

Test bank chapter (9)

Choose the most correct answer

1. What are the two types of chemical bonds commonly found in compounds ?
 - a) ionic and covalent.
 - b) ionic and electrolytic.
 - c) **ionic and covalent.**
 - d) electrolytic and compound.

2. Which type of electrons are used by atoms to form chemical bonds ?
 - a) core electrons.
 - b) **valence electrons.**
 - c) lone pair electrons.
 - d) unpaired electrons.

3. What is the statement of "Atoms tend to gain, lose, or share electrons until they are surrounded by eight valence electrons" called ?
 - a) the rule of octaves.
 - b) the double quartet rule.
 - c) the eight electron rule.
 - d) **the octet rule.**

4. What type of orbital will lose the electron first when a transition metal atom becomes a +ve ion?
 - a) p
 - b) f
 - c) d
 - d) **s**

5. What type of bonds does a molecule of CS₂ contain ?
 - a) two single bonds.
 - b) **two double bonds.**
 - c) one single bond and one double bond.
 - d) one single bond and one triple bond.

6. What is the correct electron-dot structure of an atom with atomic number Z= 5 in the ground state? **ANS. B**

- (A) $\cdot\overset{\cdot}{\underset{\cdot}{\text{X}}}\cdot$
- (B) $\overset{\cdot}{\underset{\cdot}{\text{X}}}\cdot$
- (C) $\cdot\overset{\cdot}{\underset{\cdot}{\text{X}}}\cdot$
- (D) $\overset{\cdot}{\underset{\cdot}{\text{X}}}\cdot$

7. Which compound below contains an atom that is surrounded by more than an octet of electrons?

- a) **PF₅**
- b) CH₄
- c) NBr₃
- d) OF₂

8. Which choice below correctly lists the elements in order of increasing electronegativity?

- a) **C < N < O < F**
- b) N < C < O < F
- c) N < C < F < O
- d) C < N < F < O

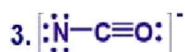
9. Which atom sometimes violates the octet rule?

- a) C
- b) N
- c) O
- d) **S**

10. How many resonance structures can be drawn for NO₃⁻?

- a) 1
- b) 2
- c) **3**
- d) 4

11. Considering formal charge, what is the preferred Lewis structure of NCO⁻? **ANS.3**



12. What is the correct formal charge on sulfur (S) in Lewis structure of (SO₄²⁻) that satisfy the octet rule?

- a) **+2**
- b) -2
- c) +1
- d) 0

13. What is the correct formal charge on sulfur (S) in the favorable Lewis structure of (SO₄²⁻) ?

- a) +2
- b) -2
- c) +1
- d) **0**

Chemical Bonding I: Basic Concepts

14. Which of these pairs of elements would be most likely to form an ionic compound?

- a) Cl and I
- b) Al and K
- c) Cl and Mg
- d) C and S

15. Which of these covalent bonds is the most polar (i.e., highest percent ionic character)?

- a) Al—I
- b) Si—I
- c) Al—Cl
- d) Si—Cl

15. which of these structures is the correct Lewis structure for CS₂ ? **ANS.c**

- a) $\overset{\cdot\cdot}{\text{C}}=\overset{\cdot\cdot}{\text{S}}-\overset{\cdot\cdot}{\text{S}}$
- b) $\overset{\cdot\cdot}{\text{S}}-\overset{\cdot\cdot}{\text{C}}-\overset{\cdot\cdot}{\text{S}}$
- c) $\overset{\cdot\cdot}{\text{S}}=\text{C}=\overset{\cdot\cdot}{\text{S}}$
- d) $\overset{\cdot\cdot}{\text{S}}=\overset{\cdot\cdot}{\text{C}}-\overset{\cdot\cdot}{\text{S}}$

16. How many lone pairs in the N₂ molecule are there?

- a) 1
- b) 2
- c) 3
- d) 4

17. Classify the O-H bond in CH₃OH as ionic, polar covalent, or nonpolar covalent?

- a) Ionic
- b) polar covalent
- c) nonpolar covalent

18. How many single bond(s), double bond(s) and lone pair(s) are there in Lewis structure for a chlorate ion, ClO₃⁻?

- a) 2, 1, 10
- b) 3, 0, 9
- c) 2, 1, 8
- d) 3, 0, 10

19. How many resonance structures are there for the sulfur dioxide molecule that satisfy the octet rule ?

- a) 1
- b) 2
- c) 3
- d) none of these.

