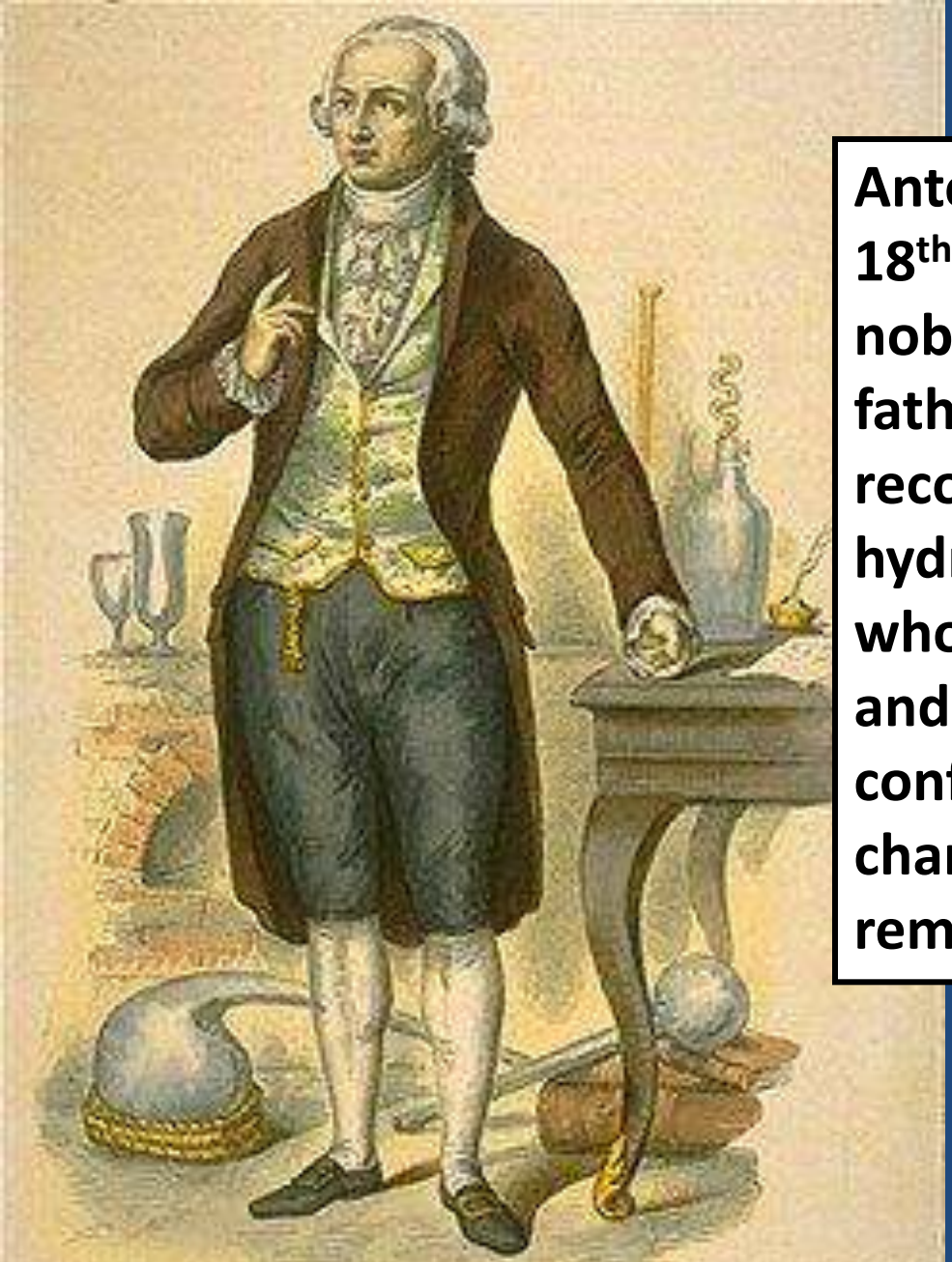
The Law of Conservation of Mass
Lesson 1



Antoine-Laurent de Lavoisier
The Father of Modern Chemistry

Antoine-Laurant de Lavoisier was an 18th century French scientist and nobleman who is considered the father of modern chemistry. He recognized and named oxygen and hydrogen, was one of the scientists who developed the metric system and through his experiments confirmed that although matter may change its form, the total mass remains constant.

The idea that the total mass of matter remains constant is know as

The Law of Conservation of Mass.

It can also be stated as:

Mass in never created or destroyed.

So how did Lavoisier prove this?

By using very precise instruments!

