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## Subject: Chemistry

### Topic: Intermolecular Forces in $SF_6$

**Introduction:**

Given: Sulfur hexafluoride (**$SF_6$**) is a molecule for which the strongest intermolecular force needs to be identified.

- Types of intermolecular forces include Dispersion (London) forces, Dipole-Dipole interactions, and Hydrogen Bonding.

**Step 1: Analyze the molecular structure of $SF_6$**

**$SF_6$** is a sulfur hexafluoride molecule where a central sulfur atom is bonded to six fluorine atoms symmetrically.

*Explanation:* The symmetry and molecular geometry determine the type of intermolecular forces that are predominant in a molecule.

**Step 2: Determine the polarity of $SF_6$**

- **$SF_6$** has an octahedral geometry.
- Due to the symmetrical distribution of fluorine atoms around the sulfur atom, the molecule is nonpolar.

*Explanation:* Polarity (or lack thereof) influences the types of intermolecular forces. Nonpolar molecules generally do not engage in dipole-dipole interactions or hydrogen bonding.

**Step 3: Identify possible intermolecular forces**

- **Dispersion (London) Forces:** Present in all molecules, especially prevalent in nonpolar molecules.
- **Dipole-Dipole Interactions:** Occur between polar molecules.
- **Hydrogen Bonding:** Occurs specifically between hydrogen and highly electronegative atoms (N, O, F).

*Explanation:* Since **$SF_6$** is nonpolar, dipole-dipole interactions and hydrogen bonding are not applicable.

**Step 4: Establish the strongest intermolecular force in $SF_6$**

The only intermolecular force applicable to **$SF_6$** is Dispersion (London) Forces.

*Explanation:* Dispersion forces, as the sole intermolecular force present, are the strongest in nonpolar molecules like **$SF_6$**.

**Conclusion:**

The most important (strongest) intermolecular force present in a sample of **$SF_6$** is **Dispersion (London) Forces**.

**Summary Explanation:**

Given the molecular structure and symmetry of **$SF_6$**, it is a nonpolar molecule. Nonpolar molecules do not exhibit dipole-dipole interactions or hydrogen bonding. Therefore, the only intermolecular force present and the strongest in **$SF_6$** is Dispersion Forces.

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