

Open Ended Problem #1
Iron Man 2
Individual work only, Due 9/13/23 at beginning of class
(Don't be afraid to "Google" for reasonable assumptions; just provide references!)

Discovery of a “new” element

Tony had developed the miniature ARC Reactor in his chest, but was daunted the Pd poisoning that was occurring on a regular basis as a result. Thankfully, he realized that his dad discovered a new element, only creatable by using a particle accelerator that behaved similar to Pd, save for the fact that it was too large to enter his blood and poison him. Considering that this new element was yet undiscovered, what is the electron structure for this new element?

- 1) What is this problem actually asking for? What is the final value you are being asked to find?
- 2) Draw a sketch that indicates the actual problem.
- 3)
 - a) What physical laws apply to this problem?
 - b) Indicate equations, correlations, and/or formulae that can model these laws.
 - c) What are the potential limitations of these equations?
- 4) What assumptions should be made to utilize the equations/correlations/formulae listed in part 3b?
 - a) List ALL the assumptions that you need to in order to solve the problem.
(hint - What elements behave similarly to Pd? Is there a trend you can follow?)
(hint – What happens to the nucleus of really, really, large elements?)
 - b) Justify your assumptions (**references**, reasoning, judgment, common sense, etc.)
- 5) What are the physical properties (list assumed or referenced values) used in this problem?
- 6) List the electron structure and atomic number for the new element.
- 7) Verify your answer... Does it look reasonable? Anything odd about the calculation?
 - a) Is this element chemically stable? Why or why not?
 - b) Is it likely that this element would last for 10 years as a power source? Why or why not?
 - c) How many valence electrons are unpaired in this new element?