

# Phase Diagrams #2

## TWO COMPONENT OF BINARY SYSTEMS

- Can represent **three variables**, generally \_\_\_\_, \_\_\_\_, and \_\_\_\_ (\_\_\_\_\_) on a two dimensional diagram
- On a binary diagram one variable, usually \_\_\_\_, is held \_\_\_\_\_ and plot \_\_\_\_ diagrams for specific pressures
- \_\_\_\_\_ diagrams - constant pressure
- **But First Some Basics!**

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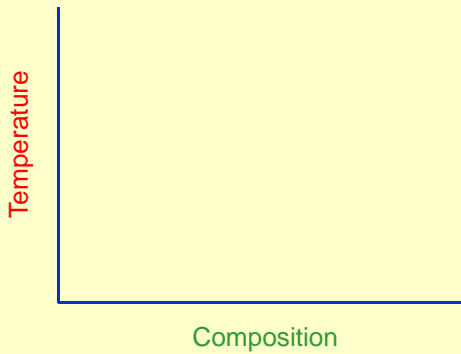
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## ERSC 3P21- Binary Phase Diagrams



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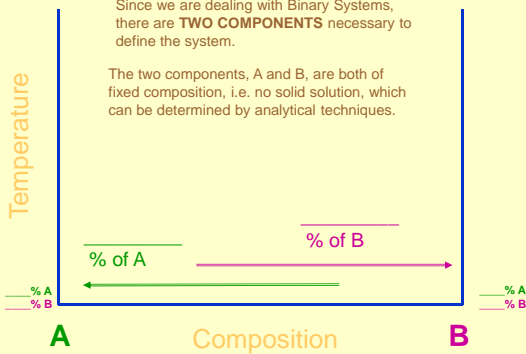
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## Components

Since we are dealing with Binary Systems, there are **TWO COMPONENTS** necessary to define the system.

The two components, A and B, are both of fixed composition, i.e. no solid solution, which can be determined by analytical techniques.



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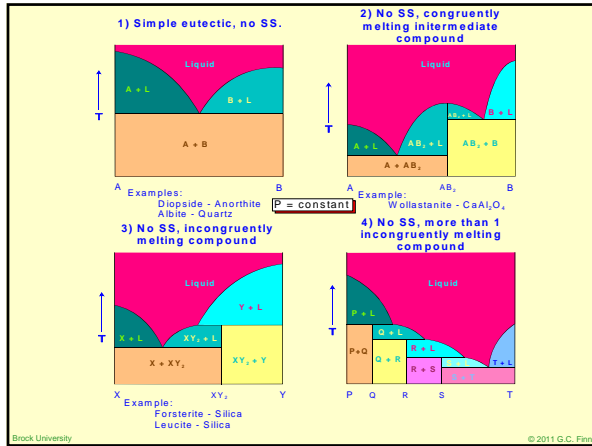
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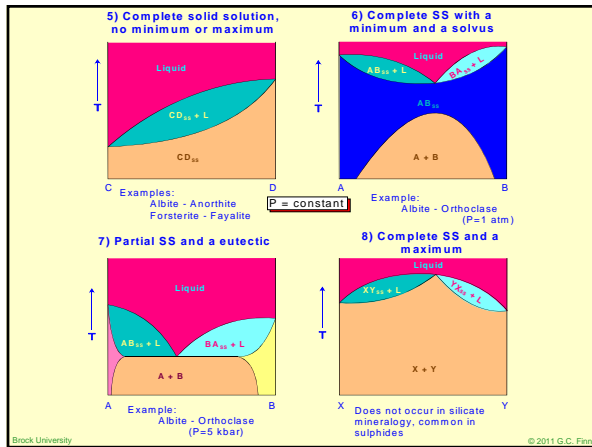
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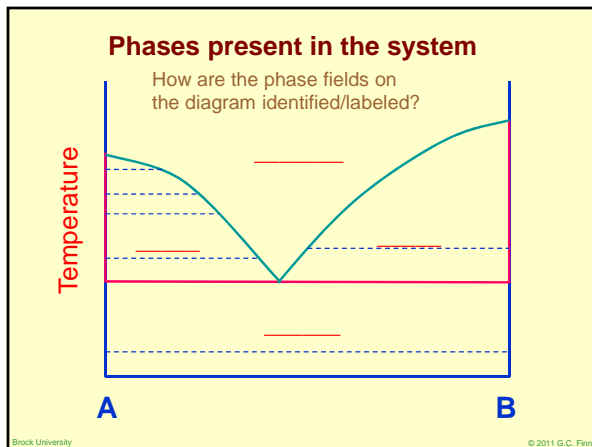
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### Condensed Phase Rule

