Answer on Question #47965, Chemistry, Other

Task:

Using the van der Waals equation, calculate the pressure (in atmospheres) exerted by 258.9 g of CCl_4 at 101.4°C in a 1.00 L container. The van der Waals constants for CCl_4 are a = 20.40 L^2*atm/mol^2 and b = 0.1383 L/mol.

Answer:

$$(p+\frac{a\nu^2}{V^2})(V-b\nu)=\nu RT$$

$$\nu=\frac{m}{M}$$

$$M(CCl_4)=154\,g/mol$$

$$\nu(CCl_4)=\frac{258,9}{154}=1,68\,mol$$

T=101,4+273=374,4 K

R=0,082 L·atm/K·mol

$$(p+\frac{20,40\cdot 1,68^2}{1^2})(1-0,1383\cdot 1,68)=1,68\cdot 0,082\cdot 374,4$$

$$p+\frac{20,40\cdot 1,68^2}{1^2}=67,2$$

$$p=67,2-57,58=9,64\,atm$$