

Name Key Name _____ blue
 (print name) (sign name)

Please show work for full credit and to get partial credit. ($P_{total} = P_A + P_B + P_C + \dots$)
 ($\chi = \text{mole fraction} = P_A / P_{total} = n_A / n_{total}$)

1. If the total pressure inside a cylinder is 1.2 atm and the pressure of the water vapor is 0.5 atm, what is the pressure of the only other gas in the cylinder, hydrogen? Show work. (4 pts)

$P_{total} = 1.2 \text{ atm}$ $P_{H_2O} = 0.5 \text{ atm}$

$P_{total} = P_{H_2O} + P_{H_2}$

$1.2 = 0.5 \text{ atm} + P_{H_2}$

$P_{H_2} = 1.2 - 0.5 = 0.7 \text{ atm}$

Attempt -2

math algebra -1

2. a. If the principal quantum number (n) is 4, what is the equation of the allowed possible angular momentum quantum number (l) (2 pts)

$l = 0, \dots, n-1$ or $0, \dots, (4-1)$

0 to 4 -1

4 to +4 -1/2

- b. How many orbitals are in the p subshell? (p is the angular momentum quantum number $l=1$)

[(0) (1) (3) (5)] (circle one) (2 pts)

-1, 0, +1

said +3, just -

- c. How many maximum number of electrons are allowed in the p subshell?

[(2) (6) (10) (14)] (circle one) (2 pts)

2 per orbital $\times 3 = 6e$

3. Give the electron configuration for the element Si using the notation ($1s^2, 2s^2, \dots$). Show all electrons starting from the lowest energy levels. (10 pts)

$1s^2, 2s^2, 2p^6, 3s^2, 3p^2$

extra wrong -1

- Extra credit: a. What is the valence electron configuration for the above element? use same notation as above (2 pts)

$3s^2, 3p^2$

not valence -1

- b. Give the electron configuration diagram for the valence electrons for the same element. (2 pts) (use the notation $\uparrow \downarrow$)

1s 2s

$\uparrow \downarrow$ $\uparrow \downarrow$ $\uparrow \downarrow$ $\uparrow \downarrow$ $\uparrow \downarrow$

3s 3p

Consistent w above OK

Incorrect orbitals 2s -

Hund violation -1

did not show orbitals -1

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Please show work for full credit and to get partial credit. ($P_{total} = P_A + P_B + P_C + \dots$)
 ($x = \text{mole fraction} = P_A / P_{total} = n_A / n_{total}$)

algebra math - 1/2

1. If the pressure of nitrogen is 760 mm Hg and the pressure of the helium is 20 mm Hg, what is the total pressure the gases inside a cylinder containing the two gases? Show work. (4 pts)

attempt - 2

$$P_{total} = P_{N_2} + P_{He}$$

$$P_{total} = 760 \text{ mmHg} + 20 \text{ mmHg} = 780 \text{ mmHg}$$

typo
m

2. a. If the angular momentum quantum number (l) is 2, what is the equation of the allowed possible magnetic quantum number (m_l) (2 pts)

$$(-2, \dots, 0, \dots, +2) \text{ or } -2, -1, 0, +1, +2$$

or 0 to +2
gave 0 to +2
-1/2 pt

- b. How many orbitals are in the d subshell? (d is the angular momentum quantum number of $l = 2$)

[(0) (1) (3) (5)] (circle one) (2 pts) $-2, -1, 0, +1, +2 \text{ or } 5$

gave -1 to +1
-1/2 pt

- c. How many maximum number of electrons are allowed in the d subshell?

[(2) (6) (10) (14)] (circle one) (2 pts) $5 \times 2 = 10e^-$

just 2
-1/2 pt

3. Give the electron configuration for the element Br using the notation ($1s^2, 2s^2, \dots$). Show all electrons starting from the lowest energy levels. (10 pts)

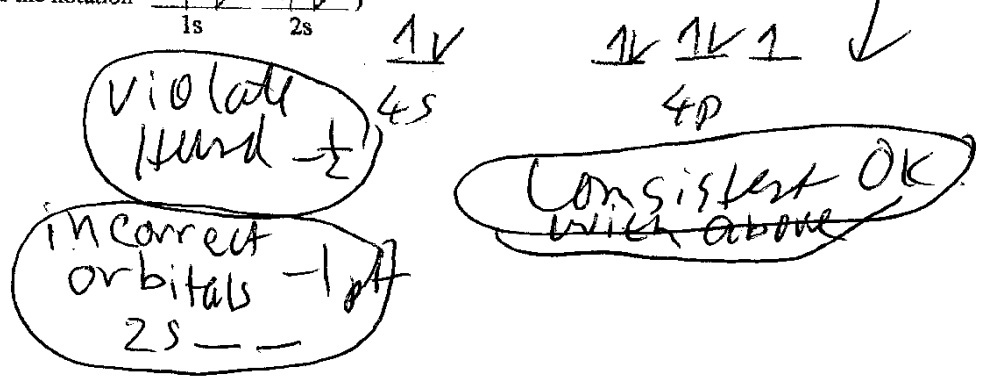
$$1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^{10}, 4p^5$$

