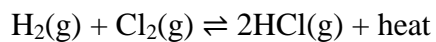


## The Effect of Temperature on the Position of the Equilibrium and the $K_{eq}$

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### Example #1:



Which way would the equilibrium shift if heat was added from an outside source? (Remember that this is an exothermic reaction.)

Why?

What would this do to the value of the  $K_{eq}$ ?

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### Example #2:



Which way would the equilibrium shift if heat was added from an outside source? (Remember that this is an endothermic reaction.)

Why?

What would this do to the value of the  $K_{eq}$ ?

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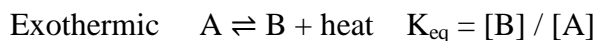
Notice that there are two questions that must be asked when the effect of heat on the value of the  $K_{eq}$  is discussed. (1) Is the reaction endothermic or exothermic? and (2) Is heat added or removed?

Here is a chart showing the effect on the value of the  $K_{eq}$  from the interplay between these two questions:

	Add Heat	Remove Heat
Endothermic	increase	decrease
Exothermic	decrease	increase

As can be seen, two combinations of the two questions yield decrease as the answer and two combinations yield increase.

For myself, when I do these, I like to write the chemical equation (in a generic way) as exothermic or endothermic. Right next to the equation, I will write the equilibrium expression. Like this:

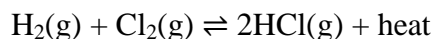


When answering AP questions, I would first discuss the effect (either increase or decrease) of adding or removing heat on the amounts of A and B. Then, I would move to the  $K_{eq}$  expression to discuss the effect on the constant of increasing and decreasing the amounts of A and B.

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There are two more possible combinations of the two question above. Here they are:

**Example #3:**



Which way would the equilibrium shift if heat was removed from the reaction vessel?

What would this do to the value of the  $K_{eq}$ ?

**Example #4:**



Which way would the equilibrium shift if heat was removed from the reaction vessel?

What would this do to the value of the  $K_{eq}$ ?