

## Chemistry 112

### Review Worksheet: Atoms and Compounds

1. Write the chemical formula for the following ionic compounds, complete with SATP pure state of matter.

- (a) mercury (II) fluoride  $\text{HgF}_2(\text{s})$
- (b) molybdenum sulfide  $\text{MoS}_3(\text{s})$
- (c) zinc oxide  $\text{ZnO}(\text{s})$
- (d) manganese (IV) nitride  $\text{Mn}_3\text{N}_4(\text{s})$
- (e) magnesium hydroxide  $\text{Mg}(\text{OH})_2(\text{s})$
- (f) lead (IV) carbonate  $\text{Pb}(\text{CO}_3)_2(\text{s})$
- (g) sodium acetate  $\text{NaCH}_3\text{COO}(\text{s})$
- (h) ammonium nitrate  $\text{NH}_4\text{NO}_3(\text{s})$

2. Use the IUPAC rules to name the following binary ionic compounds.

- (a)  $\text{CuS}(\text{s})$  copper (II) sulfide
- (b)  $\text{Ca}_3(\text{PO}_4)_2(\text{s})$  calcium phosphate
- (c)  $\text{MgO}(\text{s})$  magnesium oxide
- (d)  $\text{FeCO}_3(\text{s})$  iron (II) carbonate
- (e)  $\text{PbS}_2(\text{s})$  lead (IV) sulfide
- (f)  $\text{Al}_2(\text{SiO}_3)_3(\text{s})$  aluminum silicate
- (g)  $\text{Cu}_2\text{S}(\text{s})$  copper (I) sulfide
- (h)  $\text{Al}_2\text{O}_3(\text{s})$  aluminum oxide
- (i)  $\text{Zn}(\text{NO}_3)_2(\text{s})$  zinc nitrate

3. Explain the major difference between the Bohr Theory of an atom, and the Quantum Mechanical Model of an atom.

Bohr → states that electrons are found in orbits around nucleus  
QMM → high probability of electrons being found in atomic orbitals

4. An element, Y, has two naturally occurring isotopes with the following percent abundances: the isotope with a mass number of 39.0 amu is 72.0% abundant; the isotope with a mass number of 41.0 amu is 28.0% abundant. What is the average atomic mass for element Y?

$$(39.0 \text{ amu})(0.720) + (41.0)(0.280) = \boxed{39.56 \text{ amu}}$$

5. Differentiate experimentally and theoretically between an acid and a base.

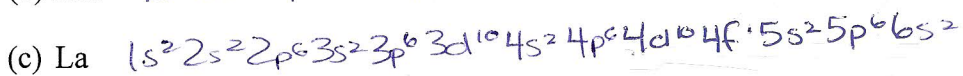
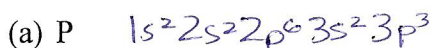
ACID: Theoretical → contains  $\text{H}^+$

Experimental → conducts electricity and turns litmus blue → red

BASE: Theoretical → contains  $\text{OH}^-$   
(ionic hydroxide)

Experimental → conducts electricity and turns litmus red → blue

6. Write the ground state electron configuration for each of the following atoms:



7. Complete the following chart, clearly indicating all information for each isotope.

Isotope Name	Symbol	Mass number	# of Protons	# of Electrons	# of Neutrons
arsenic - 76	$^{76}_{33}\text{As}$	76	33	33	43
potassium-41	$^{41}_{19}\text{K}$	41	19	19	22
Sulfur-33	$^{33}_{16}\text{S}$	33	16	16	17

8. Complete the following chart, clearly indicating whether each particle is an atom or an ion.

English Name	IUPAC Symbol	# of Protons	# of Electrons	# of Electrons	Net Charge
				Gained or Lost	
vanadium ion	$\text{V}^{3+}$	23	20	Lost 3	3+
barium atom	$\text{Ba}$	56	56	0	0
chloride ion	$\text{Cl}^-$	17	18	Gain 1	1-
oxide ion	$\text{O}^{2-}$	8	10	Gain 2	2-