



Turning copper coins into silver and gold

Engage



On our last vacation in Paris, we followed a tip in a guidebook, and decided to visit the home of Nicolas Flamel.

Nicolas Flamel...you may recognize the name...the same Nicolas Flamel who was mentioned in Harry Potter

To those who do not know, Nicolas Flamel, lived in Paris in the 14th century, and was one of the greatest alchemist in the middle ages.

Nicolas Flamel became famous for his two amazing achievements: The first was the formulation of the philosopher's stone that turns metal into gold, the second was his skill to prepare a potion for eternal life.

According to the legend Nicolas Flamel found an old book written in ancient Hebrew of potion recipes. For twenty years he tried to decipher it and to create gold. Eventually – he succeeded! Nicolas Flamel found someone who translated the recipe, and using the instructions he was able to turn copper into gold! At last, he had the philosopher's stone and could produce tons and tons of gold.

When Nicholas Flamel and his wife died, robbers broke into their house in search of the potion's recipe book. The ancient book was never found, but a few decades later, historians found a page that looked like potion-making instructions.

These instructions were found and kept at Flamel's home in Paris, today a restaurant.

When we were there we took a picture of the instructions, having in mind we could prepare the potion. Maybe together we might try to turn metal into gold just as Flamel and his wife did in the past?

By the way, when we were in Paris we also visited the tomb of Nicholas Flamel and his wife, but it turns out to be empty ... so maybe he even managed to concoct the potion for eternal life?

וּתְרַקְחוּן אֶת הַמִּרְקָחַת, וְתִהְיוּ הַנְּחוּשֶׁת לְכֶסֶף, וְהַכֶּסֶף לְזָהָב יִהְיוּ.
וְנִזְהָרְתֶם מְאֹד לְנַפְשׁוֹתֵיכֶם, עַל עֵינֵיכֶם וְעַל יָדֵיכֶם, וְעַל עוֹרְכֶם וְעַל
נְשִׁימַתְכֶם, כִּי רַעַה הַמִּרְקָחַת, וְלֹא תִגְעוּן וְלֹא תִרְיָחוּן וְלֹא יֵעֲלֶה
רִיחָה בְּאַפְכֶם.

וּלְקַחְתֶּם כְּבִיעַה מִיָּם, וְתוֹסִיפוּן שְׁלוֹשׁ אִיסְטְרָאוֹת בְּסִיס הַנְּתָרוֹן.
וְיִמִּיסוּן הַמִּיָּם אֶת בְּסִיס הַנְּתָרוֹן. וְתוֹסִיפוּן הַאִיסְטְרָא הָאַבֶּץ.
וְהַדְּלִקְתֶּם הָאֵשׁ תַּחְתָּהּ וְתִבְעֵבֶע הַקְּדָרָה. וְתִיתֵן פְּרוּטַת הַנְּחוּשֶׁת
בְּקְדָרָה – וְתִיכְסֶף. וְתִיתֵן פְּרוּטַת הַכֶּסֶף בְּאֵשׁ – וְתִהְיוּ זָהָב טְהוֹר.



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Explore



Follow the instructions left by Flamel and record your observations.

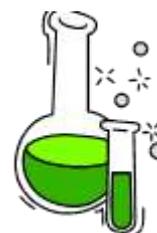
*Thou shall cook up the concoction and transmute copper into silver.
And then the silver to gold shall transform.*

*And you shall guard your souls, your eyes, your hands, your skin
and your breath, for the concoction is ghoulissh. And thou shall not touch
it or its smell shall emerge in thy snout.*

*Takest a water, the size of an egg. Addest three drachms of sodium
base. And thou shalt dissolve these in the water. And thou shall addest
a drachm of Zinc. And thou shalt place a flame from below and brew
the concoction till it bubbles. Putest the copper in the brew and it
silvers. Putest the silver in the fire and it turnest to pure gold.*

To those who do not read ancient Hebrew, We have taken the liberty of translating the recipe into contemporary English and added some tips:

- Wear goggles and disposable gloves.
- Clean a copper coin until it is shiny. You can clean the coin with nitric acid 1M for a few seconds. Wipe the coin with soft paper.
- Dissolve 6g of NaOH in 50 ml of distilled water. After the solution clears, carefully add 2.5g of zinc powder. The solution will fizz as some of the zinc dissolves forming sodium zincate and giving off hydrogen gass.
- Heat the mixture until it boils. (caution: the hot solution is **HIGHLY CORROSIVE**).
- Carefully insert the copper coin into the solution. Coin must touch the zinc powder.
- After 2-3 minutes remove the coin, and rinse it under running tap water to remove traces of sodium hydroxide and of sodium zincate. Show the 'silver' coin to the audience.
- Wipe the coin with soft paper.
- Place the coin on a hot plate for a few seconds. Turn the coin so that both sides are heated equally. Overheating will cause the coin to tarnish. Allow the coin to cool and show it to the audience.





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Explain



1. Do you think we got a silver coin? Explain.
2. Do you think we made a gold coin? Explain.
3. Try to explain what happened.
4. In what do the elements copper, silver and gold differ?
5. Is it possible by a simple chemical reaction to transform one element to another?

Extend



1. Use additional sources of information and think, is it possible to produce gold?
If so, how?
2. How can we prove that the coin is not gold?



Evaluate



Explain why is it impossible to prepare gold or silver coins from copper coins. Base your explanation on the particle structure of matter.