Developing Spatial Reasoning Skills in General Chemistry Students

Spatial Reasoning

Section 3

17 Questions

1. Do you feel that you have a better understanding of 3-D Shapes of Molecules as a result of completing Chemistry 112?

a) No change
b) A little
c) Some
d) Quite a bit
e) Significantly

2. How important do you feel it is to have an understanding of 3-D molecular shapes while learning about chemistry?

a) Not important
b) Somewhat important
c) Very important
d) Essential

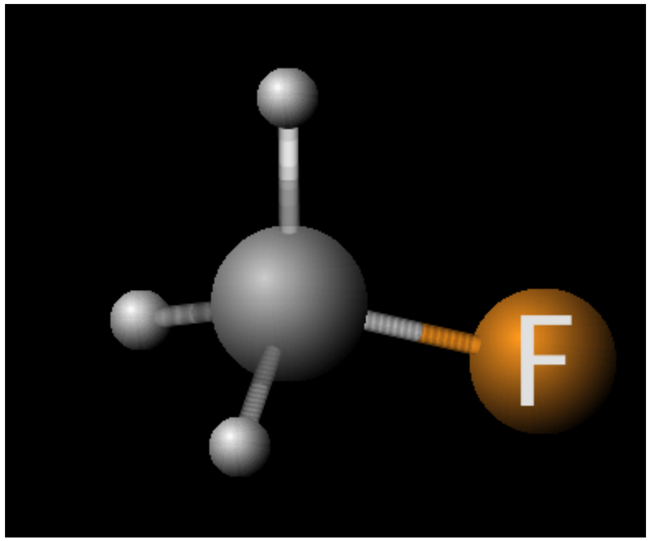
3. Which of these molecules is polar?

a) CF_4
b) C_2H_6
c) BF_3
d) NF_3
e) None of them

4. Consider the tetrahedral geometry of a molecule of carbon tetrachloride, CCl_4 . What is the *maximum* number of atoms that can lie within a symmetry plane?

a) 1 b) 2 c) 3 d) 4 e) 5

5. Does fluoromethane, CH_3F, possess a plane of symmetry?



a) yes b) no c) not sure

6. When sighting down the carbon chain of a pentane molecule, C_5H_{12}, how does it look?

a) the molecule is flat with hydrogen's extending away from the carbon atoms at 90^o

b) straight, with all carbons in a line and hydrogen atoms within the same plane

c) zig-zag, with carbon atoms alternating up and down positions and hydrogen atoms in the same plane

d) straight, with all carbons in a line and some hydrogen atoms positioned out of the plane

e) zig-zag, with carbon atoms alternating up and down positions and some hydrogen atoms positioned out of the plane

7. Does methanol, CH_3OH, possess a plane of symmetry?

a) yes b) no c) not sure

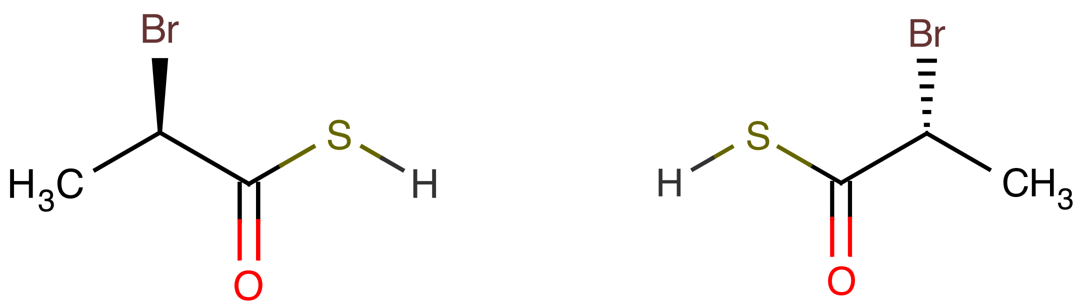
8. VSEPR Theory

Which of these molecules is NOT flat?

