Review Questions of Nuclear Reactions and Radioactivity

ANSWER KEY

- 1. James Chadwick
- 2. Radioactivity
- 3. Direct positive beam of particles at a piece of gold foil, found that most particles went through the foil, some were deflected at an angle and some bounced straight back; Concluded that atom is mostly empty space and has a positive core
- 4. Shows if particles are positive or negative depending on which way they are deflected
- 5. Same element with differing numbers of neutrons
- 6. Protons 12; electrons 12; neutrons 13
- 7. Iodine- 127
- 8. Uranium-236 has one more neutron than uranium-235
- 9. Parent is the original and the daughter is what is produced (what the parent decays into)
- 10. Alpha alpha particle (helium nucleus); beta electron; gamma high energy wave
- $11. \frac{201}{81} \text{Tl} \\ 12. \frac{225}{89} \text{Ac}$
- 13. $^{0}_{0}\gamma$
- 14. The amount of time it takes for half of a parent isotope to decay into the daughter isotope
- 15. The sample has not even gone through one half-life yet
- 16. 2 half-lives
- 17. 0.156 g
- 18. 0.4385 g
- 19. Nuclear fission splitting of larger nucleus into smaller nuclei; fusion joining of smaller nuclei into larger nucleus; both produce large amount of energy
- 20. Can alter DNA and cause cells to die; can lead to cancer; severe radiation from the sun
- 21. $\frac{16}{8}$ O; fission
- 22. $\frac{93}{32}$ Ge; fission
- 23. $\frac{2}{1}$ H; fusion
- 24. $\frac{118}{43}$ Tc; fission
- 25. Nuclear reactions are a result of a change in the nucleus of at atom, the produce huge amounts of energy; chemical reactions are the rearrangement of atoms, don't normally produce huge amounts of energy
- 26. In order for fusion to take place, particles need to be going at high speeds caused by high temperatures, increasing pressure and possibility of joining together to happen
- 27. Used nuclear fission to provide electricity to Canadian consumers harnesses energy from nuclear reactions and converts it into electricity
- 28. Lots of power is produced with low amount of materials, powerful and efficient, reliable
- 29. Atom bomb uses nuclear fission reactions the materials in the bomb join together when the bomb is meant to go off, the reaction proceeds until all the material is used up resulting in huge amounts of energy being released
- 30. The products of nuclear fusion or larger nuclei; these are not radioactive (generally), therefore they are not dangerous. Fission reactions produce radioactive waste which are potentially dangerous and must be stored.