

Answer on Question #57399 - Chemistry - General chemistry

Question:

Draw the Lewis structures of BrF_5 and XeF_2 . Using VSEPR theory, predict their shapes.

Solution

1. Lewis structure of BrF_5

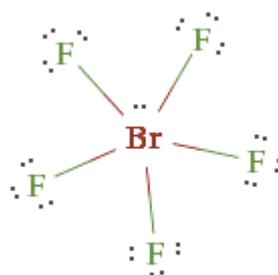
Step 1: Find valence e- for all atoms. $\text{Br}=7$; $\text{F}=7 \times 5=35$; Total=42.

Step 2: Find octet e- for each atom and add them together. $\text{Br}=1$; $2 \text{ F}=8 \times 5=40$; Total=52.

Step 3: Number of bonding electrons: $52-42=10$;

Step 4: Find number of bonds $10/2=5$ bond pairs;

Step 5: Find the number of nonbonding (lone pairs): $42-10=32=16$ lone pairs.

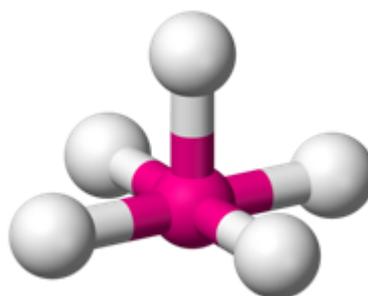


2. VSEPR shape of BrF_5

Step 1: Apply VSEPR notation, A=Number of central atoms X=Number of surrounding atoms E=Number of lone pairs on central atom.

For the above molecule VSEPR notation will be AX_5E_1

Step 2: Use VSEPR table to find the shape. AX_5E_1 has square pyramidal shape. So the shape of BrF_5 molecule is square pyramidal.



3. Lewis structure of XeF_2

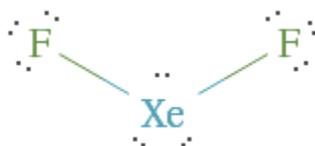
Step 1: Find valence e- for all atoms. $\text{Xe}=8$; $\text{F}=7 \times 2=14$; Total=22;

Step 2: Find octet for each atom and add them together: Xe:10; F:8x2=16; Total=26;

Step 3: Number of bonding electrons: 26-22=4.

Step 4: Find number of bonds: 4/2= 2 bond pairs;

Step 5: Find the number of nonbonding (lone pairs): 22-4 = 18=9 lone pairs.



4. VSEPR shape of XeF₂

Step 1: For the above molecule VSEPR notation will be AX₂E₃;

Step 2: Use VSEPR table to find the shape. AX₂E₃ has linear shape. So the shape of XeF₂ is linear.

