

Homework Problem 10 – Due April 13

Chapter 33

Q1

Some people say that all things are possible. Is it even remotely possible for a common hydrogen atom to emit an alpha particle? Defend your answer!

Q2

Just after an alpha particle leaves the nucleus, would you expect it to speed up? Defend your answer

Q3

The age of the Dead Sea Scrolls was found by carbon dating. Could this technique also have been used if they were carved in stone tablets? Explain!

Q4

Fission reactors (“nuclear power plants”) produce electric energy from the fission of nuclei. Fusion reactors (like the ITER being built in France) hope to produce electric energy from the fusion of nuclei. How is it possible that both fission (= splitting) and fusion (= combining) nuclei can provide a net energy **gain**? Explain!

Q5

If a nucleus has too many neutrons, it can convert one of them into a proton through a weak interaction process. What other particle would be emitted in this process, and what kind of nuclear radiation would this constitute? (alpha, beta, gamma?)

Q6

What would happen if somehow we could turn off the strong interaction everywhere in the universe? Give several examples of the consequences. What would happen to our sun, the element hydrogen, our planet, ourselves? Explain!