Unit 2: Chemistry (Books 5-7)

"Practice Test"

Science 9

Name: ___________________________  Date: ___________________________
**Vocabulary:** Referring to your notes, define each of the following vocabulary terms in a complete sentence.

1. **atom**  
   
2. **coefficient**  
   
3. **compound**  
   
4. **covalent compound**  
   
5. **element**  
   
6. **ion**  
   
7. **ionic compound**  
   
8. **molecule**  
   
9. **polyatomic ions**  
   
10. **polyvalent metal**  
    
11. **roman numerals**  
    
12. **subscript**  
    
13. **univalent metal**  
    

The atom and the subatomic particles

1. Use the following vocabulary words to label the diagram.

Vocabulary

- common ion charge
- other ion charge
- name
- symbol
- atomic number
- average atomic mass

(a) __________________________ (e) __________________________
(b) __________________________ (f) __________________________
(c) __________________________
(d) __________________________

2. Examine the periodic table for the element (right) and complete the blanks.

(a) atomic number ________  (b) average atomic mass ________
(c) ion charge ________  (d) number of protons ________
(e) name of element ________  (f) number of neutrons ________

3. Complete the following table.

<table>
<thead>
<tr>
<th>Atom/Ion</th>
<th>Atomic Number</th>
<th>Number of Protons</th>
<th>Number of Electrons</th>
<th>Number of Neutrons</th>
<th>Number of Electron Shells</th>
</tr>
</thead>
<tbody>
<tr>
<td>neon atom</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>fluorine atom</td>
<td></td>
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<tr>
<td>fluorine ion</td>
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</tr>
<tr>
<td>sodium atom</td>
<td></td>
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</tr>
<tr>
<td>sodium ion</td>
<td></td>
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<tr>
<td>potassium atom</td>
<td></td>
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<tr>
<td>potassium ion</td>
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<tr>
<td>aluminium atom</td>
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<tr>
<td>aluminium ion</td>
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<tr>
<td>phosphorus atom</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>phosphorus ion</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>copper atom</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>copper (II) ion</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
Bohr Model Practice

Draw the bohr model of the ion or compound

1. Chloride

2. Hydrogen ion

3. Oxide

4. Sodium ion

5. Magnesium ion

6. Nitride

7. Helium ion

8. Iodide

9. Aluminium ion

10. Draw the Bohr model diagram for each of the following compounds. (don’t forget your [square brackets] and ion charges! IF they are ionic...covalent compounds should overlaps and show electron sharing)

   carbon dioxide (CO₂)

   ammonia (NH₃)

   calcium chloride (CaCl₂)
Names and formulas of compounds

Match each Chemical Name on the left with the correct Chemical Formula on the right.

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Chemical Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>tin(II) chlorate</td>
<td>A. SnClO</td>
</tr>
<tr>
<td>sulphur dichloride</td>
<td>B. SCl</td>
</tr>
<tr>
<td>strontium perchlorate</td>
<td>F. Sr(ClO₃)₂</td>
</tr>
<tr>
<td></td>
<td>G. Sr(ClO₄)₂</td>
</tr>
<tr>
<td></td>
<td>H. Sr(ClO₄)₂</td>
</tr>
<tr>
<td></td>
<td>I. Sr(ClO₄)₂</td>
</tr>
</tbody>
</table>

4. Which of the following is a covalent compound?
   A. SrO  
   B. SeO₂  
   C. SnO₂  
   D. Sc₂O₃

5. In which of the following do covalent bonds hold the atoms together?
   A. silver  
   B. calcium carbonate  
   C. silicon tetrafluoride  
   D. magnesium bromide

6. What is the total number of atoms that make up iodine penta-chloride?
   A. 2  
   B. 4  
   C. 5  
   D. 6

7. Which of the following occurs when carbon forms a compound with oxygen?
   A. oxygen and carbon share electrons  
   B. both oxygen and carbon lose electrons  
   C. oxygen gains electrons, while carbon loses electrons  
   D. carbon gains electrons, while oxygen loses electrons

8. In the chemical reaction CuO + CO₂ → CuCO₃, which of the following are ionic compounds?
   I. CO₂  
   II. CuO  
   III. CuCO₃
   A. I and II only  
   B. I and III only  
   C. II and III only  
   D. I, II, and III

9. Which of the following is the formula for the compound formed by ammonium and dichromate?
   A. NH₄Cr₂O₇  
   B. (NH₄)₂Cr₂O₇  
   C. NH₄₂Cr₂O₇  
   D. (NH₄)₆Cr₂O₇

10. In which of the following compounds does manganese have the highest ion charge?
    A. MnO₃  
    B. MnBr₂  
    C. MnSO₃  
    D. Mn(OH)₄

