

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

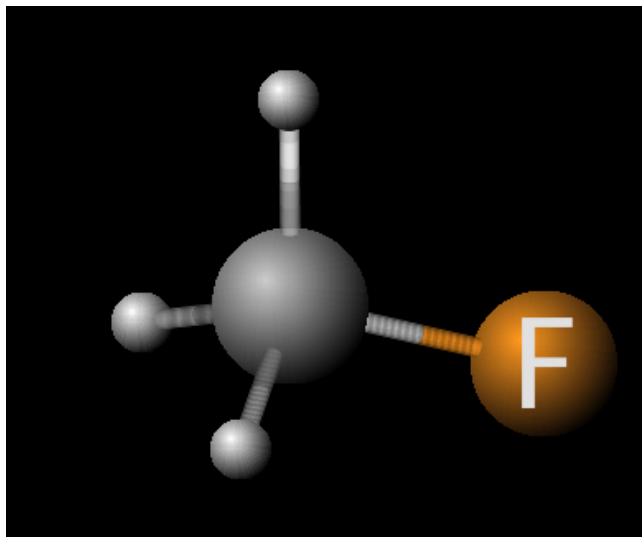
d) NF_3

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°
- 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?

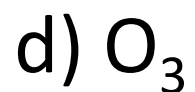
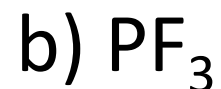
a) yes

b) no

c) not sure

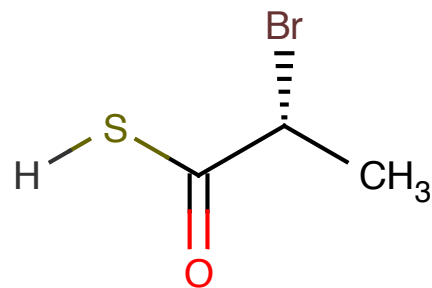
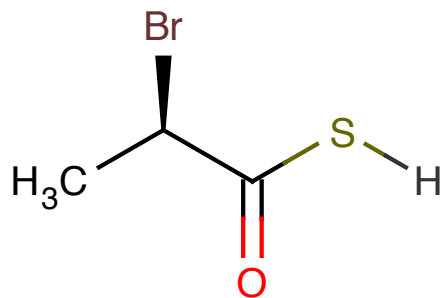
8. VSEPR Theory

Which of these molecules is NOT flat?

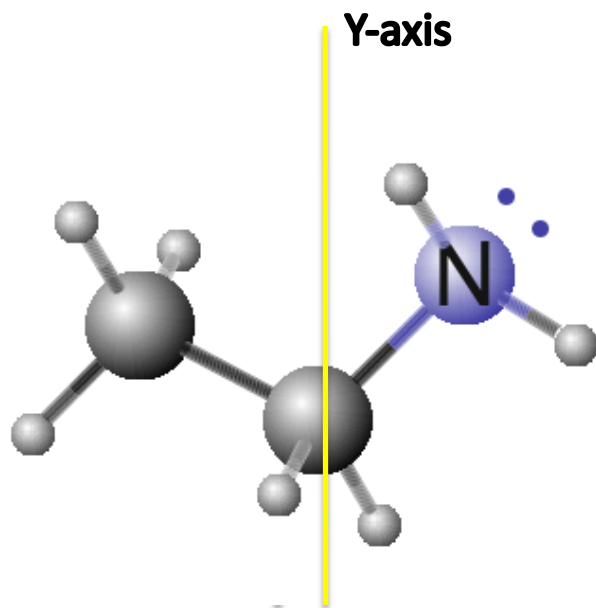


e) none of them

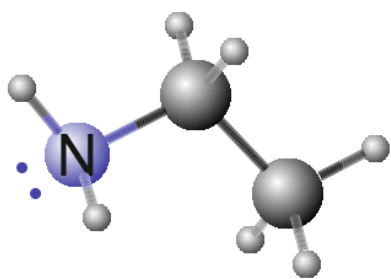
9. Are these molecules the same?



