

Question 1 SuperCool Practice

The following data table is provided for substance X:

	Data about Substance X
Melting point	300 K
Specific heat (liquid)	20 kJ/(kg K)
Specific heat (solid)	15 kJ/(kg K)
Heat of melting	200 kJ/kg

A pack of substance X is designed to be able to supercool, i.e. stay in the liquid phase below the melting point. It can be triggered to return to the 'correct' phase via the press of a button, which is done without adding or removing any energy.

- (a) What temperature must liquid X be at, such that pressing the button brings it to be fully solid and at the melting point?
- (b) What temperature must liquid X be at, such that pressing the button brings it to be fully solid and at 296 K?

An experiment is performed, where 1 kg of solid substance X at 280 K is mixed in an insulated container with an unknown amount of liquid substance X at 320 K. After reaching thermal equilibrium, it is observed that the substance is in a mixed phase.

- (c) What is the range of possible values for the initial mass of liquid X?