

## 24 • Nuclear Chemistry

### VIDEO WORKSHEET

#### Episode 1 – The Discovery of Radioactivity

1. Nuclear radiation has been part of the human experience since \_\_\_\_\_.
2. In the mid-19<sup>th</sup> century, the scientist \_\_\_\_\_, experimented with a glass tube in which the air was excited by electricity.
3. Cathode rays are deflected by both \_\_\_\_\_ fields and \_\_\_\_\_ fields.
4. Cathode rays were found to be \_\_\_\_\_-charged particles.
5. Wilhelm Roentgen discovered \_\_\_\_\_.
6. Henri \_\_\_\_\_ discovered nuclear radiation accidentally while studying x-rays.
7. The radiation was coming from the chemical, potassium \_\_\_\_\_ sulfate. The important element was \_\_\_\_\_.
8. This radiation was called \_\_\_\_\_ rays in honor of its discoverer.
9. In the electroscope experiment, Becquerel rays caused the electroscope to discharge quickly because the air became a good \_\_\_\_\_.
10. Polonium and radium were discovered by Marie and Pierre \_\_\_\_\_.
11. Marie coined the term “\_\_\_\_\_”.

#### Episode 2 – Properties of Becquerel Rays

1. On what date did Henri Becquerel discover Becquerel rays? \_\_\_\_\_
2. Pierre and Marie Curie invented a device to detect radiation because the radioactive material caused the air to \_\_\_\_\_ electricity... thereby completing the circuit in the machine.
3. Radioactivity interacts with atoms in the air to form positive ions and free \_\_\_\_\_. This makes the air conduct electricity.
4. Ernest Rutherford did an experiment using pieces of aluminum foil. The first few sheets absorbed the \_\_\_\_\_ radiation. The later sheets stopped the \_\_\_\_\_ radiation.
5. Paul Villar later discovered \_\_\_\_\_ radiation.
6. In a magnetic field, the alpha particle is bent \_\_\_\_\_ (a lot, a little, not at all).  
In a magnetic field, the beta particle is bent \_\_\_\_\_ (a lot, a little, not at all).  
In a magnetic field, the gamma particle is bent \_\_\_\_\_ (a lot, a little, not at all).
7. Alpha radiation has a \_\_\_\_\_ charge while beta radiation has a \_\_\_\_\_ charge.
8. Beta particles are identical to \_\_\_\_\_.
9. Alpha particles are identical to the nucleus of the \_\_\_\_\_ atom. (2 protons & 2 neutrons)
10. Wilson invented the \_\_\_\_\_.  
(We will construct these in class.)
11. Radiation in Wilson’s devices appear as trails of \_\_\_\_\_.

### Episode 3 – Natural Transmutation

1. The most easily stopped radiation is \_\_\_\_\_. The most penetrating radiation is \_\_\_\_\_. \_\_\_\_\_ radiation is somewhere in between.
2. During transmutation, an element changes into \_\_\_\_\_. This is because it changes its number of protons.
3. Scientists knew that the nucleus consisted of protons and neutrons in \_\_\_\_\_ [1730 1830 1930]
4. The number of \_\_\_\_\_ determines the identity of atoms.
5. Isotopes have different numbers of \_\_\_\_\_.

Hydrogen has three isotopes: hydrogen-1, hydrogen-2, and hydrogen-3. How many neutrons in hydrogen-1? \_\_\_\_\_

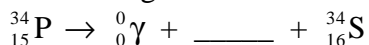
6.  ${}^7_3\text{Li}$  has \_\_\_\_\_ protons and \_\_\_\_\_ neutrons in its nucleus.
7. Nuclear changes do not involve \_\_\_\_\_ [protons, neutrons, electrons]
8. An example of alpha ( $\alpha$ ) decay is when  ${}^{212}_{86}\text{Rn} \rightarrow \text{_____} + {}^{208}_{84}\text{Po}$

What is the isotopic symbol for an alpha particle? \_\_\_\_\_

9. An example of beta ( $\beta$ ) decay is when  ${}^{14}_6\text{C} \rightarrow \text{_____} + {}^{14}_7\text{N}$

What is the isotopic symbol for a beta particle? \_\_\_\_\_

10. Gamma ( $\gamma$ ) radiation is released during other decays. An example is this decay. What particle is given off beside gamma?



11. True/False: The rate of radioactivity slows down over time. \_\_\_\_\_
12. In the video, 16 atoms of Radon-212 are shown. The half-life is 24 minutes. Fill in this data chart.

Time (min)	# atoms Rn-212
0	16
24	
48	
72	
96	