

## Latent Heat of Phase Change Problems

**Standard:** *Students know how to solve problems involving heat flow and temperature changes, using known values of specific heat and latent heat of phase change.*

In order to melt one gram of ice into liquid water at 0°C, 334 J of heat must be absorbed, or in order to freeze 1 g of liquid water into ice at 0°C 334 J of heat must be released. To vaporize 1 g of liquid water into steam at 100°C, 2260 J of heat must be absorbed. To condense 1 g of steam into liquid water at 100°C, 2260 J of heat energy must be released. To solve latent heat of phase change problems the latent heat of fusion of water is 334 J/g or the latent heat of vaporization of water is 2260 J/g.

1. The latent heat of vaporization of water is 2260 J/g. How much energy is released when 100 grams of water condenses from vapor at 100°C?
2. How much energy will it take to melt 100 grams of ice at 0°C? The latent heat of fusion of water is 334 J/g.
3. The latent heat of vaporization of water is 2260 J/g. How many grams of water at 100°C can be converted to steam by 226,000 J of energy?
4. The latent heat of fusion of water is 334 J/g. How much energy is released when 20 grams of water at 0°C undergoes freezing?
5. The latent heat of fusion of water is 334 J/g. How many grams of ice 0°C will melt by the addition of 3.34 kJ of heat energy?
6. The latent heat of vaporization of water is 2260 J/g. How many kilojoules per gram is this? How many grams of water will be vaporized by the addition of  $2.260 \times 10^3$  J of heat energy at 100°C?