**Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Unit 13: Nuclear Chemistry**

**I Can Statements**

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| **\_\_\_\_\_5. I can compare types of radiation in terms of symbol, mass number, charge, penetrating power, shielding required, and biological hazard.** | |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | | **Type** | **Symbol** | **Mass #** | **Charge** | **Penetrating Power** | **Shielding Required** | **Bio**  **Hazard** | | **alpha** |  |  |  |  |  |  | | **beta** |  |  |  |  |  |  | | **gamma** |  |  |  |  |  |  | | **neutron** |  |  |  |  |  |  | | **positron** |  |  |  |  |  |  | |
| **\_\_\_\_\_6. I can identify the three types of nuclear reactions.** | The three types of nuclear reactions are:  a.  b.  c. |
| **\_\_\_\_\_7. I can define transmutation, fission, and fusion.** | **Definitions:**  transmutation  fission  fusion |
| **\_\_\_\_\_8. I can state two synonyms for spontaneous decay.** | Two synonyms for spontaneous decay are:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_. |
| **\_\_\_\_\_9. I can show how mass number and electrical charge must be conserved in any nuclear reaction.** | Complete the following nuclear equation:  \_\_\_\_\_\_\_\_ |
| **\_\_\_\_\_10. I can explain what makes a nucleus stable or unstable.** | The stability of the nucleus is dependent on the \_\_\_\_\_\_\_\_\_\_\_\_\_\_ to  \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ratio. |
| **\_\_\_\_\_11. I can explain the difference between natural transmutation and artificial transmutation.** | The difference between natural transmutation and artificial transmutation is that in natural transmutation an\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_breaks apart on its own and in artificial transmutation a \_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_ is made \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ by hitting it with a high energy particle (such as a proton, neutron, or gamma radiation). |
| **\_\_\_\_\_12. I can identify a natural decay reaction from a list of reactions.** | Which equation represents a natural decay? |
| **\_\_\_\_\_13. I can identify an artificial transmutation reaction from a list of reactions.** | Which equation represents artificial transmutation? |
| **\_\_\_\_\_14. I can identify a fission reaction from a list of reactions.** | Which equation represents fission? |
| **\_\_\_\_\_15. I can identify a fusion reaction from a list of reactions.** | Which equation represents fusion? |
| **\_\_\_\_\_16. I can state the conditions of temperature and pressure that are needed for a fusion reaction to happen.** | The temperature and pressure conditions needed for fusion to happen are:  \_\_\_\_\_\_\_\_\_\_\_\_ temperature and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ pressure |
| **\_\_\_\_\_17. I can explain why all nuclear reactions release LOTS more energy than chemical reactions do.** | Nuclear reactions release LOTS more energy than chemical reactions do because |
| **\_\_\_\_\_18. Given a list of reactions, I can differentiate a “nuclear” reaction from a “chemical” reaction.** | Which of the following equations represent NUCLEAR reactions? |
| **\_\_\_\_\_19. I can define half-life.** | **Definition:**  half-life |
| **\_\_\_\_\_20. Given the length of the half-life and the amount of time that has passed, I can determine the amount of radioactive sample.** | Based on Reference Table N, what fraction of a radioactive sample of Au-198 will remain unchanged after 10.78 days?  What was the original mass of a radioactive sample of K-37 if the sample decayed to 25.0 g after 4.92 seconds? The half-life of K-37 is 1.23 seconds) |
| **\_\_\_\_\_21. Given the length of the half-life and the amount of radioactive sample, I can determine the amount of time that has passed.** | A 100.0 g sample of Co-60 decays until only 12.5 g of it remains. Given that the half-life of Co-60 is 5.271 years, how long did the decay take? |
| **\_\_\_\_\_22. Given the amount of time that has passed and the amount of radioactive sample, I can determine the length of the half-life.** | What is the half-life of a radioisotope if 25.0 g of an original 200.0 g sample remains unchanged after 11.46 days? |
| **\_\_\_\_\_23. Using Table N, I can determine the length of half-life and/or decay mode for a specific radioactive isotope.** | Compared to K-37, the isotope K-42 has  A) shorter half-life and the same decay mode  B) shorter half-life and a different decay mode  C) longer half-life and the same decay mode  D) longer half-life and a different decay mode |
| **\_\_\_\_\_24. I can state 5 beneficial uses for radioactive isotopes.** | Five beneficial uses for radioactive isotopes are:  a.  b.  c.  d.  e. |
| **\_\_\_\_\_25. I can state the scientific use of 4 specific radioactive isotopes.** | C-14 is used for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  I-131 is used for\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  U-238 is used for \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  Co-60 is used for\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ |
| **\_\_\_\_\_26. I can state three risks associated with radioactivity and radioactive isotopes.** | Three risks associated with radioactivity and radioactive isotopes are:  a.  b.  c. |