Tracking Energy When a Model Gas Expands

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

A class compares two models that start with the same amount of the same gas at the same temperature. Each gas receives 25 J from a heater. In P the gas is held in a rigid box. In Q the gas expands and pushes a movable platform. Neither loses heat to the room. In this model, the net energy left in the gas increases its thermal energy and determines its temperature rise.

Model	**Energy transferred from heater to gas (J)**	**Energy transferred from gas by pushing platform (J)**
P	25	0
Q	25	15

1 Which model gains more thermal energy under the stated conditions?

(1) P only

(2) Q only

(3) Both gain the same thermal energy.

(4) Neither gains thermal energy.

2 Calculate the thermal-energy increase of Q. Include both transfers in your calculation. [1]

Answer and work

3 A student predicts equal final temperatures because the heaters transfer equal energy. Evaluate the claim using the model records. [1]

Answer and work

A repeat of Q still transfers 15 J by moving the platform. A new heater supplies enough energy for the gas to gain the same thermal energy as P.

4 Calculate the energy supplied by the new heater. [1]

Answer and work