

Chem / Envsty L111:  
Spring 2007  
Quiz 9

Name \_\_\_\_\_

1. Which naturally occurring type of radiation has the greatest penetrating power?
  - a. alpha
  - b. beta
  - c. gamma      Gamma rays are high energy radiation, and can pass through some matter    14/21 correct
  - d. neutron
2. Which naturally occurring radioactive particles are the size of a helium nucleus?
  - a. alpha particles    Alpha particles consist of 2 protons and 2 neutrons – the same as a He nucleus    14/21
  - b. beta particles
  - c. gamma radiation
  - d. neutrons
3. What type of radiation is given off in this nuclear reaction?  
 ${}_{84}^{210}\text{Po} \rightarrow {}_{82}^{206}\text{Pb} + \underline{\hspace{2cm}}$ 
  - a. alpha      To balance the equation, you need an atomic number of 2 and a mass number of 4. That's 2 protons and 2 neutrons: an alpha particle    12/21
  - b. beta
  - c. gamma
  - d. neutron
4. What type of radiation is given off in this nuclear reaction?  
 ${}_{6}^{14}\text{C} \rightarrow {}_{7}^{14}\text{N} + \underline{\hspace{2cm}}$ 
  - a. alpha
  - b. beta      To balance this equation, the particle needs an atomic number of -1, which is how we represent a neutron being converted into a proton.    13/21
  - c. gamma
  - d. neutron
5. Which feature or process is unique to nuclear power plants when compared to conventional coal-burning power plants?
  - a. formation of steam
  - b. smoke stacks
  - c. generators
  - d. control rods      Control rods are used to contain the fission reaction in a nuclear power plant. They are not present in conventional power plants.    19/21

6. Which of these is **not** a realistic risk associated with nuclear power plants?
- storage of spent fuel rods
  - the likelihood of nuclear explosion**      **The fuel is not enriched enough to sustain a nuclear explosion**
  - a meltdown from loss of coolant
  - thermal pollution of the coolant source      **11/21**
7. You have a radioisotope with a half-life of 5 days. How many days will it take before the radioisotope is completely gone?
- 5 days
  - 50 days
  - 500 days
  - The isotope will never be completely gone.**      **20/21**
8. Which is **not** true of radioactive half-life? Radioactive half-life is
- the time required for the level of radioactivity in a sample to be cut in half.
  - independent of the amount of radioactive material present.
  - increased by heating the isotope.**      **Half-life is independent of temperature, pressure, chemical form, or the starting amount**      **16/21**
  - independent of the physical or chemical form of the isotope.
9. Which does **not** contribute to your annual radiation dose?
- the type of structure you live in
  - the amount of time you spend riding in jet planes
  - the number of dental X-rays you get each year
  - the number of hours you spend listening to the radio**      **Radio waves are not gamma rays, cosmic rays or X-Rays. Note that housing materials contain radioactive earth elements and plane trips expose you to more cosmic rays**      **16/21**
10. Which is true about radioactivity? Radioactivity
- is used to treat certain cancers.
  - damages white blood cells.
  - deforms DNA.
  - All of these choices are true.**      **21/21! Well done.**