

Exam Chapter 8-9 Exam D

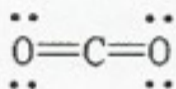
Name _____

KEY

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

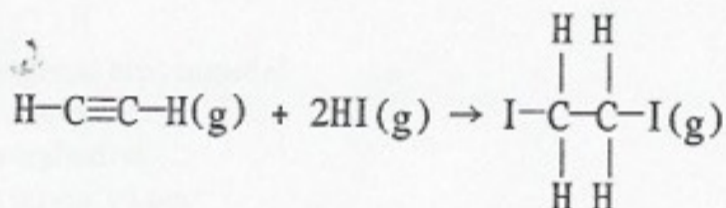
- 1) The chloride of which of the following metals should have the greatest lattice energy? 1) _____
- A) sodium
 - B) rubidium
 - C) cesium
 - D) lithium**
 - E) potassium

- 2) The formal charge on carbon in the molecule below is _____. 2) _____



- A) +3 B) +1 C) -1 D) +2 **E) 0**

- 3) Using the table of average bond energies below, the ΔH for the reaction is _____ kJ. 3) _____



Bond:	$\text{C}\equiv\text{C}$	$\text{C}-\text{C}$	$\text{H}-\text{I}$	$\text{C}-\text{I}$	$\text{C}-\text{H}$
D (kJ/mol):	839	348	299	240	413

- A) +160 **B) -217** C) -160 D) +63 E) -63

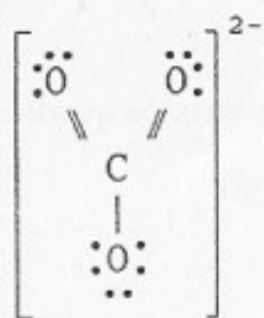
- 4) The basis of the VSEPR model of molecular bonding is _____. 4) _____

- A) electron domains in the valence shell of an atom will arrange themselves so as to minimize repulsions**
- B) regions of electron density on an atom will organize themselves so as to maximize s-character
- C) atomic orbitals of the bonding atoms must overlap for a bond to form
- D) hybrid orbitals will form as necessary to, as closely as possible, achieve spherical symmetry
- E) regions of electron density in the valence shell of an atom will arrange themselves so as to maximize overlap

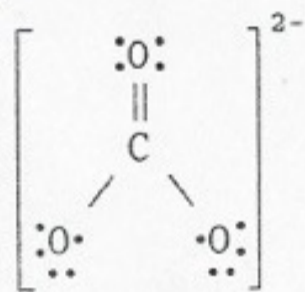
5) The Lewis structure of the CO_3^{2-} ion is _____.

5) _____

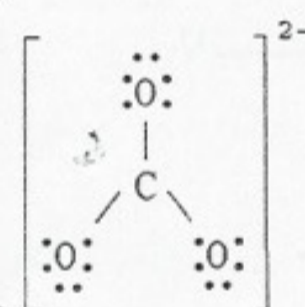
A)



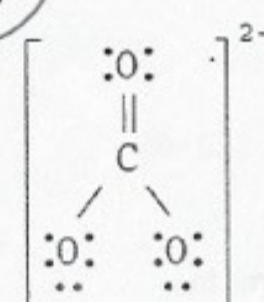
B)



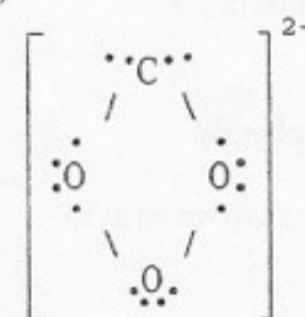
C)



D)



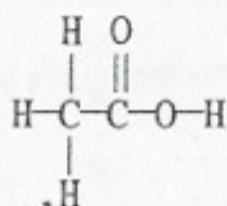
E)



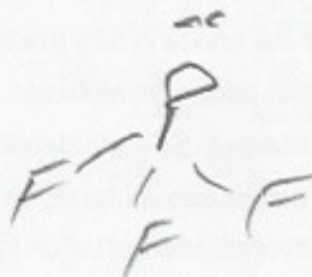
- 6) The electron-domain geometry of _____ is tetrahedral. 6) _____
- A) XeF₄
 - B) CCl₂Br₂
 - C) PH₃
 - D) CBr₄
 - E) all of the above except XeF₄

- 7) The molecular geometry of the PHCl₂ molecule is _____. 7) _____
- A) trigonal planar
 - B) T-shaped
 - C) trigonal pyramidal
 - D) tetrahedral
 - E) bent

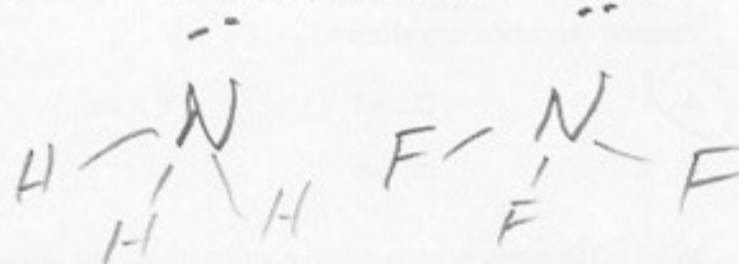
- 8) The molecular geometry of the right-most carbon in the molecule below is _____. 8) _____