11. In which of the following compounds is the ion charge on copper the same?
    I. Cu₂O  
    II. CuCl₂  
    III. CuCO₃
    A. I and II only  
    B. I and III only  
    C. II and III only  
    D. I, II, and III

12. In the name arsenic(III) chloride, what does the Roman numeral reveal about arsenic?
    A. it has an ion charge of 3–  
    B. it has an ion charge of 3+  
    C. it has gained three electrons  
    D. it can form three positive ions
Chemical names and formulas of covalent compounds

1. What is a covalent compound?

2. What type of bond is formed in a covalent compound?

3. What is used in naming covalent compounds?

4. Write the chemical formula for each of the following compounds.

<table>
<thead>
<tr>
<th>(a) silicon dioxide</th>
<th>(i) dinitrogen pentoxide</th>
</tr>
</thead>
<tbody>
<tr>
<td>(b) chlorine dioxide</td>
<td>(j) dinitrogen monoxide</td>
</tr>
<tr>
<td>(c) tellurium dioxide</td>
<td>(k) arsenic tetrabromide</td>
</tr>
<tr>
<td>(d) selenium trioxide</td>
<td>(l) arsenic pentachloride</td>
</tr>
<tr>
<td>(e) carbon disulphide</td>
<td>(m) disulphide pentoxide</td>
</tr>
<tr>
<td>(f) arsenic trichloride</td>
<td>(n) sulphur monochloride</td>
</tr>
<tr>
<td>(g) chlorine heptoxide</td>
<td>(o) phosphorus trichloride</td>
</tr>
<tr>
<td>(h) selenium difluoride</td>
<td>(p) diphosphorus pentoxide</td>
</tr>
</tbody>
</table>
5. Complete the following crossword puzzle. (use the word list provided to help!) Given the chemical formula, what is the name for the covalent compound?

**Word List**
- Arsenic trioxide
- Boron monoxide
- Carbon disulphide
- Chlorine monoxide
- Diarsenic pentoxide
- Dichlorine heptoxide
- Dinitrogen trioxide
- Disulphur dichloride
- Iodine trichloride
- Nitrogen dioxide
- Nitrogen monoxide
- Phosphorus tribromide
- Silicon tetrafluoride
- Sulphur tetrachloride
- Tellurium dibromide
- Tellurium trioxide

**ACROSS**
1. S₂Cl₂
3. PBr₃
5. SiF₄
7. Cl₂O₇
9. ClF₃
11. N₂O₃
14. TeBr₂
15. ClO
16. AsO₃

**DOWN**
1. P₂O₅
2. As₂O₅
4. SCl₄
6. ICl₃
8. NO
9. CS₂
10. TeO₃
12. BO
13. NO₂
Knowledge: Answer each of the following questions. Make sure to use complete sentences, where applicable. It should be clear from your answer what the question was!

1. Count the total number of atoms in the following compounds.

   1. NaOH  
   2. 4 HNO₃  
   3. MgCl₂  
   4. 4 Li₂O  
   5. 2 NaOH  
   6. Li₂SO₄  
   7. 3 H₂O  
   8. NaC₂H₃O₂  
   9. 3 Al₂O₃  
   10. NH₄Cl  
   11. 5 ZnSO₄  
   12. 7 C₂S₂  
   13. 2 Sr₃(PO₄)₂  
   14. 4 Al(OH)₃  
   15. Ca(C₂H₃O₂)₂  
   16. 4 Al₂(SO₃)₃  
   17. 2 (NH₄)₃PO₄  
   18. 4 Mg(OH)₂

   Na=1, O=1, H=1 Total=3 atoms

2. Draw the Bohr diagram for the ionic compound aluminum nitride.
3. Distinguish between an element and a compound.

4. Distinguish between a compound and a molecule.

5. For each of the following pairs of substances, identify whether the compound they form will be ionic or covalent:
   1. potassium and sulphur
   2. lithium and chlorine
   3. oxygen and fluorine
   4. sulphur and bromine
   5. copper and perchlorate

6. For each of the following compounds, identify whether they are ionic or covalent:
   1. AlP
   2. CO₂
   3. FeCO₃
   4. Fe₂O₃
   5. CrCl₃
   6. Na₃PO₄
   7. SO₃
   8. NO
7. Write the chemical names of each of the following IONIC compounds.

*(be sure to pay close attention in case the ions are MULTIVALENT or POLYATOMIC)*

Do any working out to the side...