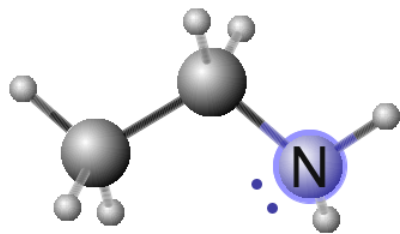
- a) yes, the same
- b) not the same
- c) not sure



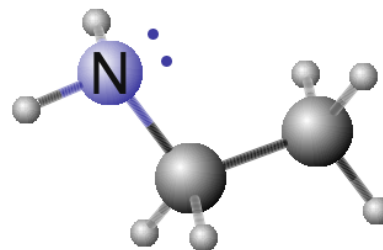
10. Consider the molecule $C_2H_5NH_2$, shown on the left. Which image matches what the molecule would look like after a 180° rotation about the Y-axis?



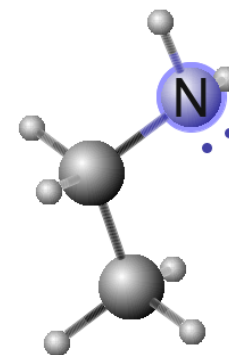
A



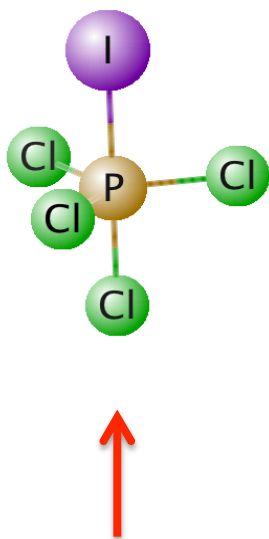
B



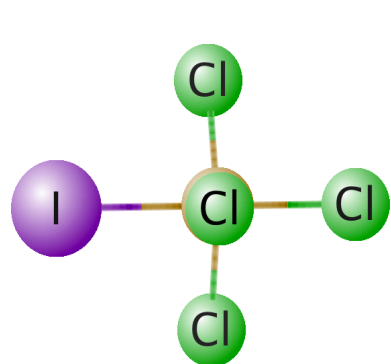
C



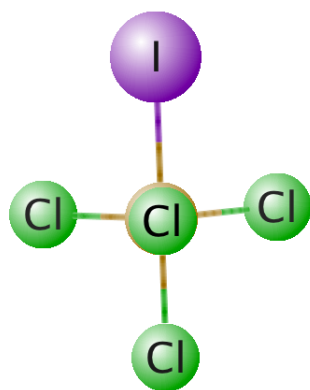
D



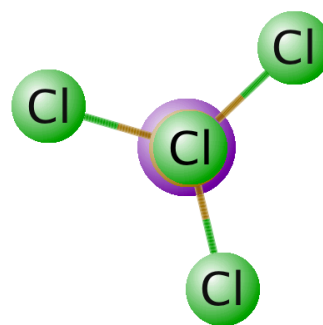
11. Consider the molecule PCl_4I , shown on the left. Which image matches what the molecule would look like viewed from the position indicated by RED arrow?



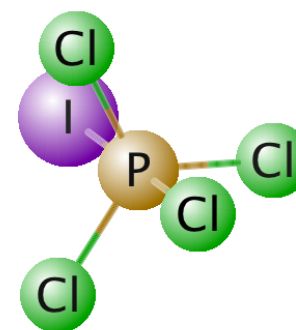
A



B

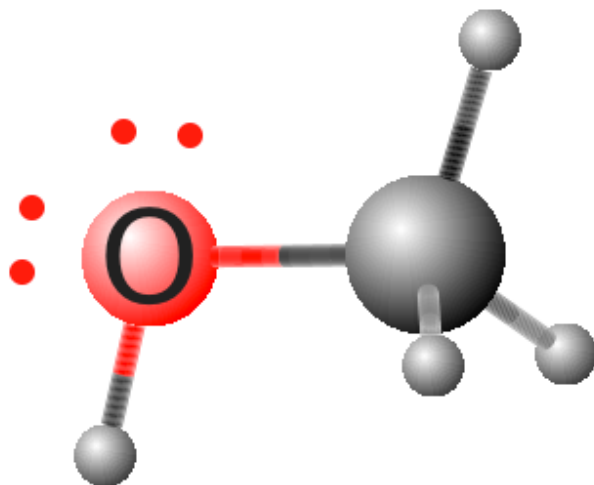


C



D

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



a) 1

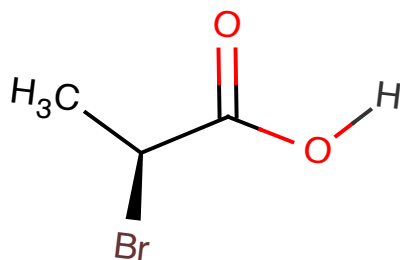
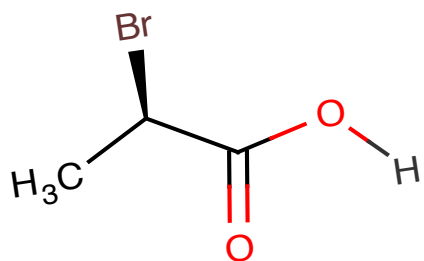
b) 2

