

Alchemy
KS3
Thursday - English

Read the passage and answer the comprehension questions that follow.

Alchemy



Before Chemistry was a science, there was Alchemy. One of the supreme quests of alchemy is to transmute lead into gold. Lead (atomic number 82) and gold (atomic number 79) are defined as elements by the number of protons they have in their nucleus. Changing the element requires changing the number of protons in the nucleus. The number of protons cannot be altered by any normal means. However advanced scientific techniques may be used to add or remove protons and thereby change one element into another. Unfortunately lead is a very difficult element to make lose protons



and for it to lose 3 of them (to change it into gold) requires huge amounts of energy, so much so that it would cost a lot more to turn lead into gold than the resulting gold would actually be worth!

Transmutation of lead into gold isn't just theoretically possible - it has been achieved! There are reports that Glenn Seaborg, 1951 succeeded in transmuting a minute quantity of lead into gold. There is an earlier report (1972) in which Soviet physicists at a nuclear research facility near Lake Baikal in Siberia accidentally discovered a reaction for turning lead into gold when they found the lead shielding of a nuclear reactor had changed to gold.



Today particle accelerators (like the LHC) regularly transmute elements. This is because particle accelerators cause particles to travel so quickly (almost the speed of light) that when they do smash into something they have so much energy that they can knock protons free of the nucleus and change the atom from one element to another.

In nature, new elements are created by adding protons and neutrons to hydrogen atoms within the centre of a star, producing increasingly heavier elements, up to iron (atomic number 26). This process is called nucleosynthesis. Elements heavier than iron are formed in the stellar explosion of a supernova. In a supernova gold may be made into lead, but not the other way around. While it may never be commonplace to transmute lead into gold, it is practical to obtain gold from lead ores. The rocks that normally contain lead (like galena) contain zinc, gold, silver, and other metals. Normally when the lead has been removed there are very small amounts of the other metals as well. The result is almost alchemy...almost.

1. What part of an atom defines what type of element it is?
2. Why do you think that early alchemists found it impossible to turn lead into gold?
3. What do you have to do to lead in order to turn it into gold?
4. What is the word used to describe the process of turning one element into another?
5. Who first reportedly turned lead into gold?
6. Turning lead into gold is possible, why don't scientists use it to get rich quick?
7. Where might you find transmutation happening in nature?
8. How are elements heavier than iron normally formed?