TABLE 1 Specific Heats of Some Common Substances at 298.15 K

Substance	Specific heat J/(g•K)
Water (*l*)	4.18
Water (*s*)	2.06
Water (*g*)	1.87
Ammonia (*g*)	2.09
Benzene (*l*)	1.74
Ethanol (*l*)	2.44
Ethanol (*g*)	1.42
Aluminum (*s*)	0.897
Calcium (*s*)	0.647
Carbon, graphite (*s*)	0.709
Copper (*s*)	0.385
Gold (*s*)	0.129
Iron (*s*)	0.449
Mercury (*l*)	0.140
Lead (*s*)	0.129

In the following mathematical equation, c_p is the specific heat at a given pressure, q is the energy lost or gained, m is the mass of the sample, and ΔT represents the difference between the initial and final temperatures.

$$c_p = \frac{q}{m \times \Delta T}$$

This equation can be rearranged to give an equation that can be used to find the quantity of energy gained or lost with a change in temperature.

$$q = c_p \times m \times \Delta T$$

SAMPLE PROBLEM A

A 4.0 g sample of glass was heated from 274 K to 314 K, a temperature increase of 40. K, and was found to have absorbed 32 J of energy as heat.

a. What is the specific heat of this type of glass?

b. How much energy will the same glass sample gain when it is heated from 314 K to 344 K?

SOLUTION

1 *ANALYZE*

Given: $m = 4.0$ g
$\Delta T = 40.$ K
$q = 32$ J

Unknown: c_p in J/(g•K)