1. Estimate the equilibrium number of vacancies in 1 m^3 of Cu at 1200°C.
   Givin: ρ =8.4 g/cm^3 A_{Cu} = 63.5 g/mol
   Q_v = 0.9eV/atom N_a =6.02 x 10^{23} atoms/mol

2. Determine the ASTM Grain Size number based on ASTM E112A given there are 4 grains per square inch in a micrograph at 100X. (Hint: Use your lab resources.)

3. Hall-Petch Calculation – Given the following plot and data, use the Hall-Petch method to calculate the YS of commercially pure Al with a grain size of 0.1 Microns.

Commercially Pure Al - YS vs Grain Size (microns)

y = -0.109x + 251.32
R^2 = 0.9157
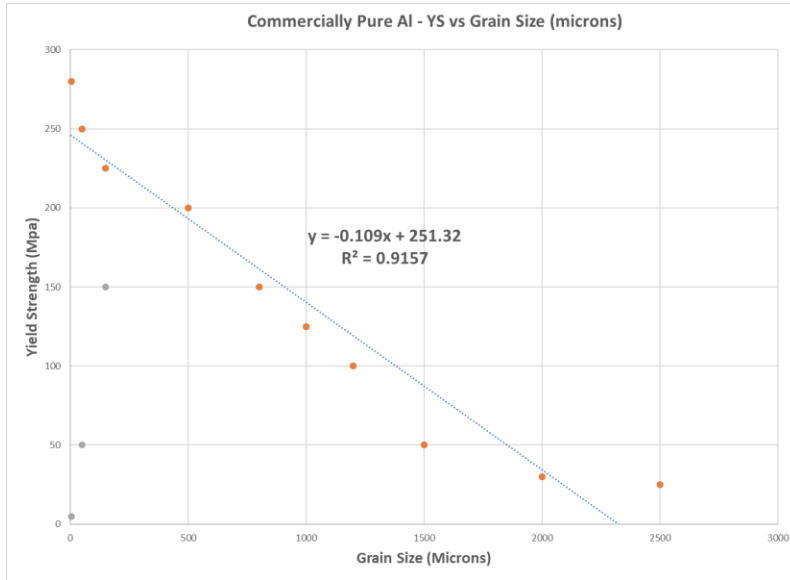
YS (Mpa)	Grain Size (microns)
280	5
250	50
225	150
200	500
150	800
125	1000
100	1200
50	1500
30	2000
25	2500

4. Determine the V_f of second phase particles in this micrograph.