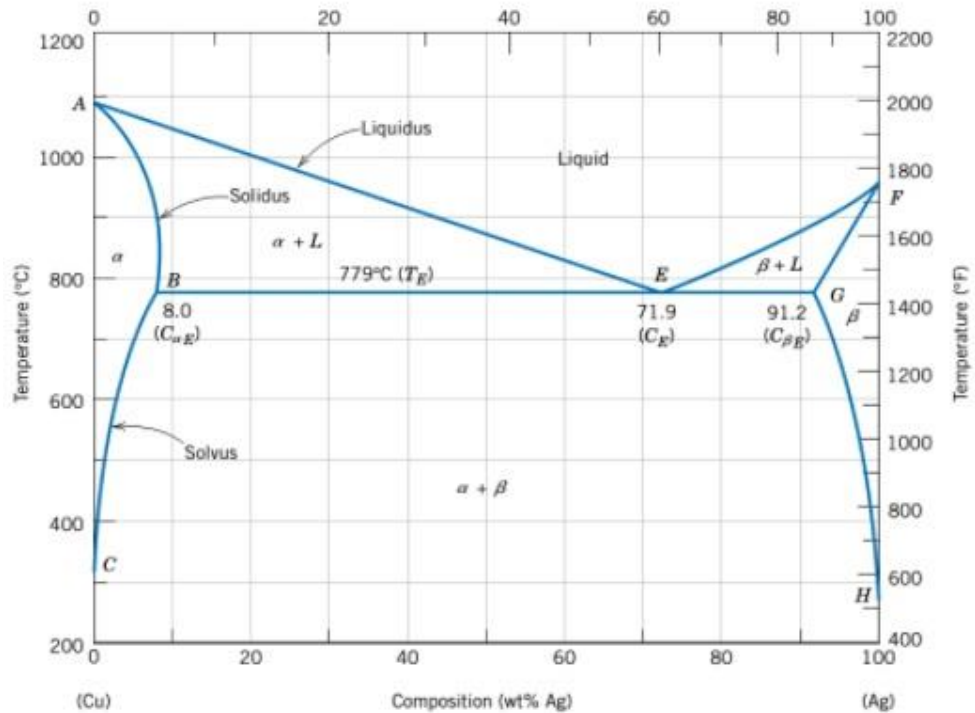


## Activity 2

A team member asks you whether it is OK to use 95% Cu – 5% Ag wire for electrical connections inside a helicopter engine. During operation, the engine temperature reaches 800 °C. To ensure consistent operation, the power dissipated by the wire should not vary significantly between room temperature and operational temperature. Based on the Ag-Cu phase diagram, and what you know about resistivity, what do you tell your team member?



To guide your response, here are a few questions:

- Is the alloy chosen for the wire
  - Fine, since both Cu and Ag have high conductivities?
  - Fine, since any alloy will work?
  - OK, but 95% Ag – 5% Cu would be better?
  - Poor since the alloy will undergo a phase transition during operation?
- What is the resistivity of the wire at room temperature?
- What is the resistivity of the wire at 800 °C?
- Based on your calculations, what will happen to the wire resistivity from room temperature to operational temperature?
  - Remain nearly unchanged from room temperature to operational temperature.
  - Exhibit a massive percent change (over +750% change).
  - Remain constant until about 650 °C.
  - Exhibit a change of +270%, which is not acceptable.