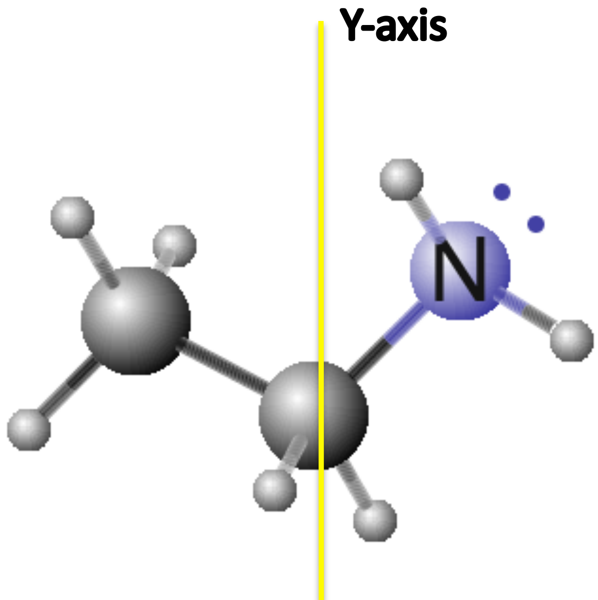
a) BH_3 c) C_2H_2 b) PF_3

d) O_3 e) none of them

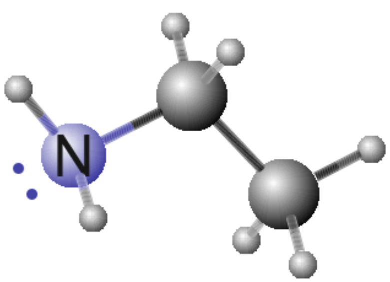
9. Are these molecules the same?



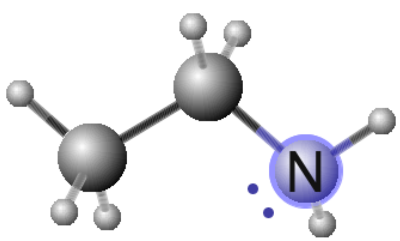
a) yes, the same
b) not the same
c) not sure



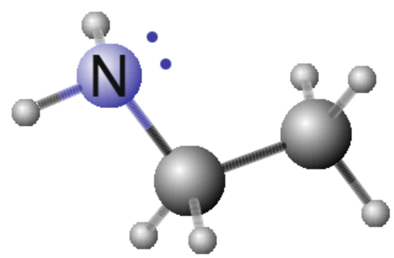
10. Consider the molecule $C_2H_5NH_2$, shown on the left. Which image matches what the molecule would look like after a 180° rotation about the Y-axis?



