Nuclear Chemistry Worksheet

Using your knowledge of nuclear chemistry, write the equations for the following processes:

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) Name three uses for nuclear reactions.
Nuclear Chemistry Worksheet – Solutions

Using your knowledge of nuclear chemistry, write the equations for the following processes:

1) The alpha decay of radon-198

\[ ^{198}_{86}Rn \rightarrow ^{4}_{2}He + ^{194}_{84}Po \]

2) The beta decay of uranium-237

\[ ^{237}_{92}U \rightarrow ^{0}_{-1}e + ^{237}_{93}Np \]

3) Positron emission from silicon-26

\[ ^{26}_{14}Si \rightarrow ^{26}_{13}Al + ^{0}_{1}e \]

4) Sodium-22 undergoes electron capture

\[ ^{22}_{11}Na + ^{0}_{-1}e \rightarrow ^{22}_{10}Ne \]

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) Name three uses for nuclear reactions.

- Nuclear weapons
- Medicine
- Nuclear power generation