

In-class problem linked to lecture pages 10-19

Calculate the number of degrees of freedom in:

- a) a gas of pentatomic molecules in a region free of external fields
- b) a mole of gold in a region free of external fields
- c) helium gas in an electric field

Physics 301

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a)  $\# \text{ dof} = 6N - 6$

here  $N=5$

$\# \text{ dof} = 24$

b)  $\# \text{ dof} = 6N - 12$

1 mole =  $6.023 \times 10^{23}$  atoms =  $N$

$\# \text{ dof} = 6 \cdot (6.023 \times 10^{23}) - 12$

$= 3.6 \times 10^{24}$

c)  $N=1$

$3(\text{com location}) + 3(\text{com momentum}) = 6$