

Nuclear Reactions Worksheet

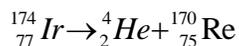
- 1) The alpha decay of radon-198
- 2) The beta decay of uranium -237
- 3) Positron emission from silicon-26
- 4) Sodium-22 undergoes electron capture
- 5) What is the difference between nuclear fusion and nuclear fission?
- 6) What is a "mass defect" and why is it important?
- 7) $^{218}\text{Po} \rightarrow ? \ ^{214}\text{Pb}$
- 8) $^{212}\text{Bi} \rightarrow \beta^- + ?$
- 9) $? \rightarrow \alpha + ^{207}\text{Tl}$
- 10) $^9\text{Be} + ^4\text{He} \rightarrow ? + ^1_0\text{n}$
- 11) $? + ^4\text{He} \rightarrow ^{12}\text{C} + ^6\text{Li}$
- 12) $^{12}\text{C} + ? \rightarrow ^1\text{H} + ^{13}\text{C}$
- 13) The alpha decay of iridium-174
- 14) The beta decay of platinum-199
- 15) Positron emission from sulfur-31
- 16) Krypton-76 undergoes electron capture
- 17) If the half-life for the radioactive decay of zirconium-84 is 26 minutes and I start with a 175 gram sample, how much will be left over after 104 minutes?
- 18) $^{42}\text{K} \rightarrow \beta^- + \underline{\hspace{2cm}}$
- 19) $^{239}\text{Pu} \rightarrow ^4\text{He} + \underline{\hspace{2cm}}$
- 20) $^9\text{Be} \rightarrow ^9\text{Be} + \underline{\hspace{2cm}}$
- 21) $^{235}\text{U} \rightarrow \underline{\hspace{2cm}} + ^{231}\text{Th}$
- 22) $^6\text{Li} \rightarrow ^4\text{He} + \underline{\hspace{2cm}}$
- 23) $\underline{\hspace{2cm}} \rightarrow ^{142}\text{Ba} + ^{91}\text{Kr} + 3 \ ^1_0\text{n}$

Nuclear Chemistry Worksheet – Solutions

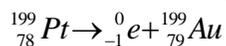
- 1) The alpha decay of radon-198
 ${}_{86}^{198}\text{Po}$
- 2) The beta decay of uranium -237
 ${}_{92}^{237}\text{Np}$
- 3) Positron emission from silicon-26
 ${}_{14}^{26}\text{Al}$
- 4) Sodium-22 undergoes electron capture
 ${}_{11}^{22}\text{Ne}$
- 5) What is the difference between nuclear fusion and nuclear fission?
In nuclear fusion, small nuclei are combined to form a larger nucleus – this process releases a very large amount of energy, and is the main source of energy in the sun. In nuclear fission, large nuclei break apart to form smaller ones, releasing a large amount of energy. Fission is used in nuclear power plants to generate energy.
- 6) What is a “mass defect” and why is it important?
“Mass defect” refers to the difference between the mass of the nucleons (protons + neutrons) in a nucleus when weighed separately and the mass of the nucleus when it’s put together. This difference is important because this missing mass is converted to energy using $E=mc^2$ that’s used to hold the nucleus together.

- 7) ${}_{84}^{218}\text{Po} \rightarrow {}_{2}^{4}\text{He} + {}_{82}^{214}\text{Pb}$
- 8) ${}_{83}^{212}\text{Bi} \rightarrow \beta^{-} + {}_{83}^{212}\text{Po}$
- 9) ${}_{83}^{211}\text{Bi} \rightarrow \alpha + {}_{81}^{207}\text{Tl}$
- 10) ${}_{4}^{9}\text{Be} + {}_{2}^{4}\text{He} \rightarrow {}_{6}^{12}\text{C} + {}_{0}^{1}\text{n}$
- 11) ${}_{7}^{14}\text{N} + {}_{2}^{4}\text{He} \rightarrow {}_{6}^{12}\text{C} + {}_{3}^{6}\text{Li}$
- 12) ${}_{6}^{12}\text{C} + {}_{1}^{2}\text{H} \rightarrow {}_{1}^{1}\text{H} + {}_{6}^{13}\text{C}$

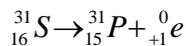
- 13) The alpha decay of iridium-



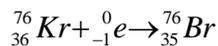
- 14) The beta decay of platinum-199



- 15) Positron emission from sulfur-31



- 16) Krypton-76 undergoes electron capture



- 17) If the half-life for the radioactive decay of zirconium-84 is 26 minutes and I start with a 175 gram sample, how much will be left over after 104 minutes?

Since 104 minutes is equal to four half-lives, the amount of zirconium left over will be:

$$175 \left(\frac{1}{2} \right)^4 = 10.9 \text{ grams}$$