

Answers to selected questions

Chapter 19

- Q6** Because there are two isotopes of chlorine each with a slightly different atomic weight (different number of neutrons in the nucleus), the experimenters found the average value of the atomic weight of these two chlorine isotopes.
- Q12** Alpha particles are used, because they can be easily stopped by smoke particles in the air, thus triggering an alarm.
- Q18** Chemical reactions involve energies of the order of an electron volt/atom while nuclear processes involve energies of the order of a Mev/nucleus. Energies released in a chemical reaction, on a per atom or molecule basis, are far less than those released in nuclear reactions.
- Q24** The control rods in a reactor absorb neutrons and are removed or inserted to control the number of neutrons in the chain reaction.
- Q30** The damage to the reactors at Fukushima was not caused by the earthquake, but by the resulting tsunami. After the reactors operating at the time of the earthquake shut down, the decay products continued to release heat. When the tsunami breached the sea wall that was supposed to protect the reactors, the plant's back-up generators were flooded and the reactors began to overheat.
- Q36** No. All commercial nuclear plants use the fission process. Controlled nuclear fusion is still in the experimental state and sustained fusion reactions have only proceeded for extremely short periods of time.