

Name:

Date:

Period: 1.2 Tracked Assignment (Objectives 3: a-g and 4)

1. Define nuclear chemistry.

study of changes in the nucleus

2. Define the two forces in the nucleus.

electromagnetic - repulsion between protons
strong nuclear force - attraction between ~~pro~~ particles in the nucleus

3. How do the two forces in the nucleus interact with each other?

electromagnetic tries to break apart the nucleus
and strong nuclear is holding the nucleus together

4. Explain what makes some atoms unstable and radioactive. List the three conditions that lead to an unstable nucleus.

when electromagnetic overpowers ~~and~~ strong nuclear force
too many protons (past 82)
too many neutrons
~~but~~ not enough neutrons

5. Fill in the following chart comparing alpha, beta, and gamma radiation

	Mass	Charge	Penetration Power/Strength	Symbol
Alpha	very large	+	weak	α or ${}^4_2\text{He}$
Beta	medium	-	medium	β or ${}^0_{-1}\text{e}$
Gamma	none	none	strong	γ

6. Fill in the following chart comparing alpha, beta, and gamma radiations.

	Change in atomic number	Change in mass number
Alpha	decreased by 2	decreased by 4
Beta	increased by 1	none
Gamma	none	none

7. Label the following as alpha, beta, or gamma decays:

a. An atom has decayed from Uranium - 238 to Thorium - 234 alpha

b. Lead - 214 decayed into Bismuth - 214 beta

c. ${}^{226}\text{Ra}$ has become ${}^{222}\text{Rn}$ alpha

d. ${}^{230}\text{Th}$ has given off radiation, but is still ${}^{230}\text{Th}$ gamma

e. ${}^{32}\text{P}$ over time has turned into ${}^{28}\text{Al}$ alpha

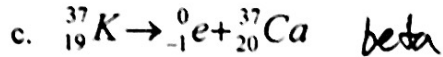
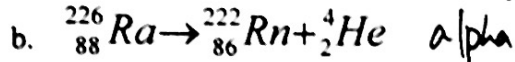
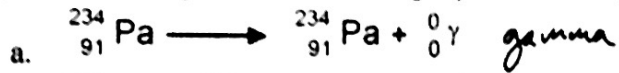
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8. Identify the following reactions as being alpha, beta, or gamma decay reactions.



9. What is the difference between fusion and fission? Provide an example of each type of reaction.

fusion combining 2 nuclei into one and fission is splitting one nucleus into multiple

fusion - stars

fission - nuclear power plant

10. How does a chemical reaction compare in energy to a nuclear reactions such as fission and fusion reactions?

chemical ~~releases~~ release less energy

11. Describe the process that most of the elements in the universe (other than Hydrogen) went through to be formed. Answer the following questions as part of your description. Where were they formed? What nuclear process formed them? What had to happen for elements heavier than Iron to form?

elements were ~~formed~~ formed inside stars through fusion until iron
after iron are formed in supernova of a star through fusion

12. What is the most abundant element in the universe? Explain why.

Hydrogen it is the simplest and doesn't need to be created through fusion

13. What happens to the abundance of an element as atomic number increases? Explain why.

decreases because they are more difficult to form $\frac{1}{2}$ past iron have to be formed in supernova