

# Lecture Notes – LeChatelier’s Principle and the Equilibrium Lab

## Std 9a

LeChatelier’s Principle tells us that if concentration, volume or temperature change after equilibrium is reached, the position of the equilibrium will shift in a direction that tends to reduce (reverse) that change.

Remember that changes for products and reactants are directly proportional!!! Why? Let’s take a simple example with real numbers:

$$\frac{A}{B} = K$$

If A = 2 and K = 1, then what does B have to be? Yes, it must be 2.

$$\frac{2}{2} = 1$$

Now, if we make A = 4, what does B have to be? Yes, it must be 4 also. Notice that when we increased A we also had to increase B so that both numbers will still divide out and become 1.

$$\frac{4}{4} = 1$$

So now do you see why products and reactants are directly proportional?

$$\frac{[C]^c [D]^d}{[A]^a [B]^b} = K$$

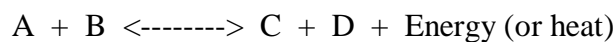
If C or D **increase**, you must **increase** either A or B for the K to be the same number. Likewise, if you **decrease** C or D, you must also **decrease** A or B.

Here is the chart we did in class to help you remember how things go:

<u>reactants</u>	<u>products</u>	<u>direction of shift</u>
increase	increased	---->
decrease	decreased	<---

## How heat works with LeChatelier's Principle .....

**EXOTHERMIC REACTIONS** - THESE REACTIONS CREATE HEAT, and heat acts like a **product** .

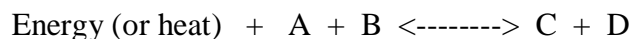


<b><u>reactants</u></b>	<b><u>products</u></b>	<b><u>direction of shift</u></b>
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increased	add heat	<----
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decreased	reduce heat	---->
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**ENDOTHERMIC REACTIONS** – THESE REACTIONS SUCK IN HEAT, and heat acts like a **reactant**



<b><u>reactants</u></b>	<b><u>products</u></b>	<b><u>direction of shift</u></b>
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add heat	increased	---->
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reduce heat	decreased	<----
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So heat either acts like a **product (exothermic reactions)** or a **reactant (endothermic reactions)**. Adding heat to a system for an exothermic reaction at equilibrium is like adding more of a product. Adding heat to a system for an endothermic reaction at equilibrium is like adding more of a reactant.