

Honors Nuclear Research Project

Research groups consisting of 4-5 students will select and distribute the following 16 questions for research among their group members. Each student will investigate their question(s), type up the answers and provide copies to each member of their group for study and one for the final group packet. Groups will be expected to share their information in round-table groups discussions on the assigned due date. Group packets containing all documents will be consolidated with a cover page identifying group members and specified contributions due at the close of the established presentation/discussion day.

1. What is a quark? Compare and contrast the differences between chemical reactions and nuclear reactions. What is this "missing mass" that they are talking about in nuclear reactions?
2. What radioactive isotope is used in geological dating? What radioactive isotope is used in organic dating and reaction mechanisms? How do these work?
3. What are used as coolants in nuclear reactors? Why is this necessary? What is the purpose of a control rod in a nuclear reactor? What is the purpose of a moderator in a nuclear reactor?
4. Why is fusion of nuclei difficult? What is cold fusion?
5. What device is used to slow the speed of neutrons in a nuclear reactor? Does this enhance fission? Why or why not?
6. Identify special uses of common radioisotopes, such as I-131 C-14 to C-12 ratio U-238 to Pb-236 ratio and Co-60. What is a radioactive tracer? What are some of the newest uses of radioisotopes?
7. What are Cosmic Rays? Why are we studying them? Did you know that Granada is involved in a Cosmic Ray Research project with Caltech called CHICOS? What do they hope to find?
8. Describe some of the inherent risks/benefits associated with radioactivity. Describe the three most common, current devices used to monitor radiation exposure and how they work. What are rads and rems?
9. What happened at Chernobyl and 3-mile Island? Describe the future implications of these historical occurrences. What is this area like today?
10. What are the closest nuclear powerplants to Granada Hills Charter High School? What is the governmental watch group that protects the community regarding these facilities? When were they built and has there been any history of accidents or injuries? Were there any issues during past earthquakes at these facilities? What agency monitors nuclear accidents? Is this public information?
11. Describe some of the important contributions by the following individuals to our understanding of nuclear chemistry: Ernest Rutherford, Marie Sklodowska Curie, Antoine Henri Becquerel, E.O. Lawrence, Wilhelm Roentgen.
12. Investigate the issues surrounding Yucca Mountain in Nevada. What are the risks and challenges of this project? Are YOU concerned?
13. What is the Large Hadron Collider? Describe the details and challenges of its construction, problems and issues surrounding this facility. What do they expect to do at this facility? What particles can/can't it accelerate?
14. What are the issues of nuclear contamination surrounding the Rocketdyne Plant in Chatsworth?
15. What happened to Alexander Litvinenko?
16. Investigate food irradiation. Do our local markets sell food that has been radiated? How do we know? How do they do it? Should we be concerned?