

# Academic Chemistry Mid-Term Review Sheet Version 1

$$\textcircled{1} \frac{2.34 \times 10^6 \text{ cm}}{100 \text{ cm}} \cdot \frac{1 \text{ m}}{1000 \text{ m}} = 23.4 \text{ km}$$

$$\textcircled{2} \frac{6.78 \times 10^{-3} \text{ Mg}}{1 \text{ Mg}} \cdot \frac{1 \times 10^6 \text{ g}}{1 \text{ g}} \cdot \frac{1000 \text{ mg}}{1 \text{ g}} = 6.78 \times 10^6 \text{ mg}$$

NOTE: Mg  $\rightarrow$  mega-gram = 1,000,000 g

$\textcircled{3}$  a. 3 sig fig  $\Rightarrow$  decimal present, count from left starting w/ first non-zero number

b. 3 sig fig  $\Rightarrow$  same as above

c. 4 sig fig  $\Rightarrow$  same as above

$\textcircled{4}$  a.  $\begin{array}{l} \downarrow \\ 1.2\text{g} \end{array}$  column w/ first uncertain digit

+ 3.45g

+ 6.789g

11.439g  $\Rightarrow$  rounds to 11.4

b. 1.23m

$\times$  4.5m

5.535m<sup>2</sup>  $\Rightarrow$  rounds to 5.5m<sup>2</sup> same number of sig fig as the least number of sig fig in the problem

$\textcircled{5}$  Assume 1.275 to be more accurate and the accepted or true value:

$$\% \text{ error} = \left| \frac{\text{experimental value} - \text{accepted value}}{\text{accepted value}} \right| \times 100 = \left| \frac{1.23 - 1.275}{1.275} \right| \times 100 = 3.5\%$$

$$\textcircled{6} \text{ Density} = \frac{\text{mass}}{\text{Volume}} \quad \frac{0.88 \text{ g}}{\text{ml}} = \frac{m}{2.34 \text{ ml}}$$

$$m = \frac{0.88 \text{ g}}{\text{ml}} \times 2.34 \text{ ml} = \underline{\underline{2.1 \text{ g}}}$$

$\textcircled{7}$  triple beam balance  $\rightarrow$  2 decimal places

The smallest measurement is  $\frac{1}{10}$  of a gram which is 0.1g  
You are then required to estimate between the two  
 $\frac{1}{10}$  gram marks to get the closest  $\frac{1}{100}$  of a gram  
which is, for example 0.15g.

graduated cylinder  $\rightarrow$  1 decimal place

The smallest measure is 1 ml, so you estimate  
to the nearest  $\frac{1}{10}$ , or 0.1, of a ml.

$\textcircled{8}$  bubbles (gas released), heat released, heat absorbed,  
color change

- $\textcircled{9}$  a. physical  
b. physical  
c. chemical  
d. physical

$\textcircled{10}$  matter is neither created nor destroyed in a  
chemical reaction

(11) a. mixture

b. mixture

c. mixture

(12) place sample in water to make a solution & then filter out the sand. Then boil the remaining liquid until all water is gone leaving only the salt.

(13) 1. Elements are composed of atoms

2. Atoms of a given element are the same (identical)

3. Atoms are neither created nor destroyed

4. A molecule of a compound always has the same ratio of atoms eg water 2 hydrogens  
1 oxygen

(14)  ${}_{11}^{23}\text{Na}^{+}$  protons ( $p^{+}$ ) - 11 neutrons ( $n^{0}$ ) - 12  
electrons ( $e^{-}$ ) - 10

(15) Comparing two isotopes of one element to protons stay the same (same number) but the number of neutrons is different

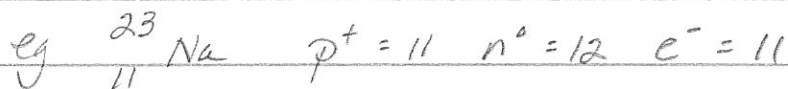
eg  ${}_{92}^{235}\text{U}$   $p^{+} = 92$   $n^{0} = 143$

