

(8b.) STUDY GUIDE

First & Last Name(s): _____ Date: _____ Period: _____

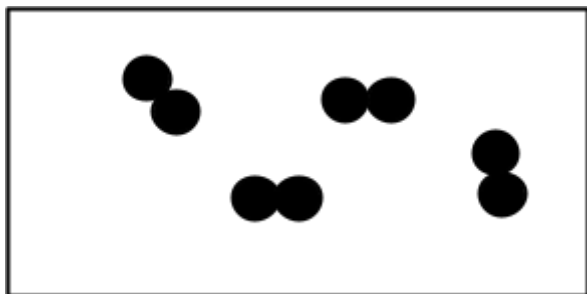
Honors Chemistry

BVHS

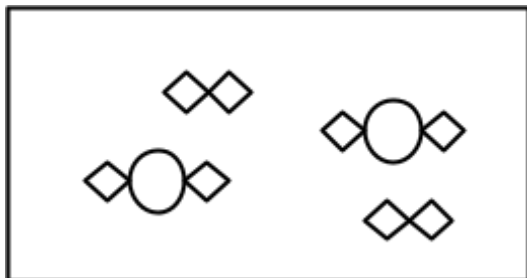
Topic: Matter and Atomic Structure

Review-Atomic Theory and Matter

1. Identify whether the sample below is a sample of atoms of elements, molecules of elements, molecules of compounds, or a mixture.



2. Identify whether the sample below is a sample of atoms of elements, molecules of elements, molecules of compounds, or a mixture.



3. Determine the number of protons, electrons, and neutrons in the following species
- $^{102}_{43}\text{Tc}$
 - $^{229}_{88}\text{Ra}^{2+}$
 - $^{372}_{171}\text{X}^{7-}$
4. Give the complete symbol (atomic mass, atomic #, symbol, and charge if necessary) for the following species with the following number of subatomic particles:
- p=34 e=34 n=48
 - p=79 e=75 n=116
 - p=33 e=36 n=45
5. Determine the frequency of radiation with wavelength equal to 583 nm.
6. Determine the wavelength of radiation with frequency equal to 2023 MHz.
7. Determine the corresponding energy for problem #5
8. Determine the corresponding energy for problem #6
9. Determine the wavelength of radiation equal to an energy of $3.63 \times 10^{-16} \text{ J}$
10. Determine the frequency of radiation equal to an energy of $2.57 \times 10^{-25} \text{ J}$

11. An electron moves from the $n=11$ level to the $n=3$ level.
- Determine the energy for the $n=11$ level.
 - Determine the energy for the $n=3$ level.
 - Determine the energy change between the two levels.
 - Is this energy absorbed or released? How do you know based on your answer from 11C?
 - Determine the corresponding wavelength of light that matches the energy change in 11C.

12. Determine the following quantum values

- If $n=9$, the values of $L=$ _____
- If $L=7$, the values of $m_L=$ _____

13. Determine the maximum number of electrons that can be described by the following quantum numbers:

- $n=5$
- $n=5, L=4$
- $n=5, L=4, m_L = -2$
- $n=5, L=4, m_L = 5$
- $n=5, L=4, m_L = 0, m_s = +\frac{1}{2}$

14. Write the longhand electron configurations

- Aluminum _____
- Manganese _____
- Ni^{2+} _____

15. Write the Noble Gas configuration for

- Copper _____
- Arsenic _____
- S^{2-} _____

16. How many unpaired (single) electrons do the following have:

- Nitrogen atom _____
- N^{3-} ion _____
- Silicon atom _____
- Nickel atom _____

17. Arrange the following electron transitions in order of increasing energy

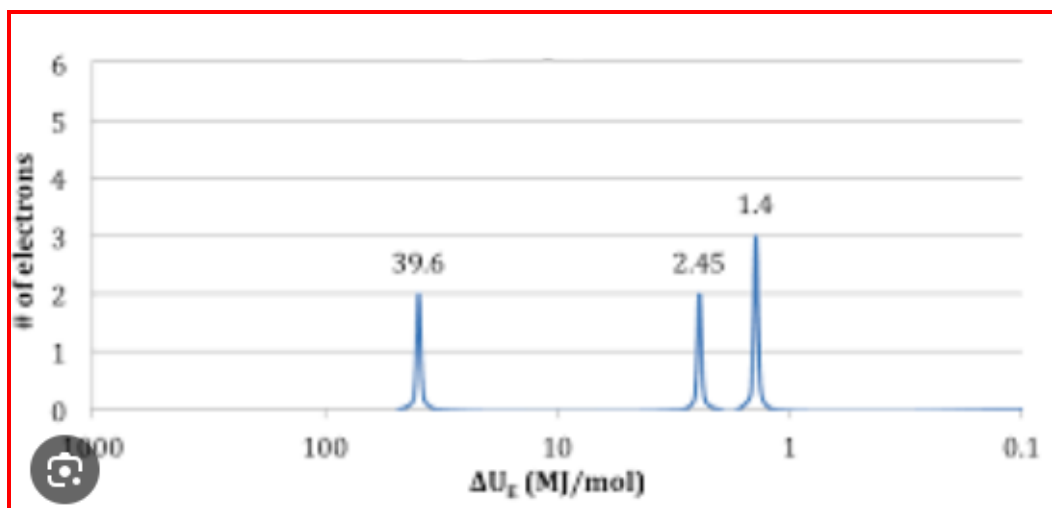
$n=5$ to $n=7$ **A** vs $n=3$ to $n=4$ **B** vs $n=3$ to $n=6$ **C** vs $n=2$ to $n=5$ **D** vs $n=2$ to $n=4$ **E**