(2 pt) (2 pt) (1 pt) (1 pt) (1 pt) (1 pt) (1 pt) (1 pt)

- Extra credit: a. What is the valence electron configuration for the above element? use same notation as above (2 pts)

$4s^2, 4p^5$
 (1 pt) (1 pt) extra wrong - 1/2
 not valence - 1

- b. Give the electron configuration diagram for the valence electrons for the same element (2 pts)
 (use the notation $\uparrow\downarrow$)



Name Key (print name) Name _____ (sign name) pink

Please show work for full credit and to get partial credit. ($P_{total} = P_A + P_B + P_C + \dots$)
 ($\chi = \text{mole fraction} = P_A / P_{total} = n_A / n_{total}$)

1. If a mixture of gases has a total pressure of 0.955 atm and the oxygen part of the mixture of gases is 0.150 atm, what is the mole fraction of the oxygen in the mixture of gases? Show work. (4 pts)

$P_{total} = 0.955 \text{ atm}$ $P_{O_2} = 0.150 \text{ atm}$ attempt -2
 $\chi_{O_2} = \frac{0.150 \text{ atm}}{0.955 \text{ atm}} = 0.157$ algebra math -1/2

2. a. If the principal quantum number (n) is 3, what are the possible values of the angular momentum quantum number l (2 pts) 0, 1, 2 ($n-1 = 3-1 = 2$) gave -3, 0, +3 -1/2

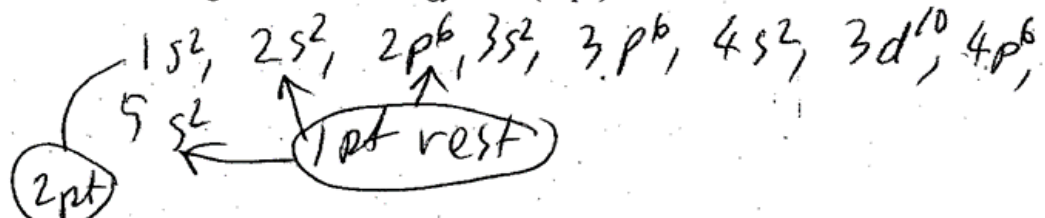
- b. How many orbitals are in the f subshell? (l is the angular momentum quantum number of $l=3$)

[(0) (1) (3) (5) (7) (circle one) (2 pts)] -3, -2, -1, 0, +1, +2, +3

- c. How many maximum number of electrons are allowed in the f subshell?

[(2) (6) (10) (14) (circle one) (2 pts)] $2 \times 7 = 14$

3. Give the electron configuration for the element Sr using the notation ($1s^2, 2s^2, \dots$). Show all electrons starting from the lowest energy levels. (10 pts)



- Extra credit: a. What is the valence electron configuration for the above element? use same notation as above (2 pts)

$5s^2$ not valence -1
gave $4p^6$ -1

- b. Give the electron configuration diagram for the valence electrons for the same element. (2 pts) (use the notation ↑↓ ↑↓)

↑↓
5s consistent w above Ok
violates Hund (-1/2)

incorrect orbitals such as ↑
2s --

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Please show work for full credit and to get partial credit. ($P_{total} = P_A + P_B + P_C + \dots$)
 (χ = mole fraction = $P_A / P_{total} = n_A / n_{total}$)

1. If water vapor is 0.12 atm and the total pressure of the gases collected over water is 1.23 atm, what is the mole fraction of the water vapor? Show work. (4 pts)

$P_{H_2O} = 0.12 \text{ atm}$ $P_{total} = 1.23 \text{ atm}$ (Attempt -2)
 $\chi_{H_2O} = \frac{0.12 \text{ atm}}{1.23 \text{ atm}} = 0.0976$ (algebra math -1/2)

2. a. If the angular momentum quantum number (l) is 2, what are the possible values of the magnetic quantum number m_l = -2, -1, 0, +1, +2 (2 pts) gave (0, 1, 2)

- b. How many orbitals are in the s subshell? (s is the angular momentum quantum number of $l = 0$)

[(0) (1) (3) (5)] (circle one) (2 pts)

$l = 0, m_l = 0$

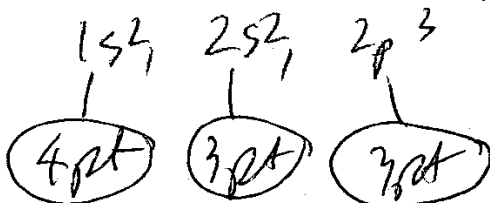
- c. How many maximum number of electrons are allowed in the s subshell?