- A) trigonal bipyramidal
- B) octahedral
- C) tetrahedral
- D) trigonal planar
- E) T-shaped



- 9) The molecular geometry of the PF₃ molecule is _____, and this molecule is _____. 9) _____
- A) trigonal planar, nonpolar
 - B) tetrahedral, unipolar
 - C) trigonal pyramidal, nonpolar
 - D) trigonal planar, polar
 - E) trigonal pyramidal, polar



- 10) The hybridizations of nitrogen in NF₃ and NH₃ are _____ and _____, respectively. 10) _____
- A) sp², sp³
 - B) sp², sp²
 - C) sp, sp³
 - D) sp³, sp³
 - E) sp³, sp

- 11) The hybridization of the terminal carbons in the H₂C=C=CH₂ molecule is _____. 11) _____
- A) sp³d
 - B) sp²
 - C) sp³d²
 - D) sp
 - E) sp³

In which of the following covalent bonds does hydrogen have the greatest partial positive charge (δ^+)?

12.

- A. H—C B. H—N C. H—O D. H—P E. H—S

Which one of the following binary compounds is covalent?

13.

- A. BeH₂ B. BaF₂ C. K₂S D. MgO E. NaBr

Consider the lattice energies of KCl and KI.

14.

KCl lattice energy: 701 kJ/mol

KI lattice energy: 632 kJ/mol

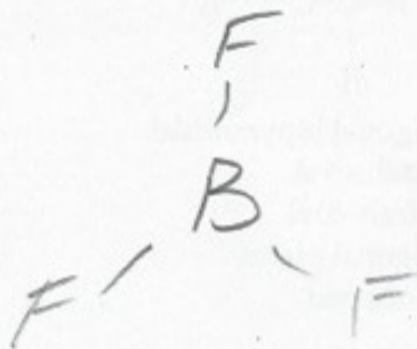
The major reason for the greater lattice energy of KCl is:

- A. The bonding in KCl is ionic; the bonding in KI is covalent.
B. The electron affinity of Cl is greater than that of I.
C. The ionization energy of Cl is less than that of I.
D. The bond dissociation energy of Cl₂ is less than that of I₂.
E. Cl⁻ is smaller than I⁻.

15.

Which one of the following statements is false? [Constitutional note: All of the fluorines in BF₃ are bonded to boron.]

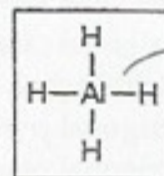
- A. All of the bonds in BF₃ are of equal length.
B. BF₃ is a pyramidal molecule.
C. The bonds in BF₃ are classified as polar covalent.
D. BF₃ has no molecular dipole moment.
E. The hybridization of boron in BF₃ is sp².



16.

What is the formal charge on aluminum in the species shown at the right? (All of the valence electrons are shown.)

- A. -1 C. +1 E. +4
B. 0 D. +3



$$3 - 4 = -1$$

17.

What is the hybridization state of aluminum in the species given in problem

- A. sp B. sp² C. sp³ D. sp³d E. sp³d²

16

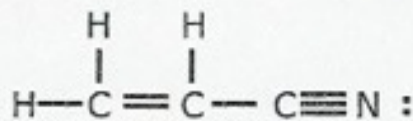
18.

The two most important factors to be considered when predicting whether a compound Y—X—Y will or will not have a dipole moment are:

- A. the shape of the molecule and the relative electronegativities of X and Y
B. the ionization energies and relative sizes of the bonded atoms
C. the electron affinities and relative sizes of the bonded atoms
D. the bond distances and bond energies of X and Y
E. the state of the molecule (solid, liquid, or gas) and the possibility of resonance

19.

The compound acrylonitrile, used in the preparation of acrylic fibers, has the Lewis structure shown. How many sigma bonds are there in acrylonitrile?



- A. 2 B. 3 C. 4 **D. 6** E. 9

20.

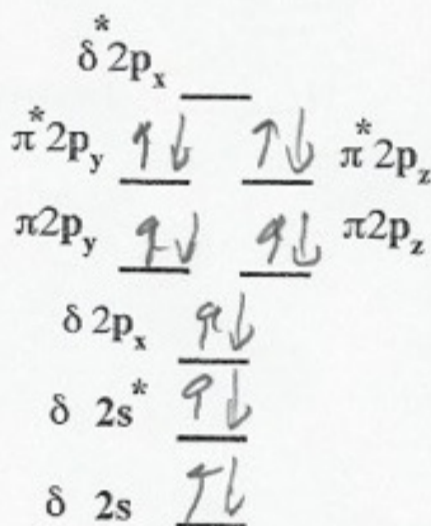
(Refer to the structure of acrylonitrile in the preceding problem.) How many pi bonds are there in acrylonitrile?

- A. 2 **B. 3** C. 4 D. 6 E. 9

21.

What is the bond order in Ne^{2+} ?

- A. 1** C. 3 E. 2.5
B. 2 D. 1.5



8
8

16
- 2
14

Bonded -
Anti Bonded

2

$$\frac{8 - 6}{2} = 1$$

