

E Schreibe die Klasse `ChemicalEquations`, um das folgende Problem zu lösen

E.1 Chemical equations¹

The elves have worked hard to produce all those presents in Santa's factory. One day, the quality control team pops in and complains about mistakes in the product "Li'l chemical kit". A quick investigation reveals that the elf who was responsible for writing the sheet with the chemical equations was making a lot of mistakes. Now we need your help to quickly check these chemical equations!

A chemical equation represents a chemical reaction and consists of the chemical formula of the reactants and the chemical formula of the products. Reactants and products are separated by an arrow symbol ($\rightarrow$). Individual substances's chemical formula are separate by a plus sign. The chemical formula of a substance can be preceded by a number indicating multiple molecules.

Some example for chemical equations are the reaction of hydrochloric acid with sodium:

$2 \text{ HCl} + 2 \text{ Na} \rightarrow 2 \text{ NaCl} + \text{H}_2$

or the equation for photosynthesis:

$6 \text{ CO}_2 + 6 \text{ H}_2\text{O} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{ O}_2$

A chemical equation is considered formally correct if the sum of each type of atoms on the left side of the " $\rightarrow$ " equals the amounts for each atom type on the right side.

E.2 Problem description

Write the program `ChemicalEquations` that reads chemical equations as strings from standard input until the string "end" is read. For each line with a chemical equation the program shall output "formally correct" or "incorrect". The formulae can contain any amount of any element, but there will be no ionized elements or single electrons. Spaces are set as in the example, but you are encouraged to provide a program that is whitespace-tolerant. After reading the string "end", your program shall terminate.

Write the method `static boolean analyze(String formula)` which checks one line of input.

E.2.1 Example Dialog

```
HCl + Na -> NaCl + H2
incorrect
```

```
2 HCl + 2 Na -> 2 NaCl + H2
formally correct
```

```
12 CO2 + 6 H2O -> 2 C6H12O6 + 12 O2
incorrect
```

```
end
```

¹Quelle: <http://mooshak.nes.aau.at/>, Rätsel 13, Dez 2016