

Write your answers on the answer sheet.

$$E_{ke} = 1/2mv^2$$

$$p = mv$$

$$p = h$$

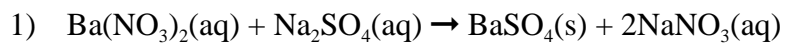
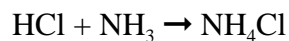
$$x \quad p = h$$

$$h = 6.63 \times 10^{-34}$$

- 1) Write the net ionic reactions for the following overall reactions (you may use $H^+ = H_3O^+$):
Be careful to write the proper charge with ions.
 $Ba(NO_3)_2(aq) + Na_2SO_4(aq) \rightarrow BaSO_4(s) + 2NaNO_3(aq)$
 $HCl + NH_3 \rightarrow NH_4Cl$
- 2) Finish the following Brønsted–Lowry reactions.
 $H_3O^+ + H_2NNH_2 \rightleftharpoons$
 $H_3CCOOH + OH^- \rightleftharpoons$
 $HNO_3 + CH_3NH_2 \rightleftharpoons$
 $HF + NH_3 \rightleftharpoons$
- 3) What is the wavelength of a proton that has an energy of 1.24×10^{-26} kJ.
 $h = 6.63 \times 10^{-34}$ $m_{p^+} = 1.67 \times 10^{-24}$
- 4) What is the uncertainty in the momentum of a neutron that is confined to a space of 4.8 nm.
 $h = 6.63 \times 10^{-34}$ $m_{no} = 1.67 \times 10^{-24}$
- 5) For the following atoms, give the four electron quantum numbers that the highest energy electron in the ground state could have. Cl , P , B , and S
- 6) Write the electron configuration, according to the aufbau principle based on the hydrogen atom, for the following atoms.
 Cd , O , Mn , and Al
- Draw the Lewis dot structure for the following compounds/ions:
- | | | |
|-----------------|---------------|--------------|
| 7) HOH | 8) H_2NNH_2 | 9) HCCH |
| 10) H_2CCH_2 | 11) NH_4^+ | 12) SO_2 |
| 13) CO_3^{2-} | 14) SF_5^- | 15) IF_2^- |
- 16) Which of the following have the rotation hindered? Tell why it the roatation is or is not hindered.
 FCN ClH_2CCH_2Cl
- 17) Which of the following have the rotation hindered. Tell why it the roatation is or is not hindered.
 HCN H_2CCH_2
- 18) Give the product for each of the following reactions. For each there is only one product. (You do not need to balance the reactions.)
 $N_2 + I_2 \rightarrow$ $N_2 + Br_2 \rightarrow$
- 19) Give the products for each of the following reactions. For each there are two products. (You do not need to balance the reactions.)
 $S_8 + Cl_2 \rightarrow$ $P_4 + Cl_2 \rightarrow$
- 20) An unknown molecule diffuses 1.38times faster than Xe (molar mass of 131.3 g mol^{-1}). What is the unknown's molar mass?

ANSWER SHEET – 1st page

NAME _____

Be sure to include units where needed. No units – no credit! \rightleftharpoons  \rightleftharpoons 

3) = _____

4) $p =$ _____

5) For Cl $n =$ _____ $l =$ _____ $m_l =$ _____ $m_s =$ _____

For P $n =$ _____ $l =$ _____ $m_l =$ _____ $m_s =$ _____

For B $n =$ _____ $l =$ _____ $m_l =$ _____ $m_s =$ _____

For S $n =$ _____ $l =$ _____ $m_l =$ _____ $m_s =$ _____

6) For Cd : _____

For O : _____

For Mn : _____

For Al : _____

ANSWER SHEET – 2nd page

NAME _____

7) HOH :

8) H₂NNH₂ :

9) HCCH :

10) H₂CCH₂ :

11) NH₄⁺ :

12) SO₂ :

13) CO₃²⁻ :

14) SF₅⁻ :

ANSWER SHEET – 3rd page

NAME _____

15) IF_2^- :

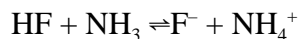
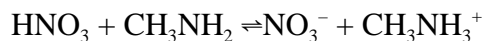
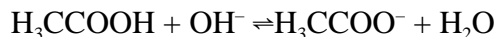
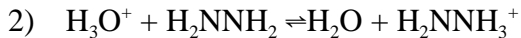
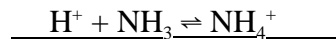
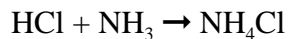
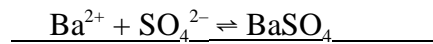
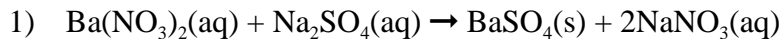
16) FCN: _____

 $\text{ClH}_2\text{CCH}_2\text{Cl}$: _____

17) HCN: _____

 H_2CCH_2 : _____18) $\text{N}_2 + \text{I}_2 \rightarrow$ _____ $\text{N}_2 + \text{Br}_2 \rightarrow$ _____19) $\text{S}_8 + \text{Cl}_2 \rightarrow$ _____ $\text{P}_4 + \text{Cl}_2 \rightarrow$ _____

20) Molar Mass = _____

KEY – 1st page

3) = 3.26×10^{-9} m

4) $p =$ 1.38×10^{-25} kg m s⁻¹

5) Cl $n = 3$ $l = 1$ $m_l = -1, 0, +1$ $m_s = +1/2, -1/2$

P $n = 3$ $l = 1$ $m_l = -1, 0, +1$ $m_s = +1/2, -1/2$

B $n = 2$ $l = 1$ $m_l = -1, 0, +1$ $m_s = +1/2, -1/2$

S $n = 3$ $l = 1$ $m_l = -1, 0, +1$ $m_s = +1/2, -1/2$

6) For Cd : $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^{10}, 4p^6, 5s^2, 4d^{10}$

For O : $1s^2, 2s^2, 2p^4$

For Mn : $1s^2, 2s^2, 2p^6, 3s^2, 3p^6, 4s^2, 3d^5$

For Al : $1s^2, 2s^2, 2p^6, 3s^2, 3p^1$

KEY – 2nd page

7) HOH :

8) H₂NNH₂ :

9) HCCH :

10) H₂CCH₂ :

11) NH₄⁺ :

12) SO₂ :

13) CO₃²⁻ :

14) SF₅⁻ :

KEY – 3rd page

15) IF_2^- :16) FCN : not hindered – triple bonded $\text{ClH}_2\text{CCH}_2\text{Cl}$: not hindered – single bonded17) HCN : not hindered – triple bonded H_2CCH_2 : hindered – double bond18) $\text{N}_2 + \text{I}_2 \rightarrow$ NI_3 $\text{N}_2 + \text{Br}_2 \rightarrow$ NBr_3 19) $\text{S}_8 + \text{Cl}_2 \rightarrow$ SCl_2 and SCl_6 $\text{P}_4 + \text{Cl}_2 \rightarrow$ PCl_3 and PCl_5 20) Molar Mass = 69.3 g mol^{-1}