A cylinder contains 1.5 g of He gas at a pressure of 8 atm. How much heat is needed for a temperature increase of 150° C at constant volume.

Given:

Mass of He:	m = 1.5 g
Pressure of He:	P = 8 atm
Increase in temperature of He:	$\Delta T = 150^{o}$ C

To determine: Heat required to increase temperature at constant volume: Q

Use formula:

$$Q = nC_v\Delta T \text{ ----------(1)}$$

C_v is the molar specific heat of gas at constant volume.
Its value is 12.5 J / mol. ^{o}C for Helium gas.

"n" is the number of moles in the given mass of gas.
Number of moles in 1.5 g of Helium : n = 0.37 moles

Substituting for n, C_v & ΔT in (1):

$$\mathbf{Q = 0.37 \times 12.5 \times 150 = 694\ J}$$

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