$\Delta U = q_V$ versus $\Delta H = q_P$

CH101 Fall 2013

Boston University

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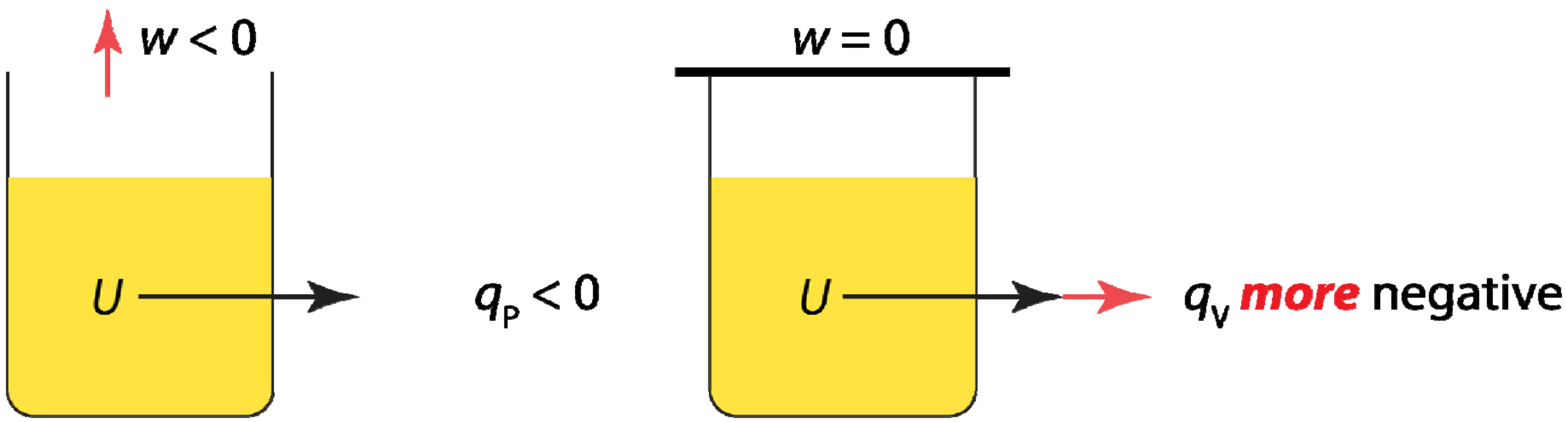
$\Delta U = q_V$ versus $\Delta H = q_P$



Exothermic reaction that does **work on surroundings** will get **hotter** at constant volume.

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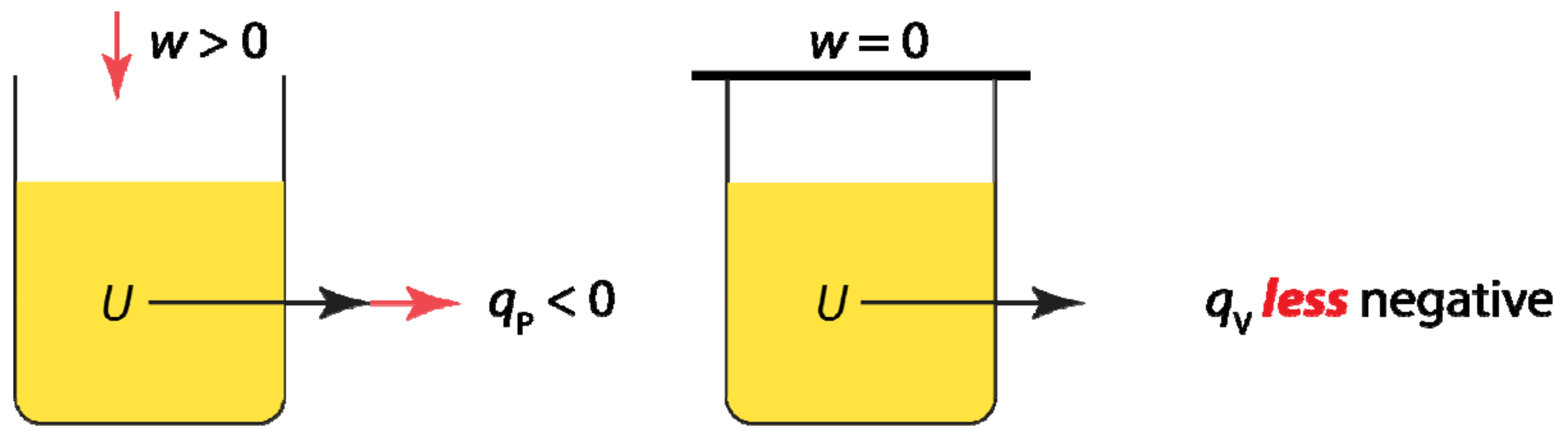

Exothermic reaction that has **work done on it** will get **less hot** at constant volume.