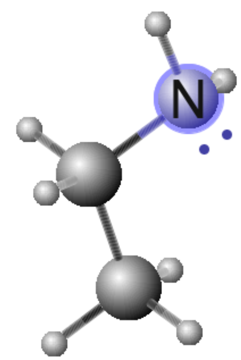
A



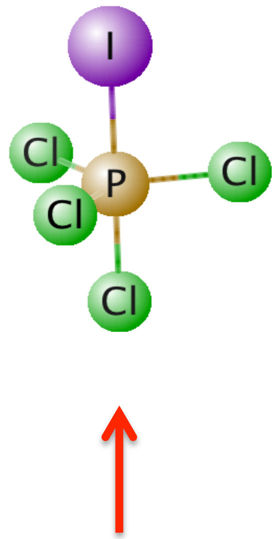
B



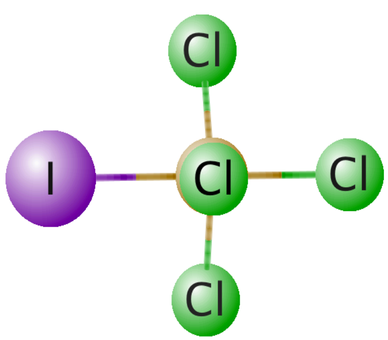
C



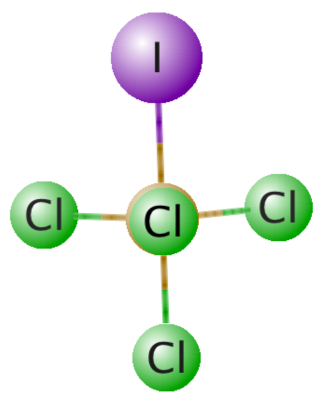
D



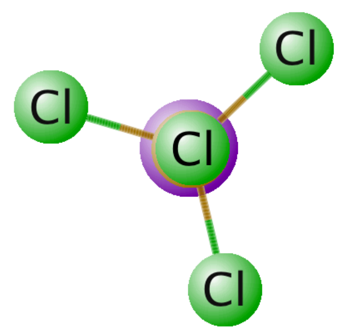
11. Consider the molecule PCl_4I, shown on the left. Which image matches what the molecule would look like viewed from the position indicated by RED arrow?



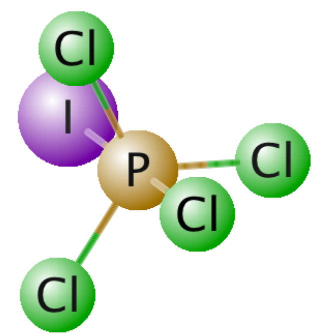
A



B

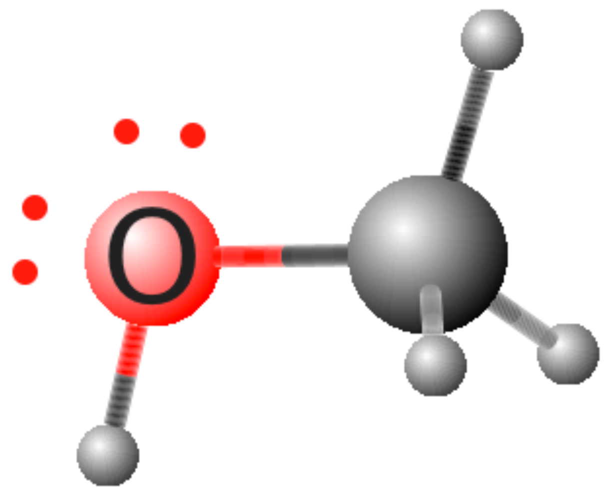


C



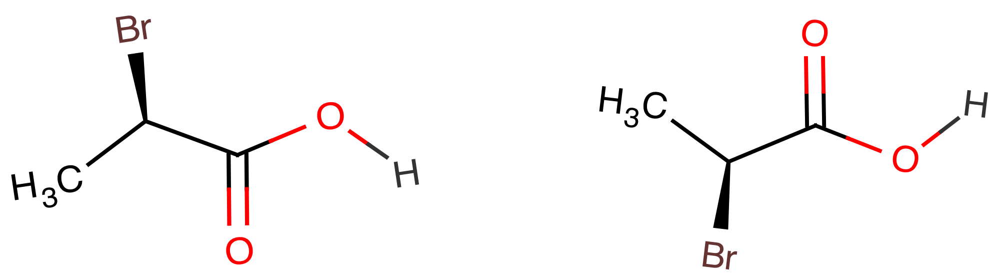
D

12. How many water molecules could hydrogen bond to **one** molecule of methanol (shown below) ?



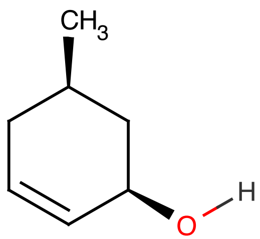
a) 1 b) 2 c) 3 d) 4 e) 5

13. Are these molecules the same?

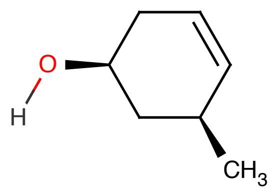


a) yes the same
b) not the same
c) not sure

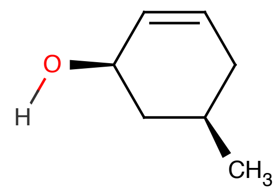
14. Which of these molecules are the same?



