Week Seven

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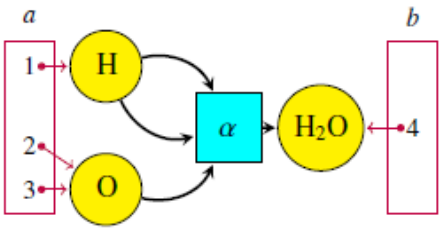
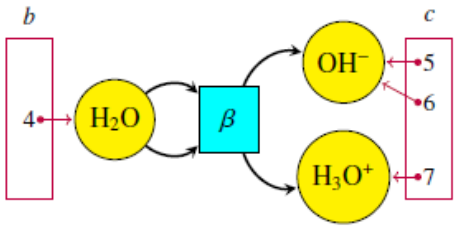
25th August

Open Petri-net

- These contain **open** places which interact with other petri-nets outside it.

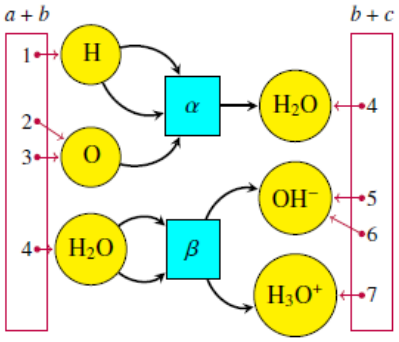


Petri net representing $2H+O \longrightarrow H_2O$



Petri net representing self-ionization.

- We use extra objects whose elements get mapped to these open places. This creates a sense of '**port**' and ports of the same type (element) can be connected together.

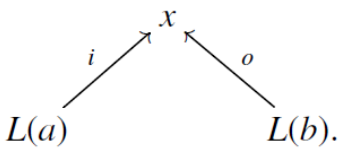


Combined Petri net

- When plugged together, the contents of the open place are shared between the two Petri nets.

Structured Cospan

It is a mathematical object which is of the form:



- L: A *functor* mapping the object A to the combined Petri net X.
- A: The object representing the set of pre-images for both input and output places.
- X: The combined Petri net that results from the structured composition.

- a and b: Subsets of A representing the pre-images of the input and output places, respectively. These subsets are referred to as the **input** and **output** sets.
- x: The specific part of the Petri net, also known as the **apex**, which is determined by the functor L. The functor L maps a to the input places and b to the output places of this apex.

Given the input set a and output set b, the apex x is the portion of the Petri net where a and b correspond to the input and output places, respectively.

In the context of chemical reactions, such as the water formation reaction, the sets a and b correspond to the **pre-images** of the input and output places, respectively. Specifically:

- The set a represents the **inputs** to the water formation reaction.
- The set b represents the **outputs** of the water formation reaction.

The *functor* L maps these sets to the corresponding elements in the Petri net:

- $L(a)$ maps the elements in a to the open input places in the Petri net.
- $L(b)$ maps the elements in b to the open output places in the Petri net.

Using the mappings $L(a)$ and $L(b)$, we can extract the Petri net x that models the water formation reaction. This Petri net x incorporates the connections and interactions defined by $L(a)$ and $L(b)$, thereby representing the complete chemical reaction process.