**Worksheet 2**

1. Aone-component system consists of the following phases:1 liquid (L),1 vapor (V), and 3 solids **(S1, S2,** and **S3).** Construct the P-T diagram which satisfies the following conditions: **S1,** and **S2** can be melted and sublimed. **S3,** can be melted but not sublimed. **S3,** is denser than **S1, S2,** and the liquid. The liquid is denser than **S2,** which is denser than **S1.** The transformations **S1 →S2** and **S1→** **S3** are both endothermic.
2. If a system is found to obey the phase rule, may we assume that thesystem is at equilibrium? Explain your answer.
3. Classify the following systems as monovariant, divariant, or invariant. Explain your answers.
	1. Alpha quartz in equilibrium with beta quartz at the transition temperature.
	2. Monoclinic zirconia at room temperature.
	3. Ice in equilibrium with its vapor.
4. In the binary system shown on Fig. below, determine the following:
	1. The temperature at which 30 wt% of B crystals are in equilibrium with a liquid composed of 60 wt% B and **40** wt% **A.**
	2. The composition of the sample described in part **a**.
	3. Show by means of a sketch how the microstructure of this sample would look at the temperature determined in part **a**.
	4. Show by means of a sketch the appearance of the microstructure for this sample if it were cooled to **500°C.**
5. System V2O5-NiO is shown on Fig. below.
	1. Label all areas in the diagram.
	2. Make an isoplethal study in the system on cooling a melt of 45 mol% NiO and **55** mol% **V2O5.** Calculate before and after each change ofphase:

(1) the percentage ofeach phase present.

(2) the percent of each component in each phase.

* 1. Make an isoplethal study in the system on cooling a melt of60 mol% NiO and **40** mol% **V2O5.**



1. System **R-G** is shown on Fig. below**.** Make an isoplethal study for a melt of composition **20** wt% G and 80 wt% **R.**
2. For Fig. shown below.
	1. Label primary phase fields.
	2. Construct Alkemade lines.
	3. Indicate slopes of boundary lines.
3. For Fig. shown below
	1. Make an isoplethal study for a melt of composition A=30%, B=5%, C=65%.
	2. Make a sketch of the isothernial section at 1100oC and at 700oC.
	3. Make a sketch to represent the vertical section taken along a line front C to 80% B (on the line AB).



1. For Fig. below.
	1. Make an isoplethal study for a melt of composition G = 70%, R=10%, K=20%.
	2. Construct a phase analysis diagram from the data calculated in part (a).