1. CaS _____________________________
2. Cs₂O _____________________________
3. FeCO₃ _____________________________
4. CrCl₂ _____________________________
5. Mg₃(PO₄)₂ _____________________________
6. Au₂O₃ _____________________________
7. CaS _____________________________
8. (NH₄)₃PO₃ _____________________________
9. FeCl₂ _____________________________
10. KCl _____________________________
11. Na₂S _____________________________
12. AlCl₃ _____________________________
13. BaO _____________________________
14. Ag₂S _____________________________
15. Al₂O₃ _____________________________
16. LiF _____________________________
17. ZnF₂ _____________________________
18. MgBr₂ _____________________________
19. CaS _____________________________
20. Li₂O _____________________________
21. ZnI₂ _____________________________
22. BaBr₂ _____________________________
23. MgS _____________________________
24. AgCl _____________________________
25. FeO _____________________________
26. SnS₂ _____________________________
<table>
<thead>
<tr>
<th>No.</th>
<th>Formula</th>
</tr>
</thead>
<tbody>
<tr>
<td>27.</td>
<td>Cr₂S₃</td>
</tr>
<tr>
<td>28.</td>
<td>SnF₂</td>
</tr>
<tr>
<td>29.</td>
<td>CuCl</td>
</tr>
<tr>
<td>30.</td>
<td>MnO₂</td>
</tr>
<tr>
<td>31.</td>
<td>HgBr</td>
</tr>
<tr>
<td>32.</td>
<td>CrCl₃</td>
</tr>
<tr>
<td>33.</td>
<td>PbS</td>
</tr>
<tr>
<td>34.</td>
<td>CuF₂</td>
</tr>
<tr>
<td>35.</td>
<td>NiS</td>
</tr>
<tr>
<td>36.</td>
<td>PbCl₄</td>
</tr>
<tr>
<td>37.</td>
<td>CrO</td>
</tr>
<tr>
<td>38.</td>
<td>Hg₃N₂</td>
</tr>
<tr>
<td>39.</td>
<td>Sn₃P₄</td>
</tr>
</tbody>
</table>

8. Write the chemical formulas of each of the following compounds. **SHOW YOUR WORK HERE!**

1. zinc oxide
2. aluminum fluoride
3. potassium bromide
4. calcium oxide
5. iron (II) fluoride
6. tin (IV) oxide
7. sodium sulphate
8. strontium hydroxide
9. nickel (III) chlorate
10. iron (III) sulphite
11. zinc bromide
12. calcium fluoride
<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>13.</td>
<td>silver sulfide</td>
</tr>
<tr>
<td>14.</td>
<td>lithium sulfide</td>
</tr>
<tr>
<td>15.</td>
<td>potassium sulfide</td>
</tr>
<tr>
<td>16.</td>
<td>magnesium oxide</td>
</tr>
<tr>
<td>17.</td>
<td>magnesium phosphide</td>
</tr>
<tr>
<td>18.</td>
<td>sodium nitride</td>
</tr>
<tr>
<td>19.</td>
<td>silver fluoride</td>
</tr>
<tr>
<td>20.</td>
<td>barium nitride</td>
</tr>
<tr>
<td>21.</td>
<td>copper (II) chloride</td>
</tr>
<tr>
<td>22.</td>
<td>iron (III) oxide</td>
</tr>
<tr>
<td>23.</td>
<td>manganese (II) nitride</td>
</tr>
<tr>
<td>24.</td>
<td>lead (IV) bromide</td>
</tr>
<tr>
<td>25.</td>
<td>tin (IV) sulfide</td>
</tr>
<tr>
<td>26.</td>
<td>manganese (IV) phosphide</td>
</tr>
<tr>
<td>27.</td>
<td>iron (II) oxide</td>
</tr>
<tr>
<td>28.</td>
<td>lead (IV) sulfide</td>
</tr>
<tr>
<td>29.</td>
<td>mercury (II) sulfide</td>
</tr>
<tr>
<td>30.</td>
<td>copper (II) nitride</td>
</tr>
</tbody>
</table>

9. The compound \( \text{H}_2\text{O}_2 \) is separated and produces hydrogen gas and oxygen gas as a result. What do you expect will be the ratio of the two gases produced?

________________________________________________________________________

________________________________________________________________________

10. Water is separated and produces hydrogen gas and oxygen gas as a result. What do you expect will be the ratio of the two gases produced?

________________________________________________________________________

________________________________________________________________________
11. Determine the ratio of atoms of each element in the compound ammonium monohydrogen phosphate: \((NH_4)_2HPO_4\)

____________________________________________________________________________________________________________________________________________________

12. Explain the importance of the Roman numerals in the names of the three compounds: manganese (IV) nitride, manganese (III) nitride and manganese (II) nitride. In your answer include the total number of atoms in each compound.

____________________________________________________________________________________________________________________________________________________

____________________________________________________________________________________________________________________________________________________

____________________________________________________________________________________________________________________________________________________

13. Knowing that barium and oxygen react in a one to one ratio, in what ratio will radium and oxygen react? In your answer include to concepts of chemical families and valence electrons.

____________________________________________________________________________________________________________________________________________________

____________________________________________________________________________________________________________________________________________________

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