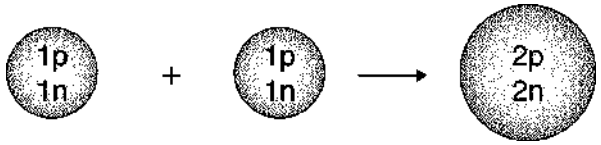
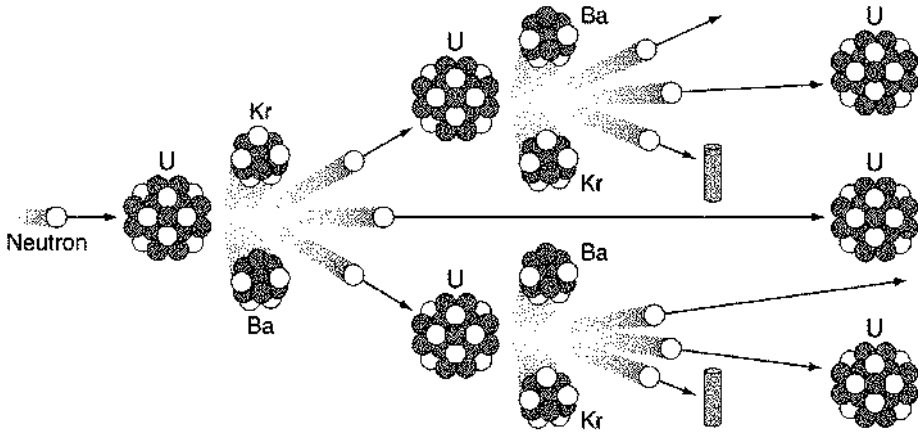
P.Sci. Unit 12 Worksheet – Nuclear Reactions Key.

1.
2. The amount of material left after two half-lives is _one-fourth (1/4)_ of the original amount.
3. _Fission_ means "to divide."
4. _Nuclear Fusion_ is the combining of two low-mass nuclei into one nucleus with a larger mass.
5. Radioactive isotopes that are put into the body to monitor a bodily process are called _radioactive tracers_.
6. Radioactive materials have unstable _nuclei_.
7. Alpha particles are positively charged, consist of two protons and two neutrons, and cannot penetrate a sheet of paper
8. List all the types of nuclear radiation? alpha particles, beta particles, gamma rays, neutrons emission
9. The type of nuclear radiation that can penetrate farthest through matter is called _neutron emissions_.
10. The process of nuclear change in an atom of radioactive material is called _nuclear decay_.
11. Nuclear radiation refers to charged particles or energy emitted by an unstable _neucleus_.
12. During beta decay, a nucleus _ gains a proton and loses a neutron _
13. The attractive force between protons and neutrons in a nucleus caused by the strong nuclear force acts only _ over a very short distance _.
14. Nuclei with too many or too few neutrons are _ unstable _.
15. The process of the production of lighter nuclei from heavier nuclei is called _fission_
16. Fusion occurs when nuclei _combine_.
17. The opposite reaction to fusion is called _fission_
18. In the equation $E = mc^2$, "c" stands for _speed of light (constant)_
19. A fission chain reaction can be slowed by using materials that will absorb some of the neutrons _.
20. The type of radioactive particle that can be stopped by a sheet of paper is the _alpha particle_.
21. The most penetrating type of radiation is the _gamma rays and neutron emissions_.
22. A helium nucleus with two protons and two neutrons is called a(n) _alpha particle_.
23. When the strong force is not sufficient to hold unstable nuclei together permanently, _the nuclei decay_.
24. Negatively charged particles emitted from a nucleus at a high speed are _beta particles_.
25. The process by which nuclei having low masses are united to form nuclei with larger masses is _nuclear fusion_.
26. The four types of nuclear radiation in increasing order of penetrating power are _alpha particles, beta particles, gamma rays, neutron emissions_.
27. The stability of an isotope nucleus depends on the _ neutron-to-proton ratio _.
28. Radioactive tracers are useful in _ determining medical problems _.
29. Both a fusion reaction and a fission reaction produce_energy_.
30. Neutrons released in a fission reaction can strike other nuclei and cause _a chain reaction_.
31. When the _nuclear strong force_ is not large enough to hold a nucleus together tightly, the nucleus can become radioactive
32. Nuclei with more than 83 protons are always unstable, no matter how many _neutrons_ they have.
33. Explain the difference between nuclear fission and nuclear fusion. nuclear fission—splitting a nucleus into two smaller nuclei; nuclear fusion—uniting two nuclei to form a larger nucleus
34. How does the composition of gamma rays compare to the composition of alpha and beta particles? gamma rays-electromagnetic radiation; alpha particles-helium nuclei; beta particles-electrons
35. What particles are given off during a typical nuclear fission reaction? two smaller nuclei, a few neutrons and energy
36. What are the products of a nuclear fusion reaction? one larger nucleus; and energy
37. Name three types of radioactive particles. Alpha particles, beta particles and neutron emissions
38. The chain reaction in a nuclear reactor is controlled by inserting the _boron or cadmium rods (control rods)_.

39. Temperature is the biggest challenge in using _nuclear fusion_ as an energy source.
40. The part of a nuclear reactor in which the fuel is located is called the _the core_.
41. What is a major problem with using nuclear fusion as an energy source? maintaining very high temperatures
42. Explain why the disposal of high-level nuclear waste can be a problem. waste is radioactive; can be harmful to living things; hard to contain because some have long half-lives
43. The half-life of lead-212 is 11 h. How much of a 100-g sample of lead-212 is left after 22 h? 25 g
44. The half-life of lead-212 is 11 h. How many half-lives have passed after 33 h? three half-lives



45. What type of nuclear reaction is shown in the above figure? nuclear fusion
46. What is the product of the reaction shown in the figure above? a helium nucleus



47. What is the name for an ongoing series of reactions, such as those shown in Figure 9-2? a chain reaction
48. What purpose do the control rods in Figure 9-2 serve? They absorb excess neutrons to keep the reaction under control