Solute A is to be absorbed from a binary mixture containing 7.5% of A with solvent B in a packed tower. Based on flooding calculation, a tower diameter of 1.2 m is selected. Total gas flow rate is 60 kmol/h. The exit gas must not contain more than 0.2% of solute A. Solute free liquid B enters from the top of the tower at 40 kmol/h. The gas phase and liquid phase mass transfer coefficients based on mole ratio unit are: k_X =2.05 kmol/m²h (ΔX) and k_Y =1.75 kmol/m²h (ΔY). The equilibrium line Equation is $Y=0.63X$. Specific interfacial area of gas-liquid contact ($\bar{a}$) is 71 m²/m³.

(a) Calculate packing height required for the desired separation.
(b) For 99.5% solute A removal, what % increase in packed height is needed?
(c) Determine slopes of operating line in each case.