

(I)  (II) 

(A) –1, –1 (B) –2, 0 (C) –1, 0 (D) 0, –1

5. Select correct about CO_3^{2-} carbonate ion in one of the lewis structure based on the presence of two single bonds and one double bond between carbon and oxygen atoms :

(A) Total number of lone pair = 8

(B) Formal charge on two oxygen = –1 and one oxygen = zero

(C) Oxidation number of C = +4 & Formal charge on C = zero

(D) All are correct

6. The Lewis theory does not account for the–

(A) cause of bond formation (B) Shape of molecules

(C) Strength of chemical bond (D) All

7. Draw the Lewis structure and find Formal charge of each atom:

1.	CO	2.	CO_2	3.	NO_2^-	4.	NO_3^-	5.	CCl_3^-	6.	$COCl_2$
7.	N_3^-	8.	O_3	9.	CH_3Cl	10.	NH_4^+	11.	NH_2Cl	12.	OCN^-
13.	CN^-	14.	SCN^-	15.	HCN	16.	HNC	17.	SiF_4	18.	$SnCl_3^-$

19.	BF_4^-	20.	BH_4^-	21.	BeF_4^{2-}	22.	H_3O^+	23.	SO_3	24.	SO_2
25.	CO_3^{2-}	26.	NO_2Cl	27.	NOCl	28.	F_2O	29.	SO_4^{2-}	30.	PO_4^{3-}
31.	SF_2	32.	CF_4	33.	PF_5	34.	PF_4^+	35.	PCl_3	36.	PCl_5
37.	SI_2	38.	SF_6	39.	SO_4^{2-}	40.	$POCl_3$	41.	ClO_4^-	42.	OF_2
44.	NO_3^-	45.	ClO_4^-	46.	PCl_4^+	47.	I_3^+	48.	ClO_3^-	49.	OCl_2
50.	$SnCl_3^-$	51.	HPO_3^{2-}	52.	SO_3^{2-}	53.	IO_3^-	54.	XeO_3	55.	NO_2^-

8. Which of the following species does not obey octet rule ?

(A) SiF_4 (B) PCl_5 (C) ICl (D) BF_4

9. Hypervalent compound is(are) :

(A) SO_3 (B) PO_4^{-3} (C) SO_4^{-2} (D) All of these

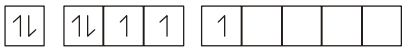
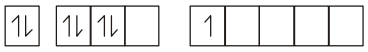
10. The octet rule is not valid for the molecule :

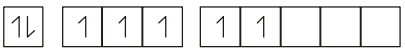
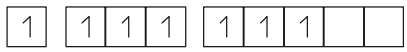
(A) CO_2 (B) H_2O (C) SF_2 (D) $Al_2(CH_3)_6$

11. In which of the excitation state of chlorine ClF_3 is formed

(A) In ground state (B) In triple excited state (C) In single excited state (D) In double excited state

12. Which of the following configuration shows second excitation state of Iodine

(A)  (B) 

(C)  (D) 

13. Highest extent of variable covalency is exhibited by.

(A) P and S (B) N and O (C) N and P (D) F and Cl

14. Which of the following species are hypervalent ?

(I) ClO_4^- (II) BF_3 (III) SO_4^{-2} (IV) CO_3^{-2}

(A) I, II, III (B) I, III (C) III, IV (D) I, III, IV

15. Find the number of isoelectronic species from the following having 14 electrons.

Mg^{2+} , Na^+, N^{3-} , S^{2-} , K^+, CN^- , N_2 , NO^+, PH_3, P^+

VBT based questions

16. A sigma bond is formed by the overlapping of

(A) s-s orbital alone (B) s and p orbitals alone

(C) s–s, s–p or p–p orbitals along internuclear axis (D) p–p orbital along the sides

17. Which overlapping is involved in HCl molecule

(A) s–s overlap (B) p–p overlap (C) s–d overlap (D) s–p overlap

18. Which of the following bonds will have directional character

(A) Ionic bond (B) Metallic bond (C) Covalent bond (D) Both covalent & metallic

19. Which of the following compound is formed in the second excitation state of sulphur atom :

(A) SF_4 (B) SF_6 (C) SF_2 (D) None

Similar questions belongs to NCERT Text Book

Excercise - 4.13, 4.19, 4.22, 4.23, 4.25, 4.26

Answers

RACE # 12

1. (D) **2.** (B) **3.** (B) **4.** (C) **5.** (D) **6.** (D) **8.** (B) **9.** (D) **10.** (C) **11.** (C)
12. (C) **13.** (A) **14.** (4) **15.** (3) **16.** (C) **17.** (D) **18.** (C) **19.** (A)