**1. Basic molecular geometries**: Insert pictures of molecules CO2, BCl3, SO2, CH4, NH3, H2O, PCl5, SF4, ClF3, SF6, BrF5, XeF4 in the table.

|  |  |  |  |
| --- | --- | --- | --- |
| steric number (hybridization and bond angle) | lone pairs | | |
| 0 | 1 | 2 |
| 2  (sp180°) | (linear) |  |  |
| 3  (sp2 120°) | (trigonal planar) | (bent) |  |
| 4  (sp3 ~109.5°) | (tetrahedral) | (trigonal pyramidal) | (bent) |
| 5  (dsp3 90°/120°) | (trigonal bipyramidal) | (seesaw) | (t-shaped) |
| 6  (d2sp3 90°) | (octahedral) | (square pyramidal) | (square planar) |

VSEPR stands for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

* VSEPR predicts the trend lp-lp > lp-bp > bp-bp for repulsions where lp=lone pair/bp=bond pair.
* For steric number > 4, dorbitals are involved so the number of electrons can exceed the octet rule in hypervalent molecules.

**2. Atomic orbitals:** Insert pictures of atomic orbitals of an H atom for the orbitals in the table.

|  |  |  |
| --- | --- | --- |
| s (sharp) | p (principle) | d (diffuse)  (circle ) |

3. **Molecular orbitals:** Insert pictures of molecular orbitals in the table. (HOMO for base, LUMO for acid and both for the product)

|  |  |  |
| --- | --- | --- |
| Lewis base is \_\_\_\_\_\_\_\_\_\_\_\_ | Product is BNH6 | Lewis acid is \_\_\_\_\_\_\_\_\_\_\_\_ |
| HOMO stands for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |  | LUMO stands for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |

* For more information see the link https://www.youtube.com/watch?v=l3Oq0rAejiU&t=590s

**4. Matching 3D structures with skeletal structures:** Give one letter alphabet that corresponds to the structures in the table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Wedge-and-dash projection** | | | **Fischer projection** | **Newman projection** | **Haworth projection** |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Bond-line structures** | | | | | |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

**BONUS: Write the name and properties of the compounds below.**

|  |  |
| --- | --- |
|  |  |
|  |  |

Enantiomers are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.