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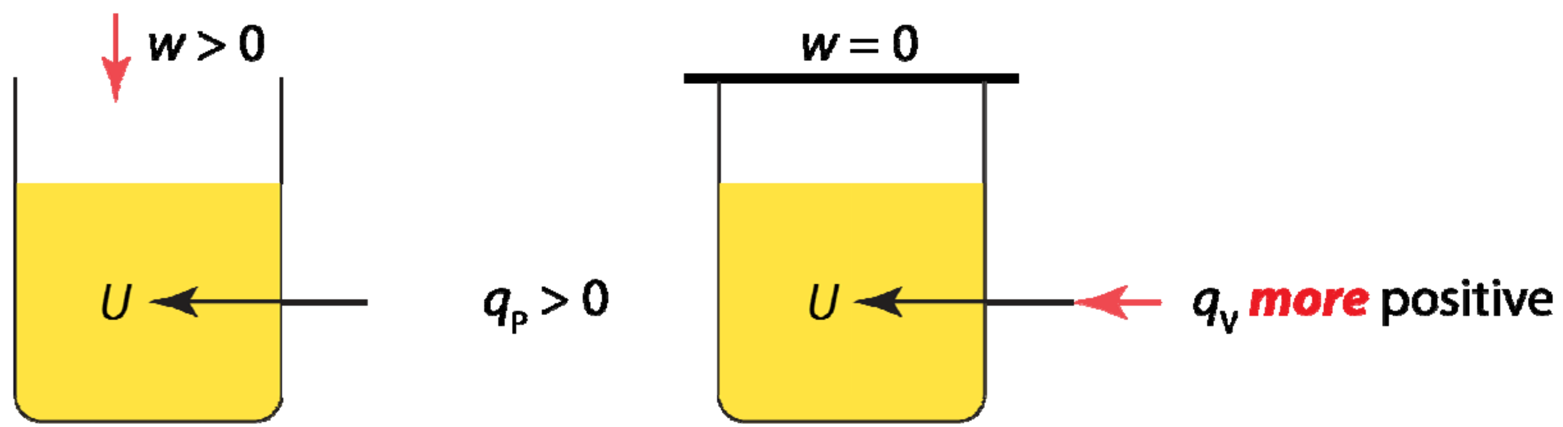
$\Delta U = q_V$ versus $\Delta H = q_P$



Endothermic reaction that has **work done on it** will get **colder** at constant volume.

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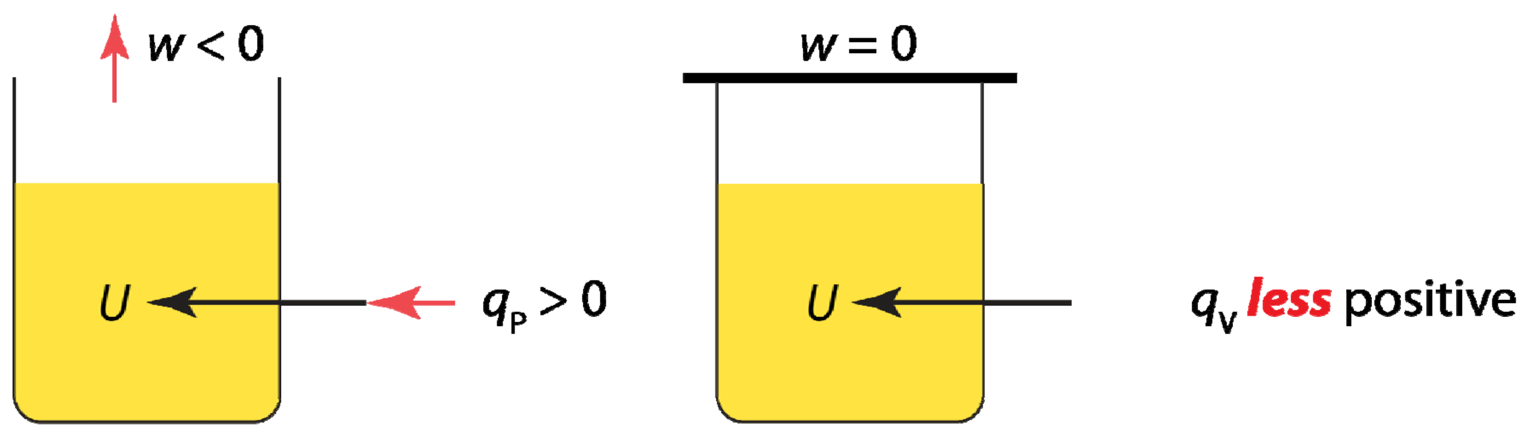
$\Delta U = q_V$ versus $\Delta H = q_P$



Endothermic reaction that does **work on surroundings** will get **less cold** at constant volume.

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$\Delta U = q_V$ versus $\Delta H = q_P$

In a ***sealed, rigid*** container …

constant $V \rightarrow$ ***no work*** possible

$\rightarrow$ **ΔT is a measure of $\Delta U = q_V$**

In an ***open*** container …

constant $P \rightarrow$ ***work*** possible

$\rightarrow$ **ΔT is a measure of $\Delta H = q_P$**

Open container	Gas moles	$\lvert\Delta T_{close}\rvert > \lvert\Delta T_{open}\rvert$?
Exothermic	Formed	Greater (hotter)
Exothermic	Consumed	Smaller (less hot)
Endothermic	Formed	Smaller (less cold)
Endothermic	Consumed	Greater (colder)

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Relationship between internal energy change, ΔU (black path), and enthalpy change, ΔH (red path), according to
(1) whether products have more (upper figures) or less (lower figures) internal energy than reactants, and
(2) whether work (cyan path) is done on the system (left figures) or on the surroundings (right figures).
When no work is done at constant P, then ΔU and ΔH have the same value.