- $P + F = C + 2$
- Because the system is now drawn with pressure \_\_\_\_\_, we have decreased the degrees of freedom by 1, therefore the Phase Rule now becomes:

$$P + F = C + 1$$

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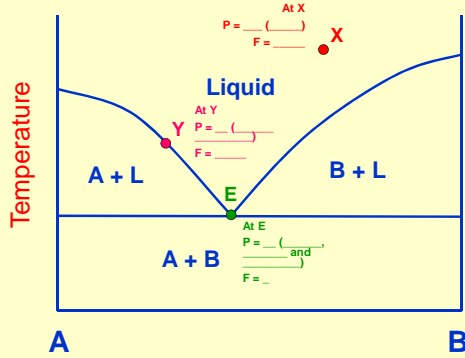
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### Phase Rule ( $P + F = C + 1$ )



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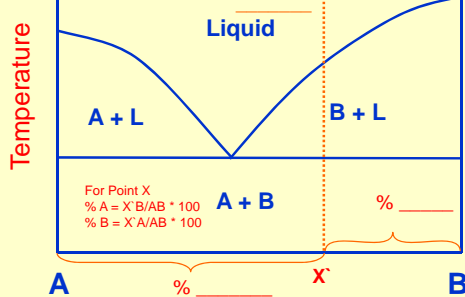
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### Lever Rule

Used to determine compositions

Composition of point X?



