11.1
This is a reaction extent problem.
Note: for gases: volume percent = mole percent = pressure percent
Get K from ΔG°

11.2
This is a reaction extent problem for the reaction
SO₂ + 0.5 O₂ = SO₃
Note: for gases: volume percent = mole percent = pressure percent
Get K from ΔG°
Once the moles of SO₃ formed is determined from the reaction extent calculation, multiply by the ΔH°.

11.3
This problem consists of four unknowns (the pressures of H₂, CO₂, H₂O, and CO) for which four equations will be needed to solve for them. The overall reaction (which should be considered to be redundant) is
2H₂ + CO₂ = 2H₂O + 2CO
is composed of the two independent reactions
2H₂ + O₂ = 2H₂O  \(K_n\)
2CO + O₂ = 2CO₂  \(K_c\)
Since the pressure of O₂ is specified and the same in both reactions, the K’s for the two reactions give two equations relating the four unknowns (the moles of each gas). Since all the H₂O and CO come from the overall reaction (the amount of O₂ formed is negligible), the moles of H₂O and CO are equal. This is a third equation relating the four unknowns. There are infinite combinations of H₂ and CO₂ that give the same equilibrium ratios. We need only one combination of initial H₂ or CO₂ so simply assume a basis of calculation, say 100 moles of either H₂ or CO₂. This assumed amount is the fourth equation.

Note an important engineering problem solving tip:
Any problem involving ratios, rates, fractions, proportions, or percentages always requires your setting a BASIS OF CALCULATION. The assumed basis value makes no difference in the outcome.

11.4
The pressure of Br₂ is half that of Li (stoichiometry) and the pressure of LiBr is still essentially unity. So substitute pressures into K and find K. Then find ΔG° = -RT ln K and solve for T using ΔG° = A + BT.