Study Questions

1. Why does iron rust, but aluminum doesn't?
2. Why are metals shiny?
3. What chemicals would be useful for cleaning my tub/unclogging my drain?
4. Determine Oxidation State of these compounds
5. Why isn't Gold attracted to magnets? (hint: look at electrons!)
6. How do you obtain copper metal from Copper Sulfide?
7. What is the chemical formula, what will 2 compounds make?
8. What dictates the hardness of a metal?
9. What part of the earth is the main source of raw materials for chemical production?
10. Name the six main classes of minerals discussed in lecture
11. What is the difference between a mineral, an ore, and a rock?
12. Which metals might be found naturally in an uncombined state?
13. True or False: Carbon is among the top 5 most abundant elements in the earth's crust.
14. Define the following terms: gangue, roasting, smelting.
15. Describe 3 methods for concentration of an ore. Under what circumstances might each method be used?
16. Provide chemical equations for the following processes:
    a. Production of sulfuric acid from S8
    b. Production of lime from limestone
17. What natural resource serves as the raw material for the production of sodium hydroxide? Show the chemical equation.
18. What is the effective Nuclear charge of an electron in the n=3 shell of sulfur?
19. Calculate Zeff for the following:
    a. An electron in the 2p orbital of boron (Z =5)
    b. An electron in the 2p orbital of oxygen (Z=8)
    c. From this, what would you conclude about the trend in Z_{eff} as you move from left to right across a period?
20. Arrange the atoms and ions in each series below in order from smallest to largest radius:
    a. Ca2+, S22-, K+, Cl-, Ar
    b. Sr, Mg, Ca, Be, Ba, Ra
21. Calculate the Z_{eff} for Na+, Na, and Na- then compare these values.
22. Looking at phosphorus and sulfur:
    a. Which has a higher Z_{eff}?
    b. Based on the Zeff alone, which would you expect to have a higher ionization energy?
    c. In reality, which has a higher ionization energy? Why? Use an orbital energy level diagram to support your argument.
23. Use concepts of ionization energy and electron affinity to determine which of the following is more energetically favorable
    a. Adding an electron to Na
    b. Removing an electron from Na
24. Is adding an electron to Si more or less favorable than adding an electron to P? Use orbital energy level diagrams to support your argument.
25. Based on your qualitative understanding of ionization energies, which do you predict will react more vigorously with water: potassium or lithium?
26. Calculate Z_{eff} for the following electrons:
    a. A 2p electron of B (Z=5)
    b. A 2p electron of O (Z=8)
    c. From this, what would you conclude about the trend in Z_{eff} when you move from left to right across a period?
27. Arrange the atoms and ions of each series below in the order from smallest to largest atomic radius:
    a. Ca2+,S2-, K+,Cl-,Ar
    b. Sr, Mg, Ca, Be, Ba, Ra
28. Why do atoms combine with other atoms?
29. Why do some substances conduct heat and electricity better than others?
30. Why do some solids absorb moisture from the air and others do not?
31. CH_3OH a lewis acid or base?