Very Important Information:

In the lab, mass is measured in _grams_ or _kilograms_.

Mass is measured using either a _scale_ or a _balance_.

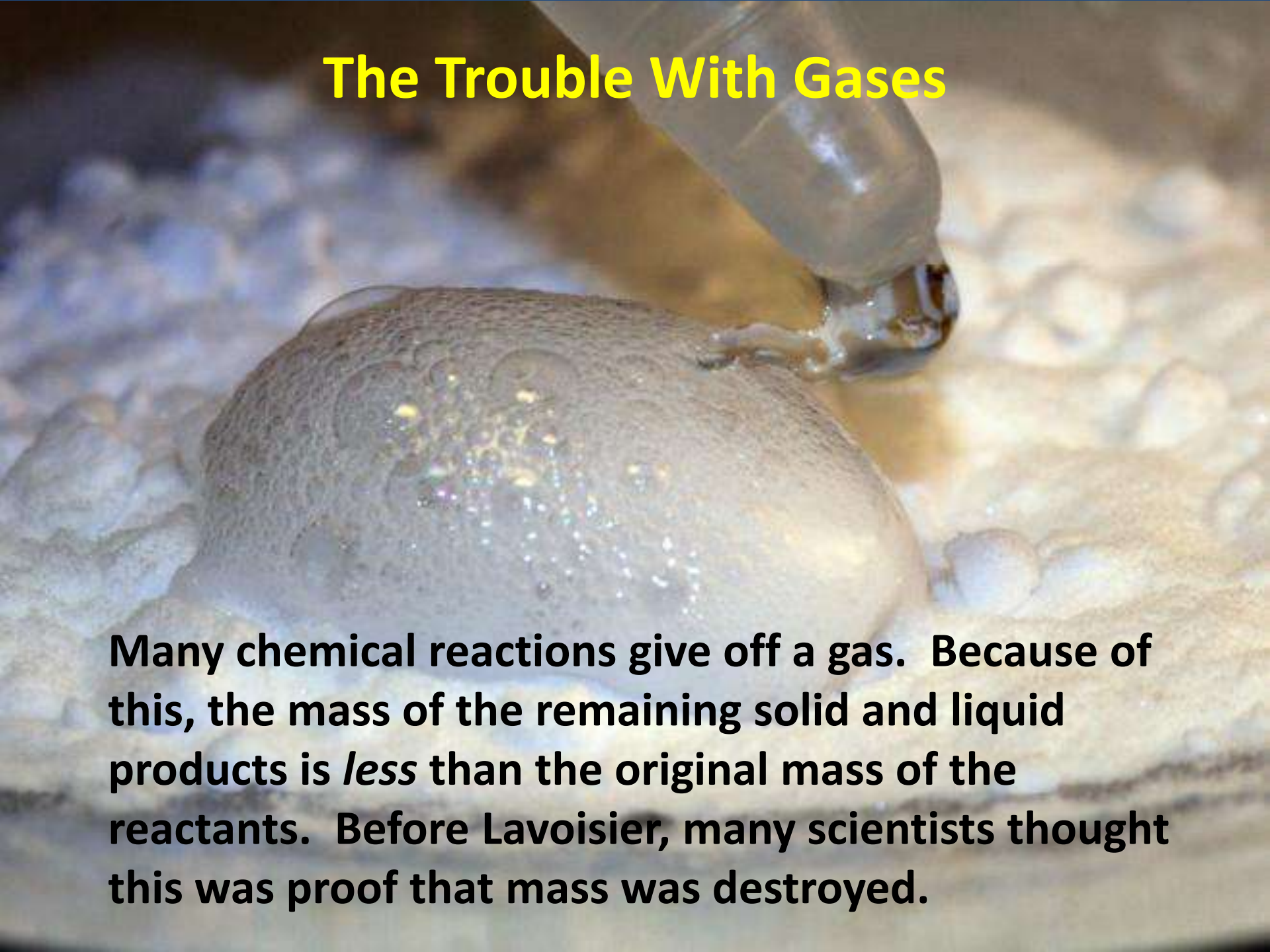
According to the Law of Conservation of Mass, the mass of the reactants should equal the mass of the products.

Reactant 1 + Reactant 2 → Product

Which scientist's results below *best* support the Law of Conservation of Mass?