18. How would you arrange the transitions in #17 in order of increasing frequency?

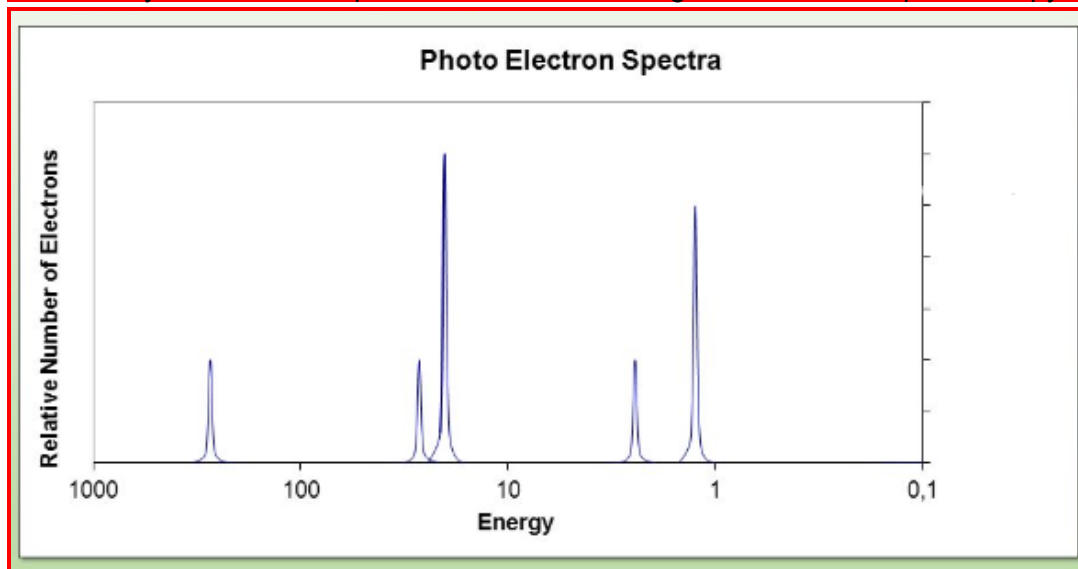
19. How would you arrange the transitions in #17 in order of increasing wavelength?

Stop here if Photoelectron
Spectroscopy is not covered this
year

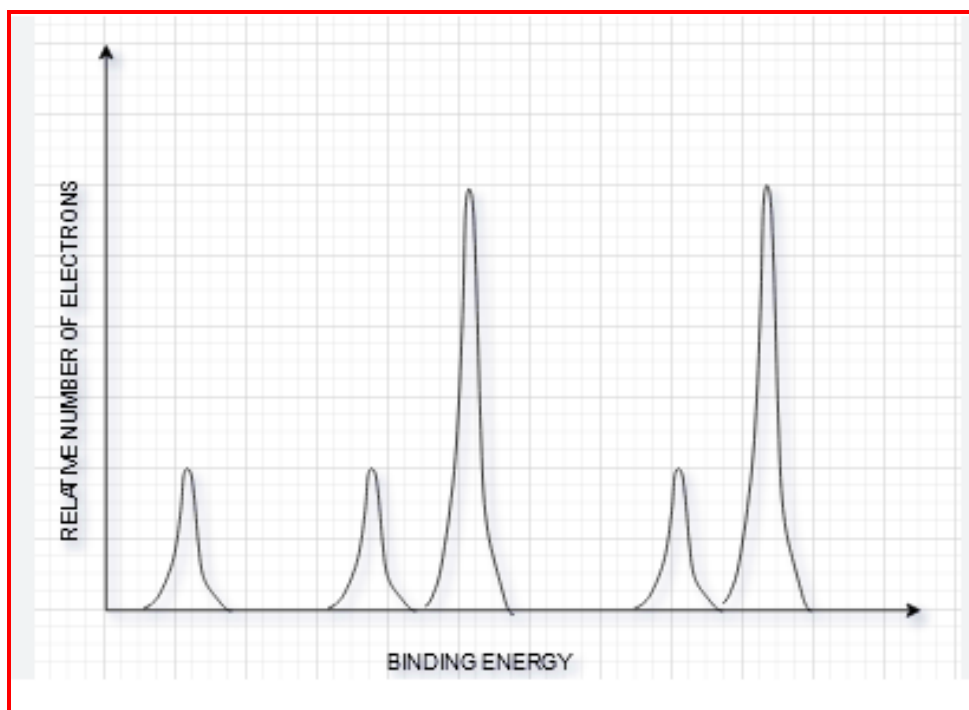
20. Identify the element represented in the following Photoelectron Spectroscopy diagram



21. Identify the element represented in the following Photoelectron Spectroscopy diagram



22. The below diagram represents the PES for Argon. Label each peak with the appropriate symbol (ex: $1s^2$, $3p^6$, ...)



23. The below diagram represents the PES for Argon. Sketch the peaks you would expect to see for the PES diagram for the Ca^{2+} ion. Think about relative size and location of peaks.