c) 3

d) 4

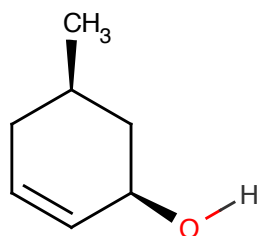
e) 5

13. Are these molecules the same?

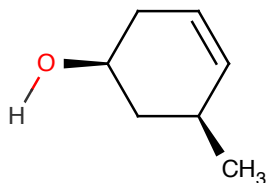


- a) yes the same
- b) not the same
- c) not sure

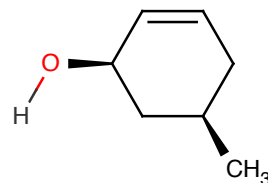
14. Which of these molecules are the same?



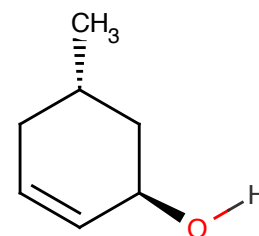
A)



B)



C)



D)

a) A and B

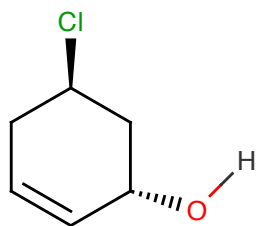
b) A and C

c) B and C

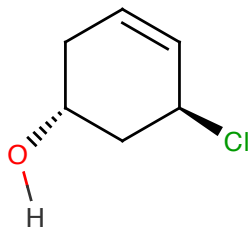
d) B and D

e) None, they are ALL different

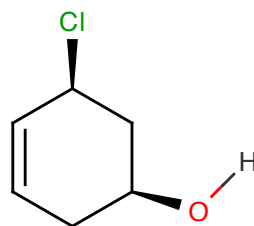
15. Which of these molecules are the same?



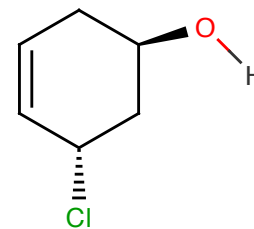
A)



B)



C)



D)

a) A and B

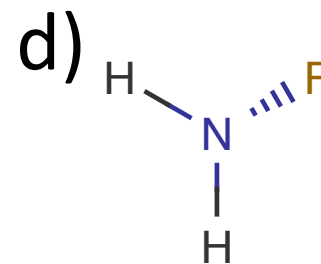
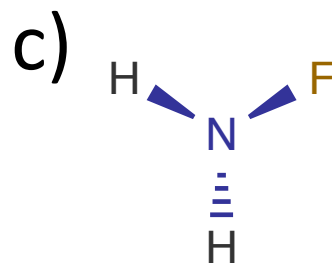
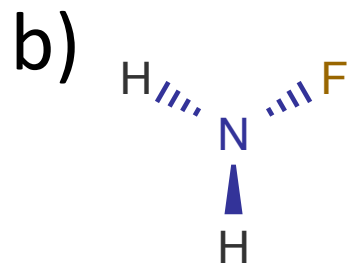
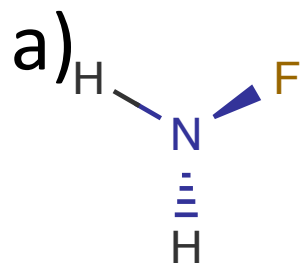
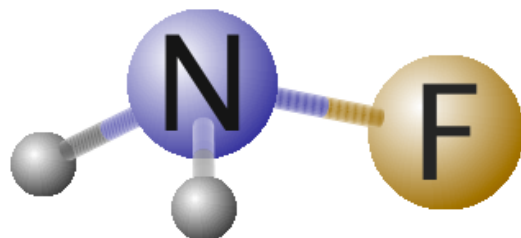
b) A and D

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?



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