${}_{92}^{238}\text{U}$   $p^{+} = 92$   $n^{0} = 146$

Academic Chem Mid Term Review Vers. 1

Pg 3

(16) In an ion, the number of electrons change while the number of protons remains the same



(17) Atomic Mass = weighted average of all of the isotopes of a given element

Mass number = sum of the number of  $p^+$  plus the number of  $n^0$  in an atom

(18)  ${}_{11}^{23}\text{Na}$  how many  $n^0$  = mass number - atomic number  
=  $23 - 11$   
= 12

(19) Atomic number of Neon (Ne)  $\Rightarrow$  10

(20) Lead (Pb) has 82 protons

(21) +1

(22) U-238  $\Rightarrow$   ${}_{92}^{238}\text{U}$  has  $238 - 92 = 146$  neutrons

(23) Alpha particle  ${}_{2}^{4}\alpha$  mass number = 4 atomic number = 2  
Beta particle  ${}_{-1}^{0}\beta$  mass number = 0 atomic number = -1

NOTE: numbering on sheet starts over again at #20

(20)	$\frac{1}{2}$ life #	Amount (I-126)	time	Half life is 13 days
	0	46g	0	} amt @ beginning
	1	23g	13 days	
	2	11.5g	26 days	
	3	5.75g	39 days	

(21) Fusion - joining together

(22) Fission - breaking apart

(23) Fission - atoms break apart and release heat. The heat boils water which turns to steam. The steam turns a turbine which generates electricity

(24) Na -  $1s^2 2s^2 2p^6 3s^1$

(25) Cr -  $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^4$   
 NOTE: Cr is an exception + changes to  $4s^1 3d^5$

(26) Li (Lithium)

(27)  $6e^-$

(28) electrons have been excited to higher energy levels and when they drop back they emit light (photons) of specific energies

(29) Na is larger than  $\text{Na}^+$  because  $\text{Na}^+$  has lost one  $e^-$  so the effective nuclear charge is greater and holds the remaining  $e^-$  more closely.

(30) S because it has fewer  $p^+$  than Cl

(31) Cl because it is smaller, holds its  $e^-$  more tightly

(32) Cl (means Cl gives off more heat than S when an  $e^-$  is gained)

(33) Cl (means Cl is more likely than S to attract an  $e^-$  when bonded to another element)

(34) Group - a column on the Periodic Table. Elements in the same group tend to have similar properties

(35) Family - same as a group

(36) Period - a row on the Periodic Table.

(37) a.  $\text{NaCl}$  - Sodium Chloride (Rule #1)

b.  $\text{CuSO}_4$  - Copper (II) Sulfate (Rule #2)

$\text{SO}_4 \rightarrow -2$  since no subscript after Cu then

$\text{Cu} \rightarrow +2$

c.  $\text{Cu}_2\text{SO}_4$  - Copper (I) Sulfate (Rule #2)

since there is a subscript after Cu the valences do not add to "0" + since there is no subscript after

$\text{SO}_4$  the valence of Cu must be +1

37 cont. d.  $AlN$  - Aluminum Nitride (Rule #1)  
↑ lower case "L"

e.  $Al_2S_3$  - Aluminum Sulfide (Rule #1)

38 a. Iron (III) Chloride  $Fe^{+3} Cl^{-1} \rightarrow FeCl_3$

b. Iron (II) Chloride  $Fe^{+2} Cl^{-1} \rightarrow FeCl_2$

c. Aluminum Sulfate  $Al^{+3} SO_4^{-2} \rightarrow Al_2(SO_4)_3$

d. diphosphorous pentoxide  $P_2O_5$  (Rule #3)

e. nitrogen monoxide  $NO$  (Rule #3)

