Checking Heat With a Melting Ice Cup

Base your answers on the information provided and your knowledge of chemistry. Use the 2025 Chemistry Reference Tables as needed.

A display uses a cup containing ice and liquid water at 0 °C. The temperature stays at 0 °C as long as both phases remain. A transfer of 334 J into the cup can melt 1.00 g of ice in the model. The class measures how much ice melts while two warm objects cool separately in identical cups. The cups exchange no heat with the room.

Warm object	Ice melted (g)	Final cup temperature (°C)
P	2.0	0
Q	5.0	0

1 Which object transfers more energy to its cup?

(1) P, because it melts less ice.

(2) Q, because it melts more ice.

(3) Both transfer the same energy because both end at 0 °C.

(4) Neither transfers energy while the cup stays at 0 °C.

2 Calculate how many more joules Q transfers than P. Show how the ice masses enter the calculation. [1]

Answer and work

In a repeat, Q cools while transferring energy to both the ice cup and a second metal plate. The cup still contains ice and water at 0 °C after the test, but only 3.0 g melts. A separate measurement shows the plate gains 668 J. No energy is exchanged with the room.

3 Use both the melted ice and the plate reading to calculate the total energy transferred out of Q in the repeat. [1]

Answer and work

4 A student claims Q transfers less energy in the repeat because less ice melts. Evaluate the claim using the original and repeat records. [1]

Answer and work