20. What is the formal charge on the oxygen atom in N₂O (the atomic order is N-N-O)?
- 0
 - +1
 - 1**
 - 2
21. Which of these substances will display an incomplete octet in its Lewis structure?
- CO₂
 - Cl₂
 - ICl
 - NO**
22. How many paired and unpaired electrons are there in the Lewis symbol for a phosphorus atom?
- 4, 2
 - 2, 4
 - 4, 3
 - 2, 3**

Explanation: Read the question carefully here, you are being asked for how many valence electrons are paired and how many are unpaired. The abbreviated electron configuration of the P atom is given by [Ne] 3s²3p³. The outermost electrons would be arranged as 2 electrons paired and 3 electrons unpaired as shown below:



23. What is the most likely forms of magnesium ion based on the octet rule?
- Mg²⁺**
 - Mg²⁻
 - Mg⁶⁺
 - Mg⁶⁻

Explanation: According to the octet rule the Mg atom will achieve an octet by losing its 2 outermost electrons and thus gaining 2+ charges. Since Mg is located in the alkali metal group it will lose electrons rather than gaining them.

24. What is most likely forms of phosphorus ion based on the octet rule?
- P³⁺
 - P⁵⁻
 - P⁵⁺
 - P³⁻**

Explanation: According to the octet rule the phosphorus atom should gain 3 electrons, thus gaining 3 negative charges and forming the phosphide ion.

25- What is the only noble gas without eight valence electrons ?

- a) Ar
- b) Ne
- c) He
- d) Kr

Explanation: The noble gases are characterized by the presence of eight electrons in their outermost shell with one notable exception of Helium. Since He has only 2 electrons it can never have 8 in its outermost shell.

26- What is the maximum number of double bonds that a hydrogen atom can form?

- a) 0
- b) 1
- c) 2
- d) 3

Explanation: Each hydrogen atom has a single electron in its valence shell and as a result can form only one bond. It cannot form a double bond as it does not have the necessary electrons to share.

28. What is the maximum number of double bonds that a carbon atom can form?

- a) 4
- b) 1
- c) 2
- d) 0

Explanation: Each carbon atom has 4 valence electrons that it can share with other atoms. Since each double bond corresponds to a pair of electrons, the carbon atom can form only 2 double bonds.

29. Given the electronegativities below, which covalent single bond is most polar?

Atom	H	C	N	O
Electronegativity	2.1	2.5	3.0	3.5

- a) C-H
- b) N-H
- c) O-H
- d) O-N

Explanation: Bond polarity can be judged based on the differences between the electronegativities of the atoms involved. Of the available choices, the bond between O and H will have the largest electronegativity difference making it the most polar bond in this group.

30. How many valence electrons does the ICl_4^- ion have?

- a) 34
- b) 36
- c) 35
- d) 28

Explanation: valence electrons $A = (7 \times 1) + (7 \times 1) + 1 = 36$

- 31-What is the trend of the electronegativity from left to right within a period and from top to bottom within a group?
- a) decreases, increases
 - b) increases, increases
 - c) stays the same, increases
 - d) **increases, decreases**
32. How many nonbonding and bonding electron pairs in the central phosphorus atom are there in Lewis structure of PF_3 ?
- a) 2, 2
 - b) **1, 3**
 - c) 3, 1
 - d) 1, 2
33. Which of the following molecules contains both ionic and covalent bonds?
- a) C_5H_{12}
 - b) **NaClO_4**
 - c) CaCl_2
 - d) H_2O
34. What is the term of the ability of an atom in a molecule to attract electron density to itself ?
- a) **Electronegativity**
 - b) Electron affinity
 - c) Diamagnetism
 - d) Ionization energy
- 35-Which one of the below is the most polar bond ?
- a) Br-H
 - b) I-H
 - c) **Cl-H**
 - d) H-H