

NAME _____

$$\lambda p = h \quad \Delta x \Delta p \approx h \quad h = 6.626 \times 10^{-34} \text{ m}^2 \text{ kg}^{-1} \text{ s}^{-1}$$

Electron mass = 9.11×10^{-31} kg, Neutron mass = 1.675×10^{-27} kg, Proton mass = 1.673×10^{-27} kg

$$p = mv \text{ (Thus, units for momentum are kg m s}^{-1}\text{)}$$

Be sure you always provide the proper units (½) off!**Be sure you always provide the proper number of significant figure (½) off!**

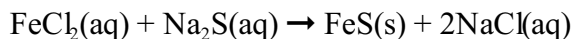
- 1) An electron's uncertainty in velocity is $2.30 \times 10^3 \text{ m s}^{-1}$ due to being confined. What is the uncertainty in its position?

ANS: _____

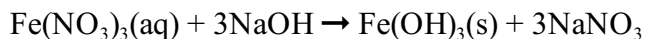
- 2) A proton is confined to a space of $2.13 \times 10^{-1} \text{ m}$. What is the uncertainty in its velocity?

ANS: _____

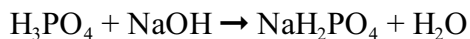
- 3) For the following overall reactions, give the net ionic reaction.



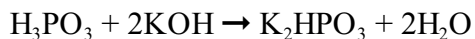
ANS: _____



ANS: _____



ANS: _____



ANS: _____

- 4) Arrange the following atoms in order of size, from large to small according to the general periodic trend.

A) O, N, C, Be, B, Li

Large _____ > _____ > _____ > _____ > _____ > _____ Small

B) S, P, Si, Mg, Al, Na

Large _____ > _____ > _____ > _____ > _____ > _____ Small

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- 5) Arrange the following atoms from high electronegativity to low electronegativity according to the general trend.

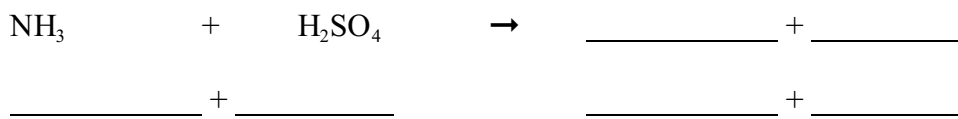
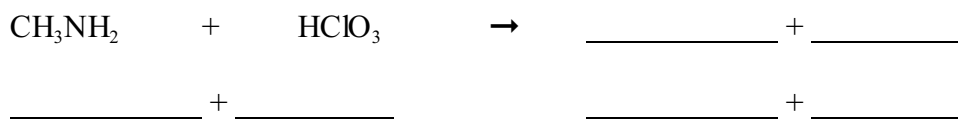
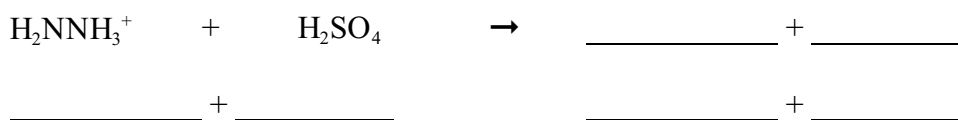
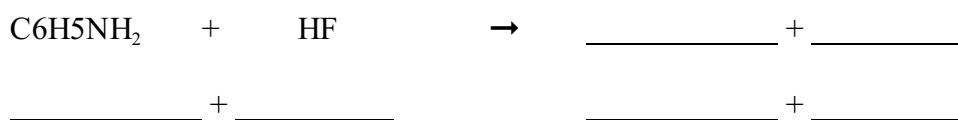
A) Se , As , Ge , Ca , Ga , K

High _____ > _____ > _____ > _____ > _____ > _____ Low

B) Ni, Mn, Cr, Ti, V, Sc

High _____ > _____ > _____ > _____ > _____ > _____ Low

- 6) Complete the following Brønsted–Lowry for acid–base reactions. On the following line label the reactants and products appropriately as "acid 1", "acid 2", "base 1" and "base 2".



- 7) Give the electron configuration according to the aufbau principle based on the hydrogen atom for the following atoms.

Mo : _____

Se : _____

La : _____

Pd : _____

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8) Give the value(s) (that is, give all possible values) for the quantum numbers for the highest energy electron in the following atoms in the ground state.

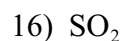
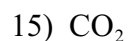
Tl: n = _____ l = _____ m_l = _____ m_s = _____

Cl: n = _____ l = _____ m_l = _____ m_s = _____

Dy: n = _____ l = _____ m_l = _____ m_s = _____

In: n = _____ l = _____ m_l = _____ m_s = _____

In the spaces provided, give the proper Lewis dot structures for the following compounds. Use the convention with the double arrow for resonance.



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What is the electronic and molecular geometry for the following molecules? If there are more than one central atom, give the geometry of both.

17A) H_2CNH Electronic = _____ Molecular = _____17B) COS Electronic = _____ Molecular = _____18A) SO_3 Electronic = _____ Molecular = _____18B) NO_2^- Electronic = _____ Molecular = _____19) Does the molecule HCCH have a rotation that is hindered. Give you reason for your answer.

