Ch. 4 & 5 atomic structure, AO, spectroscopy, & electron configuration / orbital diagram

40 points honors chem

Academic Honesty: The answers on this test are my own and I am using only the allowed set of notes as described in the syllabus. I have not discussed the test questions with anyone before or during the test nor have I seen the test questions prior to the exam. If you violate any of the preceding items or do not sign, your semester grade is a F.

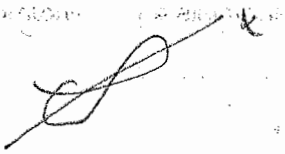
Signature: _____

1. Fill-in the below table regarding some hypothetical (?) isotopes. Need not show any work. [11 points]

symbol	# protons	# electrons	# neutrons	charge	Atomic mass
$^{143}Ba^{2+}$	56	54	87	+2	143
$^{90}Sr^{+2}$	38	36	52	+2	90
$^{69}Br^{-1}$	35	36	34	-1	69

2. Sketch the ___ atomic orbital and draw / label the x-, y-, and / or z- axis to illustrate the orientation of these atomic orbitals with respect to these axis(es); do not draw extraneous axis(es) to avoid ambiguity. [10 points]

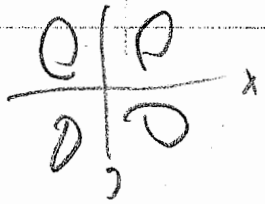
a. p_x



2pt : shape

3pt : axis orientation

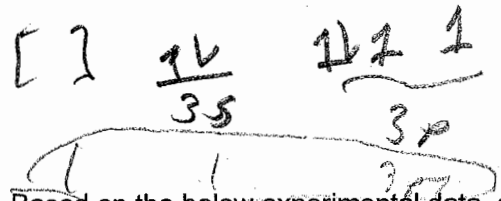
b. d_{xy}



3. Write the electron configuration for the sulfur atom. [4 points]

[Ne] $3s^2$ $3p^4$

4. Sketch the orbital diagram for the sulfur atom. [5 points]



5. Based on the below experimental data, determine the average mass of a bean in the sample of beans. Show your work in an organized manner and show the equation / formula used to get your answer. [10 points]

Type of bean	Mass of a single bean (g)	# beans in sample
lima	1.2	15
navy	0.7	25
pinto	0.4	30

→ $\Sigma = 70$

$\bar{X} = \sum m_i p_i = m_e p_e + m_n p_n + m_p p_p$

$= 1.2 \frac{15}{70} + 0.7 \frac{25}{70} + 0.4 \frac{30}{70}$

$= 0.257 + 0.25 + 0.171$

$= 0.678$