Topic 3.2: How is energy transformed?

- Energy is transformed in _____ .
- Energy is transformed in _____.
- Energy is transformed when _____ interacts with _____.

Concept 1: Energy is transformed in _____.

- The amount of energy _____ depends on the _____ in the compounds of the chemical reactions.
- In an _____ reaction, reactants have _____ chemical potential energy than the_____.
- In an _____ reaction, reactants have _____ chemical potential energy than the _____.
- All plants and animals carry out _____ to produce energy in the
- form of _____ (adenosine triphosphate) for life processes.

_____

- Plants and algae capture the _____ energy and combine _____
- and _____ to produce _____ (_____) and_____.
- This is the process of _____

_____

Photosynthesis occurs in the _____.

- _____ contain large amounts of chemical _____.
- When fossil fuels are burned through_____, energy is released along with
- _____.

- Fossil fuels also contain _____ such as sulfur and nitrogen that pollute the environment.
-
- _____ transform _____ energy into _____ energy and emit fewer pollutants.

- Where is chemical potential energy in molecules stored?
- How is chemical potential energy transformed by living things?

Concept 2: Energy is _____ in nuclear reactions.

- Energy is _____ in nuclear reactions when atoms are changed into atoms of

  _____ elements.

- *Isotopes*: two or more forms of the same element with _____ number of protons, _____ number of neutrons

- _____: unstable isotopes that emit _____ by giving off energy in the form of electromagnetic waves

- _____**:** the change to an atom due to the emission of _____or radiation

- **Alpha decay:** a nuclear reaction that emits _____ particles or _____ nuclei

  The new nucleus has ____ fewer protons and _____ fewer neutrons.

- **Beta decay:** a nuclear reaction that emits _____ particles or fast-moving _____
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- The new nucleus has _____ neutron and _____ proton.

- **Gamma decay:** a nuclear reaction that emits _____ rays or high-energy _____
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- The unstable _____ that is undergoing the decay has a "*" to represent an excited state.

- **Nuclear fission:** a process in which a heavier _____ is split into smaller, lighter _____ with the release of _____

- It occurs in nuclear reactors.

- A single _____ reaction usually results in a _____ of many further reactions.

- **Nuclear fusion:** a process in which two _____ combine, or fuse, to form a _____ nucleus

    - It requires high_____.

    - It occurs in _____and other _____.

    - It does not produce _____ materials.

1. Compare chemical reactions and nuclear reactions in terms of how much energy they transform.
2. a) What is a radioactive isotope?

b) How do these isotopes get rid of their extra energy?

3. How is alpha decay different from beta decay?
4. Why does gamma decay occur?
5. How are nuclear fission and fusion similar? How do they differ?
6. At a glance, it appears like the law of conservation of energy does not apply to nuclear reactions. Explain why it does.

Concept 3: Energy is _____ when light energy interacts with_____.

- _____, the green pigment in plants, absorbs light.

  _____a process in which energy is taken up by matter without being

  _____or _____

- _____ cells transform light energy into electrical energy.

- The _____ and _____ in the retina of the eye absorb light energy.

- An electrical signal is sent to the brain by nerve cells and an _____ is formed.

1. What role do electrons play in transforming light energy?
2. Compare human vision to a photovoltaic cell in terms of energy transformation.

Topic 3.2 Summary: How is energy _____?

- Energy is transformed in _____reactions.

- Energy is transformed in _____reactions.

- Energy is transformed when _____energy interacts with _____