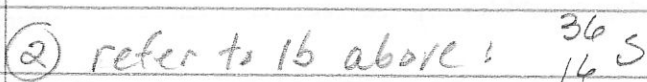
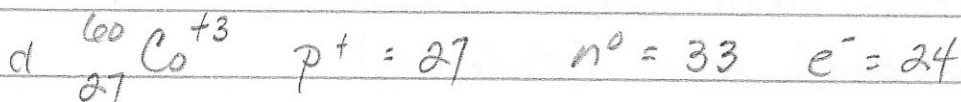
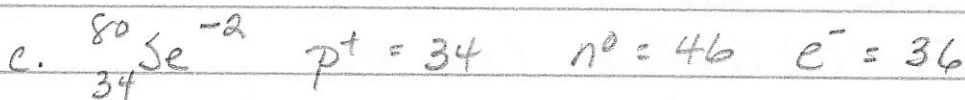
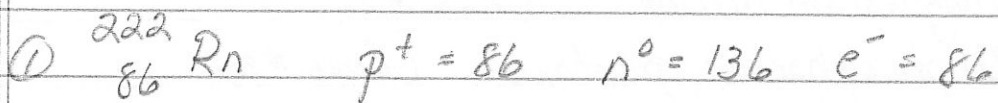
39 elements want to have a full valence shell of  $8e^-$

40 they already have a full valence shell (they're happy or perfect)





# Academic Chemistry Mid Term Review Version 2

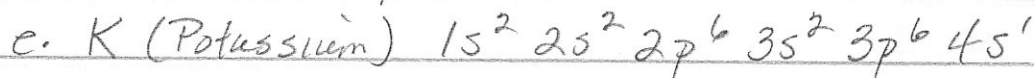
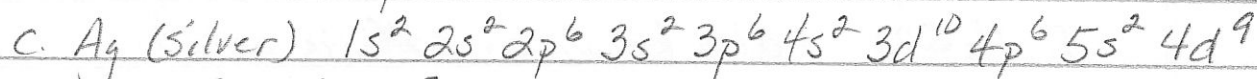
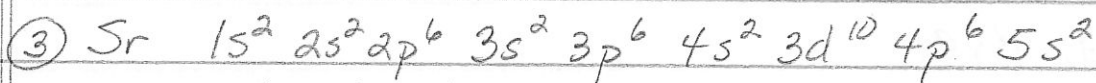


a. atomic number = 16

b. mass number = 36

c. average atomic mass = 32.07 (from periodic table)

d. an isotope w/  $p^+ = 16$   $n^0 = 17$   $e^- = 16$



④ a. Neon

b. Silver, Potassium, Strontium

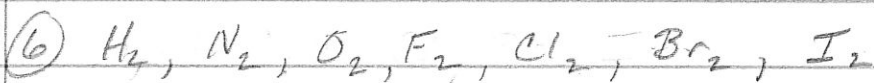
c. Fluorine

d. Fluorine

Academic Chem. Mid Term Review Vers. 2

page 2

- ⑤ a. Magnesium nitride (Rule #1)  
b. Diphosphorous pentoxide (Rule #3)  
c. Copper (II) Nitrate (Rule #2)  
d. Ammonium Chloride (Rule #1)  
e. Carbon monoxide (Rule #3)  
f. Iron (III) Sulfate (Rule #2)  
g. Xenon hexafluoride (Rule #3)  
h. Carbonic Acid (Rule #5)



- ⑧ a.  $CCl_4$   
b.  $TiO_2$  ( $Ti_2O_4$  ionic compound so reduce ratio to 1:2)  
c.  $NO_2$   
d.  $CsCl$   
e.  $Ca(OH)_2$   
f.  $H_2SO_4$  (also known as sulfuric acid)  
g.  $Sb_2O_3$   
h.  $NaCl$   
i.  $(NH_4)_2O$

