Assignment 11

Due on 2023-12-02, 23:59:59

1. In the absence of any correlations, put correlation function becomes
   \[ \phi(r) = \frac{1}{r^6} \]

2. In the absence of any correlations, put correlation function becomes
   \[ \phi(r) = \frac{1}{r^6} \]

3. Calculate the following integrations for a system consisting of N molecules of molecules unit volume: one molecule per cubic meter. Find the distance from the origin where our molecule is located.
   \[ \int_0^\infty \phi(r) \, dr = \frac{3}{2} \pi N r^2 \]

4. Which of the following statements is correct?
   \[ \text{(a) } \text{Linear relationship} \quad \text{and} \quad \text{Volume} \quad \text{and} \quad \text{Temperature} \]
   \[ \text{(b) } \text{Linear relationship} \quad \text{and} \quad \text{Volume} \quad \text{and} \quad \text{Temperature} \]
   \[ \text{(c) } \text{Linear relationship} \quad \text{and} \quad \text{Volume} \quad \text{and} \quad \text{Temperature} \]
   \[ \text{(d) } \text{Linear relationship} \quad \text{and} \quad \text{Volume} \quad \text{and} \quad \text{Temperature} \]

5. Given the following formula, where \( r \) is the radial distance from the origin.
   \[ \phi(r) = \frac{1}{r^6} \]

6. Basic statistics theory shows that the radial distribution function is
   \[ \phi(r) = \frac{1}{r^6} \]

7. The correct relation between radial density \( \rho(r) \) and radial distribution function \( \phi(r) \) is
   \[ \phi(r) = \frac{1}{r^6} \]

8. For water, with an ionic radius \( r_+ \) equal to the radius of a water molecule, the coordination number of water is
   \[ \rho(r) = \frac{1}{r^6} \]

9. Which of the following best represents the behavior of a simple chain?
   \[ \text{A) } \text{Linear polymer} \quad \text{B) } \text{Random coil} \quad \text{C) } \text{Cylindrical coil} \]

10. For a system consisting of a polymer in a good solvent, which of the following is not true?
    \[ \text{A) } \text{Chain polymer in a good solvent} \quad \text{B) } \text{Effective interactions between molecules depend on temperature} \quad \text{C) } \text{Effective interactions between molecules depend on solvent} \]

11. The surface area of a sphere \( 4\pi r^2 \) as its radius \( r \) will be
    \[ \frac{1}{2} \cdot \frac{1}{2} \cdot \frac{1}{2} \]