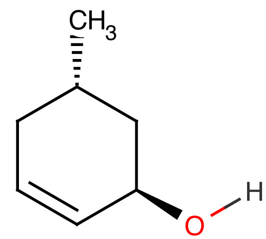
A)



B)



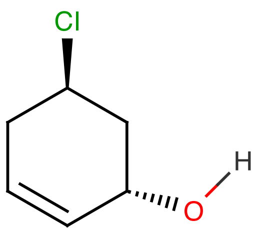
C)



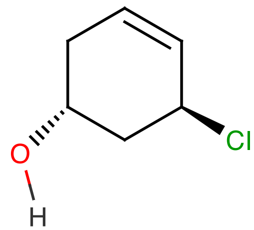
D)

a) A and B
b) A and C
c) B and C
d) B and D
e) None, they are ALL different

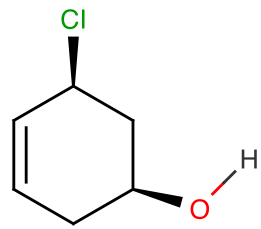
15. Which of these molecules are the same?



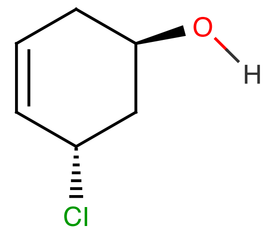
A)



B)



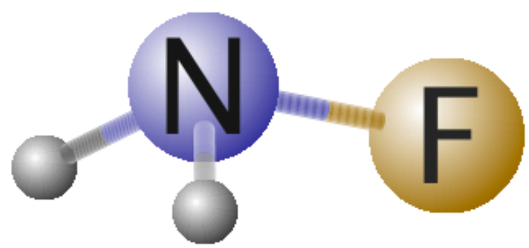
C)

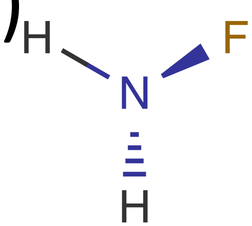


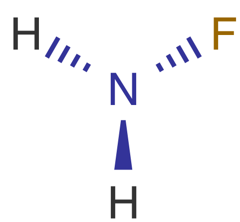
D)

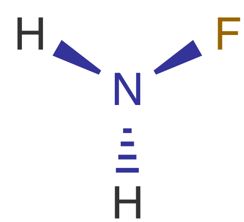
a) A and B
b) A and D
c) B and C
d) B and D
e) None, they are ALL different

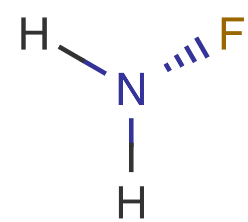
16. Which of these sketches correctly represents the molecule, NH_2F as shown below?



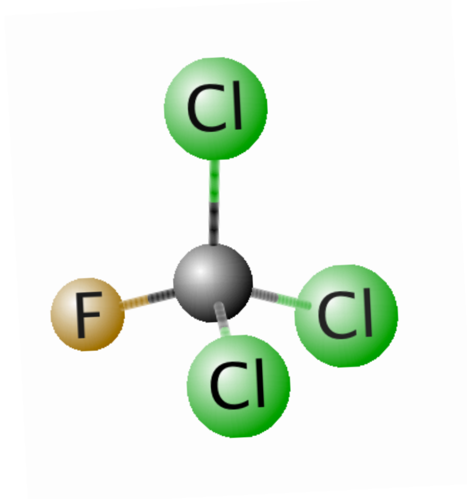
a) 

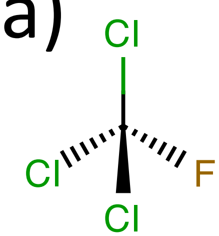
b) 

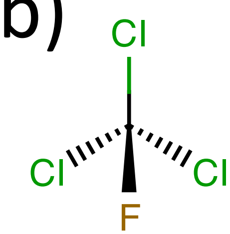
c) 

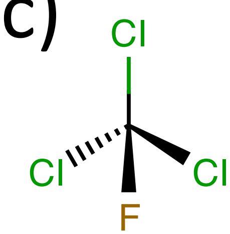
d) 

17. Which of these sketches correctly represents the molecule shown below when viewed down the F to C bond?



a) 

b) 

c) 

d)