[(2) (6) (10) (14)] (circle one) (2 pts)

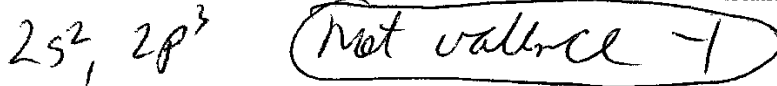
$2e^- \text{ per orbital} = 2e^-$

gave (0, 1, 2) or (0, 1) - 1/2 just 2 - 1

3. Give the electron configuration for the element N using the notation ($1s^2, 2s^2, \dots$). Show all electrons starting from the lowest energy levels. (10 pts)

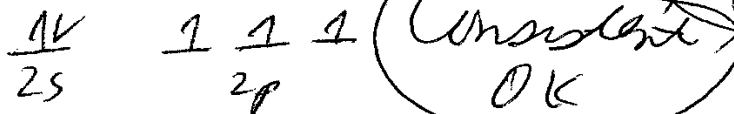


- Extra credit: a. What is the valence electron configuration for the above element? use same notation as above (2 pts)



- b. Give the electron configuration diagram for the valence electrons for the same element. (2 pts)

(use the notation $\uparrow \downarrow$ $\uparrow \downarrow$)
 1s 2s



(consistent) OK (with above)

violates Hund - 1/2

(-1) incorrect orbitals such as 2s - -

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1. If the total pressure inside a cylinder is 1.2 atm and the pressure of the water vapor is 0.5 atm, what is the pressure of the only other gas in the cylinder, hydrogen? Show work. (4 pts)

2. a. If the principal quantum number (n) is 4, what is the equation of the allowed possible angular momentum quantum number (ℓ) (2 pts)

$\ell =$ _____

- b. How many orbitals are in the **p** subshell? (p is the angular momentum quantum number $\ell = 1$)

[(0) (1) (3) (5)] (circle one) (2 pts)

- c. How many maximum number of electrons are allowed in the **p** subshell?

[(2) (6) (10) (14)] (circle one) (2 pts)

3. Give the electron configuration for the element **Si** using the notation ($1s^2, 2s^2, \dots$). Show all electrons starting from the lowest energy levels. (10 pts)

Extra credit: a. What is the valence electron configuration for the above element? use same notation as above (2 pts)

- b. Give the electron configuration diagram for **the valence electrons** for the same element. (2 pts)

(use the notation $\uparrow \downarrow \uparrow \downarrow$)
 $1s \quad 2s$

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- b. How many orbitals are in the **d** subshell? (d is the angular momentum quantum number of $\ell = 2$)

[(0) (1) (3) (5)] (circle one) (2 pts)

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[(2) (6) (10) (14)] (circle one) (2 pts)

3. Give the electron configuration for the element **Br** using the notation ($1s^2, 2s^2, \dots$). Show all electrons starting from the lowest energy levels. (10 pts)

Extra credit: a. What is the valence electron configuration for the above element? use same notation as above (2 pts)

- b. Give the electron configuration diagram for **the valence electrons** for the same element. (2 pts)

(use the notation $\frac{\uparrow \downarrow}{1s} \frac{\uparrow \downarrow}{2s}$)

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b. How many orbitals are in the f subshell? (f is the angular momentum quantum number of $\ell = 3$)
[(0) (1) (3) (5) (7)] (circle one) (2 pts)
c. How many maximum number of electrons are allowed in the f subshell?
[(2) (6) (10) (14)] (circle one) (2 pts)

3. Give the electron configuration for the element Sr using the notation ($1s^2, 2s^2, \dots$). Show all electrons starting from the lowest energy levels. (10 pts)

Extra credit: a. What is the valence electron configuration for the above element? use same notation as above (2 pts)

b. Give the electron configuration diagram for **the valence electrons** for the same element. (2 pts)
(use the notation $\begin{array}{c} \uparrow \downarrow \\ 1s \end{array} \begin{array}{c} \uparrow \downarrow \\ 2s \end{array}$)

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2. a. If the angular momentum quantum number (ℓ) is 2, what are the possible values of the magnetic quantum number m_ℓ _____ (2 pts)

b. How many orbitals are in the s subshell? (s is the angular momentum quantum number of $\ell = 0$)

[(0) (1) (3) (5)] (circle one) (2 pts)

c. How many maximum number of electrons are allowed in the s subshell?

[(2) (6) (10) (14)] (circle one) (2 pts)

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(use the notation $\begin{array}{c} \uparrow \downarrow \\ 1s \end{array} \begin{array}{c} \uparrow \downarrow \\ 2s \end{array}$)