100 g of water is supercooled to $-10^{\circ}C$. At this point, due to some disturbance mechanised or otherwise some of it suddenly freezes to ice. What will be the temperature of the resultant mixture and how much mass would freeze?

$\left[S_w = 1 cal/g/^{\circ}C \text{ and } L^{w}_{Fusion} = 80 cal/g\right]$

Given, $S_w = 1\ cal/g/°C$ = (specific heat capacity of water)

$L^w_{fusion} = 80\ cal/g$ (Latent heat of fusion of water)

mass of water (m_w) = 100 g

As water at $-10°C$ freezes to ice; temperature changes for $-10°C \longrightarrow 0°C$ i.e. $\Delta T = [0 - (-10)]$

$$\boxed{\Delta T = 10°C}$$

Heat given out by $-10°C$ water to convert at $0°C$ ice

$Q \Rightarrow ms\Delta T$

$\Rightarrow (100)(1)(10)$

$$\boxed{Q \Rightarrow 1000\ cal}$$

Let 'x' gm of ice melted

$\therefore x_m = \frac{Q}{L} \Rightarrow \frac{1000}{80}$

$$\Rightarrow \boxed{x = 12.5\ gm}$$

So, there is 12.5 gm. of water and ice in the mixture.

Hence, temperature remains at $0°C$.