YES? ____ NO? ____ Why? _____

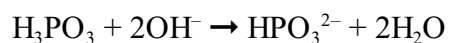
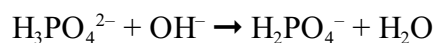
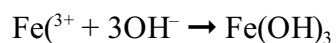
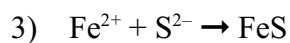
20) Does the molecule CH_3SH have a rotation that is hindered. Give you reason for your answer.

YES? ____ NO? ____ Why? _____

KEY

1) $3.16 \times 10^{-7} \text{ m}$

2) $1.86 \times 10^{-6} \text{ m s}^{-1}$

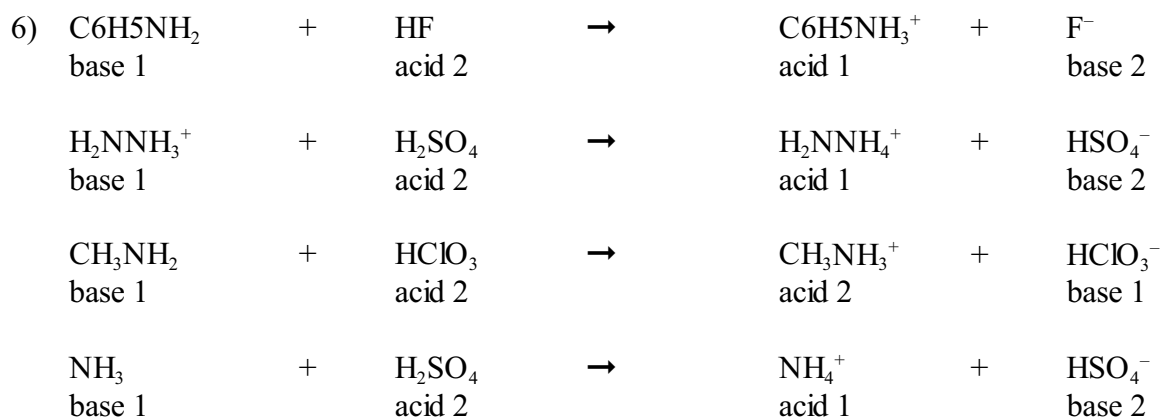


4) $\text{Li} > \text{Be} > \text{B} > \text{C} > \text{N} > \text{O}$

$\text{Na} > \text{Mg} > \text{Al} > \text{Si} > \text{P} > \text{S}$

5) $\text{Se} > \text{As} > \text{Ge} > \text{Ga} > \text{Ca} > \text{K}$

$\text{Ni} > \text{Mn} > \text{Cr} > \text{V} > \text{Ti} > \text{Sc}$



7) $\text{Mo} : [\text{Kr}]5s^24d^4$

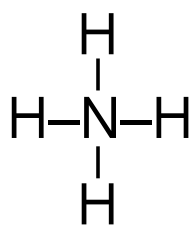
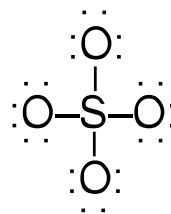
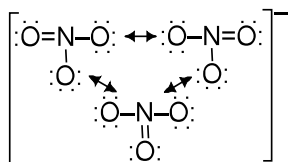
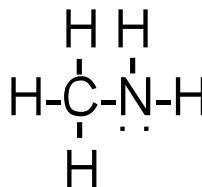
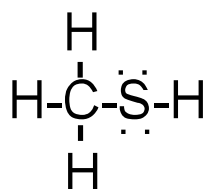
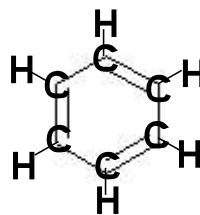
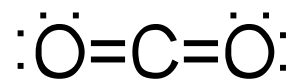
$\text{Se} : [\text{Ar}]4s^23d^{10}4p^4$

$\text{La} : [\text{Xe}]6s^24f^1$

$\text{Pd} : [\text{Kr}]5s^24d^8$

KEY

- 8) Tl: $n=6$ $l=+1$ $m_l = -1, 0, +1$ $m_s = \pm 1/2$
 Cl: $n=3$ $l=+1$ $m_l = -1, 0, +1$ $m_s = \pm 1/2$
 Dy: $n=4$ $l=+3$ $m_l = -3, -2, -1, 0, +1, +2, +3$ $m_s = \pm 1/2$
 In: $n=5$ $l=+1$ $m_l = -1, 0, +1$ $m_s = \pm 1/2$

9) NH_4^+ 10) SO_4^{2-} 11) NO_3^- 12) CH_3NH_2 13) CH_3SH 14) C_6H_6 ring15) CO_2 16) SO_2 

KEY

- 17A) H_2CNH : hybrid = sp^2 and sp^2 electronic = trigonal molecular = trigonal and bent 120°
- 17B) COS : hybrid = sp electronic = linear molecular = linear
- 18A) SO_3 : hybrid = sp^2 electronic = trigonal molecular = trigonal
- 18B) NO_2^- : hybrid = sp^2 electronic = trigonal molecular = bent 120°
- 19) HCCH hindered? NO Why? triple bond
- 20) CH_3SH hindered? NO Why? single bond