MULTIPLE CHOICE (7 points each)

1. An impure sample of pure copper(I) chloride has 200 g of the compound. The sample is 95.2% pure. What is the mass of the sample including the impurities:
   a. 96.0 g  b. 190 g  c. 210 g  d. 417 g

2. Name $\text{H}_2\text{SO}_4$ (aq) correctly:
   a. dihydrogen sulfur hexoxide
   b. sulfuric acid
   c. hydrogen sulfate
   d. hydrogen(I) sulfite

3. Name $\text{FeCl}_2$ correctly:
   a. iron(II) chloride
   b. iron chloride
   c. iron dichloride
   d. fermium chloride

4. Name $\text{P}_4\text{O}_{10}$ correctly:
   a. potassium oxide
   b. potassium pentoxide
   c. phosphorus(V) oxide
   d. tetraphosphorus decoxide

5. The ratio of the number of Bismuth atoms to the number of Oxygen atoms in $\text{Bi}_2(\text{SO}_4)_3$ is
   a. 2:1  b. 2:3  c. 2:7  d. 1:6  e. 1:4

6. A 0.00311 mole sample of an unknown compound has a mass of 0.1371 g. Of the following, the compound is most likely:
   a. CH$_3$
   b. C$_2$H$_6$
   c. C$_3$H$_8$
   d. C$_3$H$_{10}$

7. The ion $\text{^{35}\text{Cl}^-}$ has ______ protons, _______ neutrons and ______ electrons.
   a. 35, 17, 36
   b. 17, 18, 16
   c. 17, 35, 18
   d. 17, 18, 18
SHORT ANSWERS

8. If 0.231 mole of P₄ is reacted with an 3.00 mole of Cl₂, according to the formula below, how many moles of PCl₅ will be produced? (8 points)

\[ \text{P}_4(s) + 10 \text{Cl}_2(g) \rightarrow 6 \text{PCl}_5(g) \]

9. a) Carbohydrates are a class of compounds that have empirical formulas of CH₂O. What are the percentage weights of carbon, hydrogen and oxygen? (8 points)

   carbon ________
   hydrogen ________
   oxygen ________

b) What is the molecular formula of a carbohydrate whose molecular mass is 180 g/mol? (8 points)

10. Naturally occurring chromium consists of four isotopes of the following relative masses and percent abundances:

<table>
<thead>
<tr>
<th>Isotope</th>
<th>% Abundance</th>
<th>Atomic Mass</th>
</tr>
</thead>
<tbody>
<tr>
<td>⁵⁰Cr</td>
<td>4.31</td>
<td>49.9461</td>
</tr>
<tr>
<td>⁵²Cr</td>
<td>83.76</td>
<td>51.9405</td>
</tr>
<tr>
<td>⁵³Cr</td>
<td>9.55</td>
<td>52.9407</td>
</tr>
<tr>
<td>⁵⁴Cr</td>
<td>2.38</td>
<td>53.9389</td>
</tr>
</tbody>
</table>

Calculate the relative atomic mass of naturally occurring chromium. (8 points)
11. A white crystalline compound that contains only iodine, potassium and oxygen is purified and found on analysis to contain 18.27% potassium and 59.30% iodine by mass.

a) What is the % by mass of oxygen? ______ (5 points)

b) What is the empirical formula of the substance? (7 points)

12. If molybdenum(IV) sulfide (MoS$_2$) is heated in air, oxygen (O$_2$) reacts to make molybdenum(IV) oxide (MoO$_3$) and sulfur dioxide (SO$_2$).

Express these facts in the form of a balanced chemical reaction. (8 points)