practice test 1

About this assignment
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1. ZumChem5 2.E.070. [224546] Name each of the following compounds.

(a) HC\textsubscript{2}H\textsubscript{3}O\textsubscript{2} (aq)
(b) NH\textsubscript{4}NO\textsubscript{2}
(c) Co\textsubscript{2}S\textsubscript{3}
(d) ICl
(e) Pb\textsubscript{3}(PO\textsubscript{4})\textsubscript{2}
(f) KIO\textsubscript{3}
(g) H\textsubscript{2}SO\textsubscript{4} (aq)
(h) Sr\textsubscript{3}N\textsubscript{2}
(i) Al\textsubscript{2}(SO\textsubscript{3})\textsubscript{3}
(j) SnO\textsubscript{2}
(k) Na\textsubscript{2}CrO\textsubscript{4}
(l) HClO (aq)

2. ZumChem5 3.AE.108. [224556] Chloral hydrate (C\textsubscript{2}H\textsubscript{3}Cl\textsubscript{3}O\textsubscript{2}) is a drug formerly used as a sedative and hypnotic. It is the compound used to make "Mickey Finns" in detective stories.

(a) Calculate the molar mass of chloral hydrate.

\[
g/\text{mol}
\]

(b) How many moles of C\textsubscript{2}H\textsubscript{3}Cl\textsubscript{3}O\textsubscript{2} molecules are in 400.0 g chloral hydrate?
(c) What is the mass in grams of 2.0 \times 10^{-2} \text{ mol} \text{ chloral hydrate?}

(d) How many chlorine atoms are in 5.0 \text{ g} \text{ chloral hydrate?}

(e) What mass of chloral hydrate would contain 5.0 \text{ g} \text{ Cl?}

(f) What is the mass of exactly 500 molecules of chloral hydrate?

3. ZumChem5 3.E.026. [224572] The element rhenium (Re) has two naturally occurring isotopes, \(^{185}\text{Re}\) and \(^{187}\text{Re}\), with an average atomic mass of 186.207 amu. Rhenium is 62.60\% \(^{187}\text{Re}\), and the atomic mass of \(^{187}\text{Re}\) is 186.956 amu. Calculate the mass of \(^{185}\text{Re}\).

4. ZumChem5 3.E.104. [224605] A student prepared aspirin (C\(_9\)H\(_8\)O\(_4\)) in a laboratory experiment using the following reaction.

\[
\text{C}_7\text{H}_6\text{O}_3 + \text{C}_4\text{H}_6\text{O}_3 \rightarrow \text{C}_9\text{H}_8\text{O}_4 + \text{HC}_2\text{H}_3\text{O}_2
\]

The student reacted 1.50 \text{ g} \text{ salicylic acid (C}_7\text{H}_6\text{O}_3\) with 2.00 \text{ g} \text{ acetic anhydride (C}_4\text{H}_6\text{O}_3\). The yield was 1.50 \text{ g} \text{ aspirin. Calculate the theoretical yield and the percent yield for this experiment.}

Theoretical yield

\[
\text{percent yield}
\]

5. ZumChem5 3.AE.100. [224551] Mercury and bromine will react with each other to produce mercury(II) bromide.

\[
\text{Hg}(l) + \text{Br}_2(l) \rightarrow \text{HgBr}_2(s)
\]

(a) What mass of HgBr\(_2\) can be produced from the reaction of 10.27 \text{ g} \text{ Hg and 9.00 \text{ g} \text{ Br}_2?}

What mass of reagent is left unreacted?

Which reagent is in excess?

\[
\text{C Br}_2
\]

\[
\text{C Hg}
\]

(b) What mass of HgBr\(_2\) can be produced from the reaction of 5.63 \text{ mL} \text{ mercury (density} = 13.6 \text{ g/mL) and} 5.63 \text{ mL} \text{ bromine (density} = 3.10 \text{ g/mL)?}

\[
\text{g}
\]
6. A compound contains only carbon, hydrogen, and oxygen. Combustion of 10.68 mg of the compound yields 16.01 mg CO₂ and 4.37 mg H₂O. The molar mass of the compound is 176.1 g/mol. What are the empirical and molecular formulas of the compound? (Type your answer using the format CO₂ for CO₂.)

empirical formula

molecular formula

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