

## Intra-Molecular Forces (Bonding) Class MC Practice

- Which atom geometry is associated with  $sp^3d^2$  hybridization?
  - Octahedral
  - Tetrahedral
  - Linear
  - Trigonal planar
  - Trigonal bipyramidal
- What is the total number of LONE pairs of electrons in the Lewis diagram for  $SF_6$ ?
  - 7
  - 18
  - 6
  - 12
  - 36
- Which one of the following bonds would be the most polar?
  - O=O
  - Br-Br
  - O-Cl
  - N-O
  - F-H
- Which of these molecules is polar?
  - $BF_3$
  - $CO_2$
  - HF
  - $O_2$
  - $SF_6$
- What type of hybridization would you expect around the S atom in  $SF_5^-$ ?
  - $sp^3d$
  - sp
  - $sp^3d^2$
  - $sp^3$
  - $sp^2$
- Which of the following molecules is NOT linear in terms of its molecular geometry?
  - $I_2$
  - $I_3^-$
  - $CO_2$
  - $H_2O$
  - $H_2$
- Which of the following pairs have the same molecular geometry?
  - $BF_3$  and  $NH_3$
  - Carbonate ion and  $BF_3$
  - $NH_3$  and  $PF_5$
  - $PF_5$  and  $SF_6$
  - $H_2O$  and  $NH_3$

8. Which of the following is NOT trigonal planar?
- (A) Carbonate ion
  - (B) Nitrate ion
  - (C) Boron trichloride
  - (D) Phosphorus trichloride
  - (E) Sulfur trioxide
9. What is the most likely bond angle for O-S-O in  $\text{SO}_2$ ?
- (A) 120 degrees
  - (B) 109.5 degrees
  - (C) 104.5 degrees
  - (D) 107.5 degrees
  - (E) 90 degrees
10. A molecule with a central atom exhibiting  $\text{sp}^3\text{d}^2$  hybridization could have which of the following molecular geometry/geometries?
- (A) Only octahedral
  - (B) Only tetrahedral
  - (C) Only octahedral and square planar
  - (D) Octahedral, square planar and square based pyramidal
  - (E) None of the above
11. In which of the following pairs are the two items NOT correctly related?
- (A)  $\text{sp}^3$  and 109.5 degrees
  - (B) linear and 180 degrees
  - (C) octahedral and six bonded pairs
  - (D)  $\text{sp}^2$  and trigonal planar
  - (E)  $\text{sp}$  and 104.5 degrees
12. How many possible resonance structures can be drawn for the  $\text{SO}_3$  molecule?
- (A) 0
  - (B) 1
  - (C) 2
  - (D) 3
  - (E) 4
13. How many valence electrons are there in the species  $\text{CO}_3^{2-}$  ?
- (A) 2
  - (B) 3
  - (C) 22
  - (D) 24
  - (E) 20
14. Iodine is a molecular solid. What type of intermolecular bonds are present in  $\text{I}_2(\text{s})$ ?
- (A) Hydrogen
  - (B) Ionic
  - (C) Covalent
  - (D) London Dispersion
  - (E) Dipole-Dipole

15. Iodine is a molecular solid. What type of intra bonding is present in an  $I_2$  molecule?
- (A) Hydrogen
  - (B) Ionic
  - (C) Covalent
  - (D) London Dispersion
  - (E) Dipole-Dipole
16. In which of the following species would one expect to find a pi bond?
- (A)  $H_2$
  - (B)  $N_2$
  - (C)  $Cl_2$
  - (D)  $F_2$
  - (E)  $I_2$
17. At room temperature and pressure, bromine is a liquid that consists of diatomic molecules. Which statement is consistent with these observations?
- (A) Bromine is a polar molecule
  - (B) There are weak attractions between the atoms in a bromine molecule
  - (C) There are weak attractive forces between bromine molecules in liquid bromine
  - (D) Bromine is very electronegative
  - (E) Bromine's covalent bonds are weak
18. Which of the following ionic compounds would have the most covalent character?
- (A)  $NaCl$
  - (B)  $CsCl$
  - (C)  $MgCl_2$
  - (D)  $RbCl$
  - (E)  $CaCl_2$
19. Which of the following covalent species would one expect to have the greatest ionic character?
- (A)  $HF$
  - (B)  $HCl$
  - (C)  $HI$
  - (D)  $HBr$
  - (E)  $H_2$
20. What accounts for the fact that the carbonate ion exhibits carbon-oxygen bond lengths that are intermediate in length between a single carbon-oxygen bond and a double carbon-oxygen bond?
- (A) Covalent bonding
  - (B) Dative covalent bonding
  - (C) Resonance
  - (D) Expanded octets
  - (E) Electron deficiency

21. Identify the molecule that has the most polar bonds and then the molecule with the greatest dipole moment from the following list:

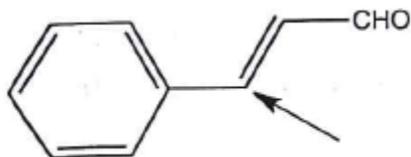


- (A)  $F_2$  most polar bonds ;  $NH_3$  greatest dipole
- (B)  $PF_5$  most polar bonds and the greatest dipole
- (C)  $PF_5$  most polar bonds ;  $CH_3I$  greatest dipole
- (D)  $NH_3$  most polar bonds and the greatest dipole
- (E)  $PF_5$  most polar bonds ;  $NH_3$  greatest dipole

22. A substance has a melting point of 1150 K. It conducts electricity while melted, but not in the solid state. This substance would be classified as \_\_\_\_\_

- (A) An ionic solid
- (B) A molecular solid
- (C) A metallic solid
- (D) A covalent network solid
- (E) A hydrogen bonding solid

23. Consider the structure for cinnamaldehyde:



What is the hybridization of the atom indicated by the arrow?

- (A)  $sp^3d^2$
- (B)  $sp^3$
- (C)  $sp^3d$
- (D)  $sp$
- (E)  $sp^2$

24. What is the molecular geometry of  $SbCl_4^-$ ?

- (A) See-saw
- (B) Bipyramid
- (C) Tetrahedral
- (D) Square planar
- (E) Tee-pee

25. How many  $\pi$  bonds are present in the molecule ethyne ( $C_2H_2$ )

- (A) 0
- (B) 4
- (C) 3
- (D) 2
- (E) 1



IntraMolecular Class MC Practice - KEY  
<http://tinyurl.com/doolan72>