Name Date Class

Note-taking Worksheet

Radioactivity and Nuclear Reactions

Section 1 Radioactivity

A. The _____ of an atom is composed of protons and neutrons which comprise most of the atom's mass.

B. The _____ causes protons and neutrons to be attracted to each other in the nucleus.

1. The strong force is powerful only when neutrons and protons are _____.

2. The protons and neutrons in a _____ nucleus are held less tightly by the strong force than protons and neutrons in a _____ nucleus.

C. _____—nuclear decay which happens when the strong force is not large enough to hold the nucleus together; the nucleus gives off matter and energy.

1. _____ are atoms of the same element with varying numbers of neutrons.

2. A nucleus with too many or too few neutrons compared to _____ is radioactive.

3. _____—number of protons in an atom

4. _____—number of protons and neutrons in a nucleus

D. Uranium radioactivity was discovered in 1896 by Henri Becquerel; Marie and Pierre _____ discovered the radioactive elements polonium and radium in 1898.

Section 2 Nuclear Decay

A. _____—particles and energy are released from a decaying nucleus.

B. _____ **particle**—two protons and two neutrons with an electric charge of +2

1. Alpha particles leave charged _____ in their path when they travel through matter.

2. Alpha particles are the _____ penetrating form of nuclear radiation.

3. Alpha particles can cause serious biological damage.

C. _____ **particle**—neutron decays into a proton and releases an electron at high speed; more penetrating than alpha particles

D. _____—penetrating electromagnetic waves that carry energy, but have no mass or charge

Meeting Individual Needs

Note-taking Worksheet (continued)

E. _____—process of one element's changing to another through nuclear decay

F. The _____ of a radioactive isotope is the length of time it takes half the nucleus to decay; half-lives vary from fractions of a second to billions of years.

G. Carbon dating can be used to date once-living materials while _____ dating can be used to date rocks.

Section 3 Detecting Radioactivity

A. Radiation detectors are instruments used to identify _____ formed when radiation passes through matter.

1. A _____ **chamber** detects alpha or beta particles by means of a trail of condensed vapor.
2. A _____ **chamber** detects radioactive particles by means of a bubble trail in a superheated liquid.
3. _____ can measure charged particles in the air.

B. A _____ measures radioactivity by producing an electric current when radiation is present.

C. Background radiation comes from _____ gas produced in the Earth's crust, from cosmic rays, and from radioactive isotopes in the body.

Section 4 Nuclear Reactions

A. Nuclear _____—process of splitting a nucleus into two nuclei with smaller masses; a large amount of energy is released.

1. _____—an ongoing series of fission reactions
2. _____—amount of fissionable material required to continue a reaction at a constant rate

Note-taking Worksheet (continued)

B. Nuclear _____—two nuclei with low masses are combined to form one nucleus of larger mass.

1. Nuclear fusion can happen only when nuclei are moving fast enough to get _____ to each other.
2. _____ in stars (millions of degrees Celsius) are high enough for fusion to occur.

C. Nuclear _____ have medical uses.

1. Radioisotopes are used as _____ to find or keep track of molecules in an organism.
2. _____ cells can be killed with carefully measured doses of radiation.