Radioactivity and Its History

For each scientist below, include information about the following:

- a) Area of experimentation
- b) Discoveries
- c) How does this relate to radioactivity
- d) Interesting facts
- e) Diagrams (*if needed*)

William Crookes (Crookes tube and cathode ray tube):

- CRT glass tube in vacuum, current produces beam (goes from negative to positive) cathode to anode, fluorescent glows
- Crookes tube two electric terminals connected to low and high voltages, fluorescence made from beam of particles, cathode rays defect away from negative and towards positive these are electrons

J.J. Thomson:

- Identified the cathode rays in CRT as electrons since they were negatively charged
- "Raison bun model" (plum pudding model) of the atom positive charges all around (the bun) and negative pieces inside (the raisons)

Wilhelm Röntgen:

- Covered CRT with black paper cathode rays hit a metal plate and he noticed fluorescent light outside of the tube, the rays had no name so he called them X-rays
- X-rays can penetrate paper, skin (not bone or metal), high energy waves on the electromagnetic spectrum
- X-rays used to treat and find diseases

Henri Becquerel:

- Used minerals and uranium to find shapes on photographic film, discovered 'Becquerel rays'
- Emissions had an electric charge discovered radioactivity

Pierre and Marie Curie:

- Analyzed uranium to see Becquerel rays
- Uranium was the source of the emission later Marie gave these emissions the name radioactivity and defined it as the spontaneous emission of radiation of the nucleus of an atom
- Discovered polonium and radium, amount of energy based on amount of starting material; Marie won two Nobel prizes

Rutherford (gold foil experiment):

- Direct positive beam of particles at a piece of gold foil, found that most particles went through the foil, some were deflected at an angle and some bounced straight back
- Concluded that atom is mostly empty space and has a positive core discovered the nucleus came up with the planetary model of the atom
- Named the positive particle the proton (equal and opposite to the electron but 1800 times heavier

James Chadwick

- proved the existence of neutrons atomic nuclei had neutral particles as well
- no electric charge and similar in size to proton
- hard to detect because it has no charge stable in the nucleus, unstable outside of the nuclues

Define: **Radioactivity** based on what you have read and discussed (see page 278)

- spontaneous emission of radiation from the nucleus of an atom
- the atom is unstable and emits radiation or radioactive particles