

This print-out should have 8 questions. Multiple-choice questions may continue on the next column or page – find all choices before answering. The due time is Central time.

CIC Bond type 710

10:01, general, multiple choice, < 1 min, fixed.

001

Select the set of bonds below that lists in order an ionic bond, polar covalent bond, and a nonpolar covalent bond.

1. Na — S, C — H, Br — Br **correct**
2. Br — Br, C — H, Na — S
3. Na — S, Br — Br, C — H
4. K — O, H — F, C — H
5. N — O, O — H, C — H

Explanation:

An ionic bond is formed when two substances of very different electronegativity form a bond – usually a metal and a non metal. A polar covalent bond results when two substances of low to moderate differences in electronegativity form a bond. When two of the same atoms bond, or when two atoms having the same electronegativity bond, the result is a nonpolar covalent bond (as long as neither substance is a metal.)

ChemPrin3e T03 30

12:05, basic, multiple choice, < 1 min, fixed.

002

Which of the following has bond angles of 90° , 120° , and 180° ?

1. PF_6^-
2. IF_5
3. XeF_4
4. ICl_4^-
5. SF_4 **correct**

Explanation:

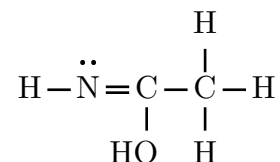
Only SF_4 has five regions of electron density around the central atom; the rest have six.

Brodbelt 8200504

13:01, general, multiple choice, < 1 min, fixed.

003

Give the hybridization of each central atom: nitrogen, middle carbon, right carbon.



1. sp , sp , sp
2. sp^2 , sp^2 , sp^2
3. sp^2 , sp^3 , sp^3
4. sp^2 , sp^2 , sp^3 **correct**
5. sp , sp^3 , sp^3
6. sp^2 , sp , sp^2
7. sp^3 , sp^3 , sp^3
8. sp^3 , sp^2 , sp^3

Explanation:

Hybridization is chosen based on the electronic geometry around the central atom, which is based on the number of RHED around the central atom. The RHED are three, three, and four.

Mlib 03 2001

12:05, general, multiple choice, > 1 min, fixed.

004

A molecule or ion with two lone pairs and three bond pairs would have what kind of molecular geometry?

1. linear
2. trigonal planar

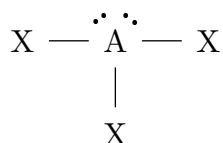
3. trigonal bipyramidal

4. V-shaped

5. T-shaped **correct**

Explanation:

HED = 5 and the electronic geometry is trigonal bipyramidal. The lone pairs prefer the equatorial positions, so the molecular geometry is T-shaped.



ChemPrin3e T03 35

12:08, general, multiple choice, < 1 min, fixed.

005

Which of the following is polar?

1. XeF₄

2. PCl₅

3. ICl₄⁻

4. SF₆

5. IF₅ **correct**

Explanation:

XeF₄ and ICl₄⁻ have 6 RHED with two RHED being lone pairs situated opposite each other so their effects cancel. Only IF₅ has an unbalanced number of lone pairs which places one of the polar I-F bonds opposite a lone pair. This unopposed dipole and the lone pair itself make it polar. The others have either 5 or 6 RHED and no lone pairs on the central atom.

Msci 08 1303

13:03, general, multiple choice, > 1 min, fixed.

006

Which of the following has only one π bond?

1. H₂CO **correct**

2. H₂O

3. HCl

4. Cl₂

5. N₂

Explanation:

White 5

13:01, basic, multiple choice, < 1 min, fixed.

007

When forming hybrid orbitals that could be used to describe covalent bonds involving S, which of the following should be considered as atomic orbitals on S that might contribute?

1. 3s, 3p, 3d **correct**

2. only 3s, 3p

3. only 3p

4. 1s, 2s, 2p, 3s, 3p, 3d

Explanation:

DAL 08 013

13:03, general, multiple choice, < 1 min, fixed.

008

In the compound C₂H₂, the bond between the two carbons formed off the axis is ? and the atomic orbitals involved in forming the bond are ?.

1. π; 2p **correct**

2. π; 1p

3. σ; sp²

4. π; sp²

5. σ; sp³

Explanation:

π bonds form off the axis, σ bonds form along the axis. Two 2p atomic orbitals overlap to form π bonds.