Alignment of Science Teacher Workshops With TEKS

Albert E. Evans, Ph.D, CHP
South Texas Chapter, Health Physics Society

Texas Essential Knowledge and Skills. Chapter 112.4, **SCIENCE**

D) describe types of nuclear reactions such as fission and fusion and their roles in applications such as medicine and energy production; and

This requirement is found in 112.42 (integrated Physics and Chemistry), 112.45 (Chemistry) and 112.47 (Physics). Fission, fusion, radioactive decay, and other types of nuclear reactions are covered in Session I of the Science Teacher Workshop (STW). Applications of nuclear radiation technology to medical diagnosis and treatment, power production, food sterilization, and other activities are described in Session II, "Exposure to radiation in Modern Life".

Chapter 112.45, **CHEMISTRY**

D) describe types of nuclear reactions such as fission and fusion and their roles in applications such as medicine and energy production;

(6) Science concepts. The student knows that atomic structure is determined by nuclear composition, allowable electron cloud, and subatomic particles. The student is expected to:

(A) describe the existence and properties of subatomic particles;

(B) analyze stable and unstable isotopes of an element to determine the relationship between the isotope's stability and its application; and

Properties of electrons, protons, neutrons, and various forms of radiation are covered in Session I of STW

(9) Science concepts. The student knows the processes, effects, and significance of nuclear fission and nuclear fusion. The student is expected to:

(A) compare fission and fusion reactions in terms of the masses of the reactants and products and the amount of energy released in the nuclear reactions;

(B) investigate radioactive elements to determine half-life;

(C) evaluate the commercial use of nuclear energy and medical uses of radioisotopes; and

(D) evaluate environmental issues associated with the storage, containment, and disposal of nuclear wastes.

(A) and (B) are covered in Session 1 of STW
(C) is covered in session II of STW
(D) is covered in Session IV of STW.

(From Chapter 112.43):

(3) Scientific processes. The student uses critical thinking and scientific problem solving to make informed decisions. The student is expected to:

(A) analyze, review, and critique scientific explanations, including hypotheses and theories, as to their strengths and weaknesses using scientific evidence and information;

(B) draw inferences based on data related to promotional materials for products and services;

(C) evaluate the impact of research on scientific thought, society, and the environment;

(D) describe connections between physics and chemistry, and future careers; and

(E) research and describe the history of physics, chemistry, and contributions of scientists.

Session III of STW is a discussion of the hazard in the use of nuclear energy and nuclear radiation, together with a comparison of that hazard with that from exposure to naturally occurring radiation, and other hazards to life. The effect of radiation on living cells is discussed in some detail, including details of damage to DNA structure and possible cell mutation. Session V enumerates principles of radiation safety and radiation safety regulation, and discusses the role of the health physicist in radiation safety management. (It is noted that there is a growing shortage of people trained in this very promising career.)

A history of the development of radiation science and technology from 1895 to the present is given in the introduction to the course.