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--- Day 14: Extended Polymerization ---

The incredible pressures at this depth are starting to put a strain on your submarine. The submarine has [polymerization](#) equipment that would produce suitable materials to reinforce the submarine, and the nearby volcanically-active caves should even have the necessary input elements in sufficient quantities.

The submarine manual contains instructions for finding the optimal polymer formula; specifically, it offers a polymer template and a list of pair insertion rules (your puzzle input). You just need to work out what polymer would result after repeating the pair insertion process a few times.

For example:

NNCB
CH -> B
HH -> N
CB -> H
NH -> C
HB -> C
HC -> B
HN -> C
NN -> C
BH -> H
NC -> B
NB -> B
BN -> B
BB -> N
BC -> B
CC -> N
CN -> C

The first line is the polymer template - this is the starting point of the process.

The following section defines the pair insertion rules. A rule like `AB -> C` means that when elements `A` and `B` are immediately adjacent, element `C` should be inserted between them. These insertions all happen simultaneously.

So, starting with the polymer template `NNCB`, the first step simultaneously considers all three pairs:

- The first pair (`NN`) matches the rule `NN -> C`, so element `C` is inserted between the first `N` and the second `N`.
- The second pair (`NC`) matches the rule `NC -> B`, so element `B` is inserted between the `N` and the `C`.
- The third pair (`CB`) matches the rule `CB -> H`, so element `H` is inserted between the `C` and the `B`.

Note that these pairs overlap: the second element of one pair is the first element of the next pair. Also, because all pairs are considered simultaneously, inserted elements are not considered to be part of a pair until the next step.

After the first step of this process, the polymer becomes `NCNCBCHB`.

Here are the results of a few steps using the above rules:

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