Test bank chapter (9)

Choose the most correct answer

1. The two types of chemical bonds commonly found in compounds are:

a) doric and covalent.
b) ionic and electrolytic.
c) **ionic and covalent.**
d) electrolytic and compound.

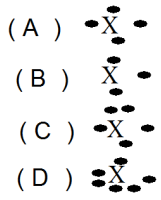
2. The electrons used by atoms to form chemical bonds are the:
a) core electrons.
b) valence electrons.
c) lone pair electrons.
d) unpaired electrons.

3. “Atoms tend to gain, lose, or share electrons until they are surrounded by eight valence electrons” is a statement of:
a) the rule of octaves.
b) the double quartet rule.
c) the eight electron rule.
d) the octet rule.

4. When a transition metal atom becomes a +1 ion, the electron lost usually comes from what type of orbital?
a) p
b) f
c) d
d) s

5. A molecule of CS_2 contains
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. An atom in the ground state has atomic number Z=5. Choose the correct electron-dot structure which represents this atom? **ANS. B**



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

a) PF_5
b) CH_4
c) NBr_3
d) OF_2

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

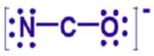
9. Which atom sometimes violates the octet rule?

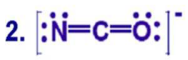
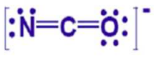
a) C
b) N
c) O
d) S

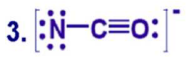
10. How many resonance structures can be drawn for NO^{3-}?

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

11. Considering formal charge, what is the preferred Lewis structure of NCO^-? ANS.1

1. 
4. 

2. 
5. 

3. 

12. In Lewis structure of $(SO4)^{-2}$structure the correct formal charge on sulfur (S) is:

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

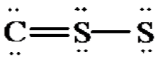
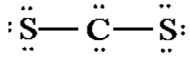
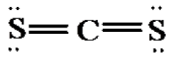
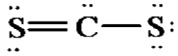
13. Which of these pairs of elements would be most likely to form an ionic compound?

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

14. 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. The Lewis structure for CS_2 is: ANS. c

a) 
b) 
c) 
d) 

16. The number of lone electron pairs in the N_2 molecule is ___.

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

17. Classify the O-H bond in CH_3OH as ionic, polar covalent, or nonpolar covalent.

a) Ionic
b) polar covalent
c) nonpolar covalent
d) none of the above

18. The Lewis structure for a chlorate ion, ClO_3^{-1}, should show ____ single bond(s), ____ double bond(s), and ____ lone pair(s).

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

19. The number of resonance structures for the sulfur dioxide (SO_2) molecule that satisfy the octet rule is

a) 1
b) 2
c) 3
d) None of these.

20. What is the formal charge on the oxygen atom in N_2O (the atomic order is N-N-O)?

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

21. Which of these substances will display an incomplete octet in its Lewis structure?

a) CO_2
b) Cl_2
c) ICl
d) NO

22. There are _____ paired and _____ unpaired electrons in the Lewis symbol for a phosphorus atom (P).

a) 4, 2
b) 2, 4
c) 4, 3
d) 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] $3s^2 3p^3$. The outermost electrons would be arranged as 2 electrons paired and 3 electrons unpaired as shown below:

23. Based on the octet rule, magnesium (Mg) most likely forms a _____ ion.

a) Mg^{2-}
b) Mg^{2+}
c) Mg^{6-}
d) Mg^{6+}

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. Based on the octet rule, phosphorus (P) most likely forms a _____ ion.

a) P^{3+}
b) P^{5-}
c) P^{5+}
d) P^{3-}

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

25- The only noble gas without eight valence electrons is _____.

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 (H) 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 (C) 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. The ion ICl_4^- has _____ valence electrons.

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

Explanation: valence electrons A = (7×1) +(7×1) +1 = 36

31- 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**

Explanation: Atomic size decreases from the left to the right in a period thus making it easier for the nuclei to attract electrons towards themselves resulting in an increase in the electronegativity. On the other hand atomic size increases down a group making it harder for the nuclei to attract the valence electrons towards themselves resulting in a decrease in electronegativity.

32. The Lewis structure of PF_3 shows that the central phosphorus atom has ___nonbonding and__ bonding electron pairs.

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. The ability of an atom in a molecule to attract electron density to itself is termed

a) Electronegativity
b) Electron affinity
c) Diamagnetism
d) Ionization energy

35- the most polar bond is

a) Br-H
b) I-H
c) Cl-H
d) H-H