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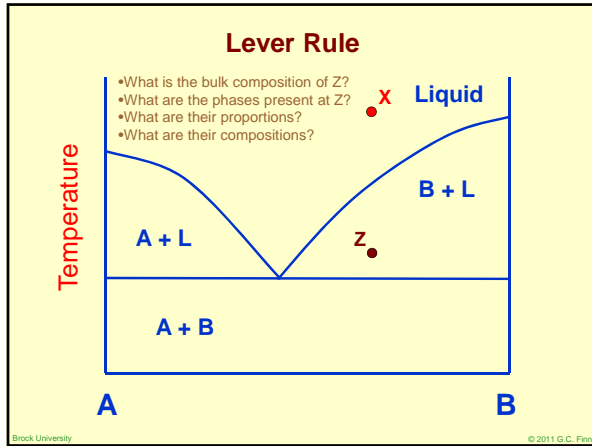
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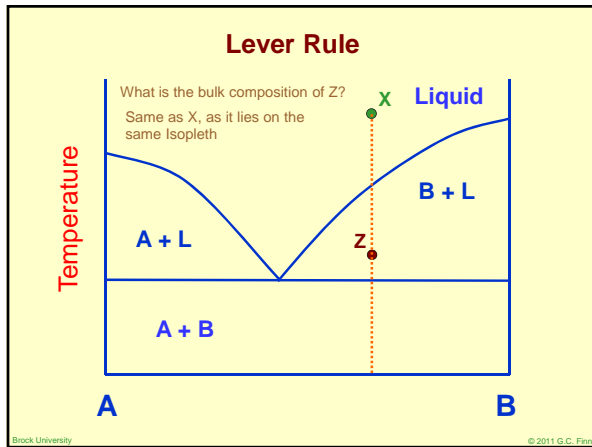
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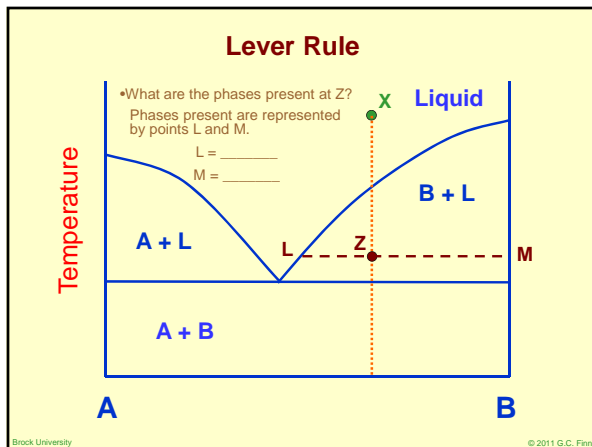
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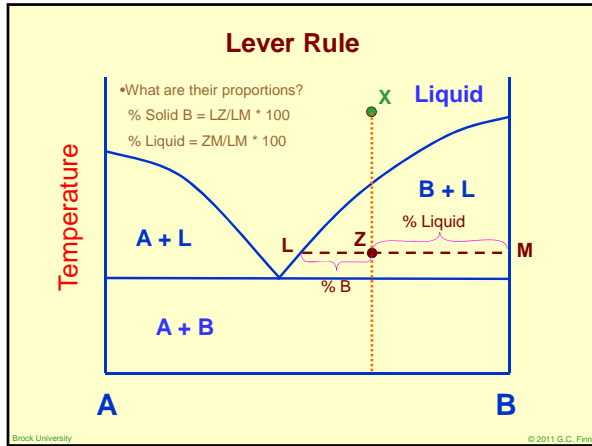
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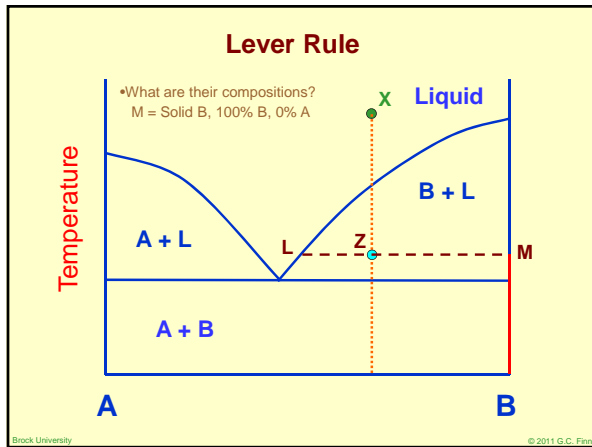
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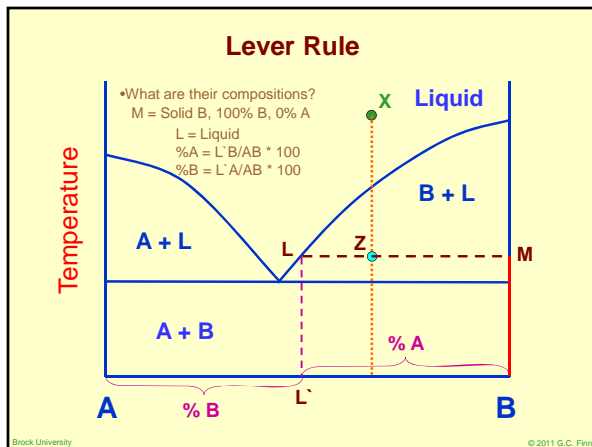
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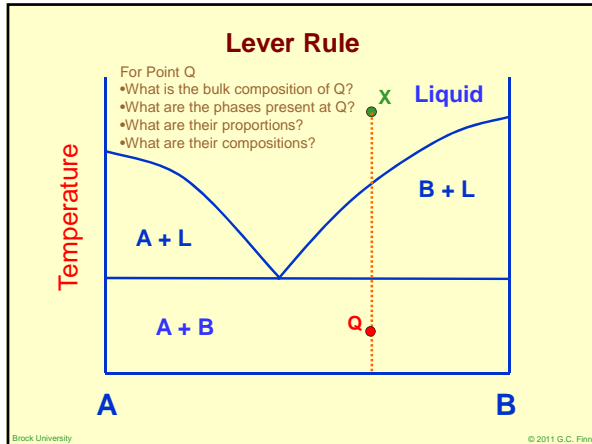
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### Point of Clarification

- Bulk compositions are always expressed in terms of the two end member components which define the system
- Likewise the composition of any solid phase (100% A, 0% B) and the composition (40% A, 60% B) of any Liquid, that coexists, in equilibrium with the solid, are expressed in terms of the end member components

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### What's next?

We will examine three different binary diagrams pertinent to Igneous Petrology and discuss:

- **Crystallization**
  - the liquid and solid crystals remain in contact with each other, and there is no change in the bulk chemical composition as a result of crystallization
- **Crystallization**
  - the liquid and crystals do not remain in contact, the crystals are prevented from reacting with the liquid. The final liquid composition is not the same as the initial bulk composition.

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