

Name: \_\_\_\_\_

Homework due next week. You can give brief answers.

Please email ([wfm@tohoku.ac.jp](mailto:wfm@tohoku.ac.jp)) this homework to me by 5PM Wednesday night.

1. Define the four main classes of elements according to V.M. Goldschmidt and give an example of an element from each class. [Look at the periodic I gave you]
2. Can an element fall into more than one of Goldschmidt's classes? If so, give an example of such an element.
3. What is the predominant valence state of REE? Can they have other valence states on Earth? If so, which REE and what are their valence states?
4. What do the adjectives "volatile" and "refractory" mean when applied to elements?
5. Explain briefly how the  $^{182}\text{Hf}$ - $^{182}\text{W}$  isotope system can tell us about the timing of the formation of Earth's core? What properties of these elements make this possible?