# Answer on Question #77131, Chemistry / Inorganic Chemistry

## Question:

For a molecule A, the plot of total polarization $P_m$ vs 1/T has zero slope while for molecule B, it has a finite positive slope. Out of $CHCl_3$ and $CCl_4$, which one could be molecule A and why?

## Solution:

The relation between molar polarization and temperature:

$$P_m = \frac{N_A}{3\varepsilon_0} \cdot \left( \alpha + \frac{\mu^2}{3kT} \right)$$

where $\alpha$ is the polarizability, $\mu$ is the dipole moment.

As we can see, if the dipole moment $\mu = 0$ then the second part of the sum = 0. Therefore $P_m$ does not depend on temperature and the plot ($P_m$ vs 1/T) has zero slope. Out of given two molecules only $CCl_4$ has dipole moment $\mu = 0$.

So the molecule A is $CCl_4$

## Answer:

A - $CCl_4$

B - $CHCl_3$