Scientist	Mass of Reactant 1	Mass of Reactant 2	Mass of Product
Scientist A	19 g	22 g	42 g
Scientist B	19.4 g	22.4 g	41.7 g
Scientist C	19.36 g	22.37 g	41.74 g
Scientist D	19.364 g	22.372 g	41.736 g

The Trouble With Gases

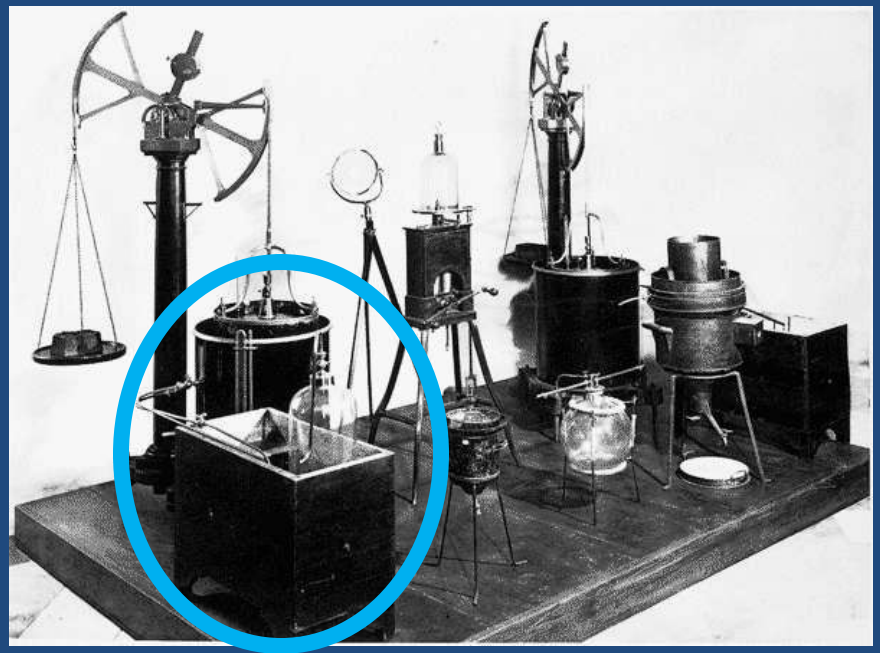


Many chemical reactions give off a gas. Because of this, the mass of the remaining solid and liquid products is *less* than the original mass of the reactants. Before Lavoisier, many scientists thought this was proof that mass was destroyed.

The Trouble With Gases

Lavoisier understood what was happening, and correctly hypothesized that the difference in mass was equal to the mass of the gas given.

So how did he prove it?



Lavoisier developed a device to trap the gases that were given off, then he *performed many experiments* where he showed that the mass of products, including the gas, was equal to the original mass of the reactants.

Understanding Chemical Equations

What is a substance? **A substance is an element or a compound**

The substances that originally react, that is to say that they gain, lose or share electrons, are known as the reactants.

The new substances that are produced are known as the products.

Reactants → **Products**

Solving for Mass

When all but one of the masses are known, solving for the mass of the unknown takes the most elementary of algebra.

3.4g + ?g = 4.2g

?g = 4.2g – 3.4

? = 0.8 g

2.1g + 8.5g = ?g

? = 10.6 g

3.4g + ?g = 12.0g

?g = 12.0g – 3.4g

? = 8.6 g

2.2g + ?g = 5.6g + 2.7g

?g = 5.6g + 2.7g – 2.2g

? = 6.1 g

1.5g + 6.7g = ?g + 3.3g

?g = 1.5g + 6.7g – 3.3g

? = 4.9 g

Solve for the unknown masses on your notes.

Solving for Mass

When this concept is shown with a chemical equation, nothing changes about how it should be solved.

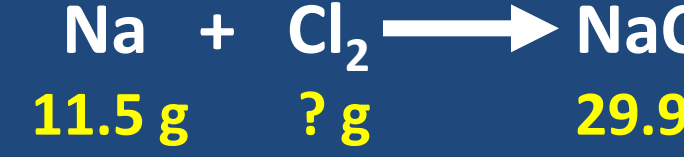
Hydrogen	+	Oxygen	⟶	Water
16.0 g		128 g		? g

16.0 grams of hydrogen reacts with 128 grams of oxygen. Assuming all of the reactants are used up, how much water will be produced?

16.0 g + 128 g = 144 g

Solving for Mass

When you are solving for masses, the most important thing to pay a attention to is the placement of the given masses. Sloppiness and laziness will make an easy question turn into a wrong answer.



If 11.5 grams of sodium are mixed with chlorine gas to make 29.3 grams of sodium chloride, how much chlorine gas was used.

Make sure you place the numbers with the appropriate substance.

29.9 g – 11.5 g = 18.4 grams

Solve for the unknown masses in each of the chemical equations on your notes.