Academic Chem. Mid Term Review Vers. 2

Pg. 3

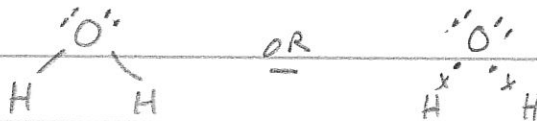
9 a. 2.1

b. 3.5

c. 1.4

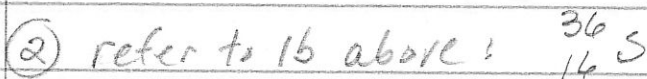
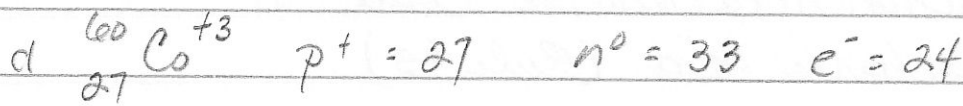
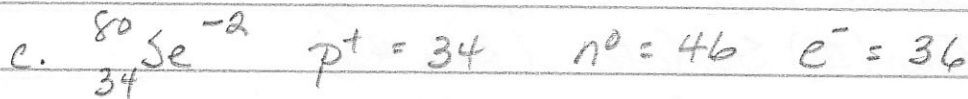
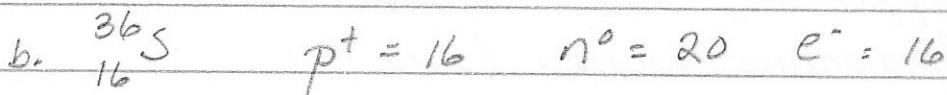
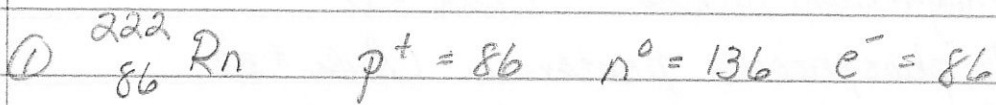
d. single polar covalent

e.





# Academic Chemistry Mid Term Review Version 2

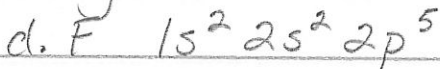
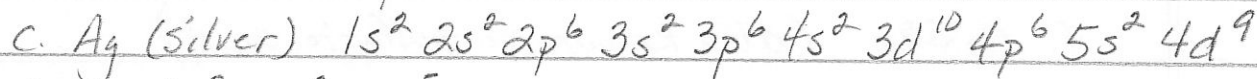
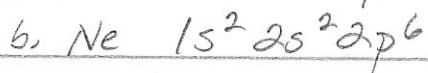
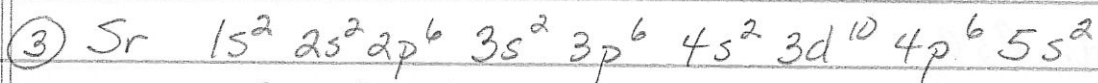


a. atomic number = 16

b. mass number = 36

c. average atomic mass = 32.07 (from periodic table)

d. an isotope w/  $p^+ = 16$   $n^0 = 17$   $e^- = 16$



④ a. Neon

b. Silver, Potassium, Strontium

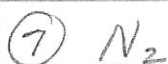
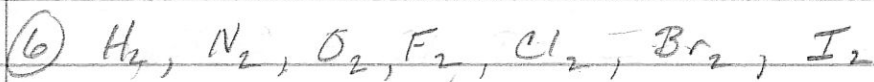
c. Fluorine

d. Fluorine

Academic Chem. Mid Term Review Vers. 2

page 2

- ⑤ a. Magnesium nitride (Rule #1)  
b. Diphosphorous pentoxide (Rule #3)  
c. Copper (II) Nitrate (Rule #2)  
d. Ammonium Chloride (Rule #1)  
e. Carbon monoxide (Rule #3)  
f. Iron (III) Sulfate (Rule #2)  
g. Xenon hexafluoride (Rule #3)  
h. Carbonic Acid (Rule #5)



- ⑧ a.  $CCl_4$   
b.  $TiO_2$  ( $Ti_2O_4$  ionic compound so reduce ratio to 1:2)  
c.  $NO_2$   
d.  $C_5Cl$   
e.  $Ca(OH)_2$   
f.  $H_2SO_4$  (also known as sulfuric acid)  
g.  $Sb_2O_3$   
h.  $NaCl$   
i.  $(NH_4)_2O$

Academic Chem. Mid Term Review Vers. 2

Pg. 3

④ a. 2.1

b. 3.5

c. 1.4

d. single polar covalent

e.



