

Exam 2 CHM 2045C

General Knowledge:

1. List the driving forces for a double replacement reaction
2. Will Sn displace Mg in solution?
3. List the strong acids. There are 7
4. Define strong electrolyte and describe which substances qualify.
5. Into what ions does CaCl₂ dissociate?
6. What is the charge on an element?
7. How many electrons occupy a 2 p orbital?
8. Which orbitals are there in the 4th energy level?
9. What are the gas-forming products of double replacement reactions?
10. What is the difference between an energy level and an orbital?

Calculations:

11. What is the DeBroglie wavelength of an electron whose mass is $9.11(10^{-31})$ kg, traveling at the speed of light, $2.998(10^8)$ m/s? $\frac{1}{\lambda} = \frac{h}{mv}$
12. What is *the wavelength* of an electron in the 5th energy level according to Bohr? He described the energy as $E=Rhc(1/n^2)$;
Rydberg constant = 0.01097 nm^{-1} ; Planck's Constant: $6.626(10^{-34})\text{Js/photon}$
13. What is the wavelength of the transition between $n=6$ to $n=2$? Is it in the visible range? $\frac{1}{\lambda} = R\left\|\frac{1}{m^2} - \frac{1}{n^2}\right\|$

Essay/Short answer:

1. Explain what a node is and give examples using orbitals
2. Write the electron configuration for the following: Cr, and Ca
3. Write the orbital diagrams for Cr and Ca. you may use the noble gas core
4. What are the 4 quantum numbers for the last e- that were placed in Cr and in Ca.
5. Discuss briefly the stability and magnetic character of Cr and Ca.
6. Describe the implications of the photoelectric effect on our understanding of the atom

Reactions:

Predict the products of and balance the following reactions: If no reaction expected, write "NR".

1. $\text{Sn}_{(s)} + \text{H}_3\text{PO}_{4(aq)} \rightarrow$
2. $\text{MgCl}_{2(aq)} + \text{AgNO}_{3(aq)} \rightarrow$
3. $\text{H}_3\text{PO}_{3(aq)} + \text{CaCO}_{3(s)} \rightarrow$
4. $\text{NH}_4\text{Cl}_{(aq)} + \text{KOH}_{(aq)} \rightarrow$
5. $\text{Fe}_{(s)} + \text{CuCl}_{2(aq)} \rightarrow$

Pick 2 of your reactions that did occur above, and write the total and net ionic equations associated with them.

Write equations from words:

Nickel(II)Chloride solution reacts with Iron(III) Sulfate solution to form Nickel(II) sulfate and Iron (II) chloride solution. This is a redox reaction. Use the half cell approach to balance the reaction.

Mercury(I) nitrate solution reacts with potassium iodide solution to form mercury(I)iodide and potassium nitrate solution.

Extra Credit: describe one idea that we have discussed that caused you problems, and explain the idea in your own words.