

# Chem 10 Chapter 5

## Molecules and Compounds

### *Practice and End of Chapter Questions*

Worked solutions at the end

Use your course periodic table and a calculator as needed. Show the setup, include units, and round at the end. Question numbers match the numbers in the solutions. Use heading navigation to move between sections.

### Practice Questions

#### Question 1

What is the formula mass of magnesium nitride?

- A) 38.32
- B) 116.33
- C) 90.65
- D) 100.95
- E) none of the above

#### Question 2

Suppose that in an ionic compound, "M" represents a metal that could form more than one type of ion. In the formula  $MF_2$ , the charge of the M ion would be:

- A) -2
- B) +1
- C) +2
- D) +4
- E) -1

#### Question 3

What is the name of  $HIO_3$ ?

- A) hydroiodic acid
- B) iodic acid
- C) hydroiodous acid
- D) iodous acid
- E) none of the above

**Question 4**

What is the proper name for HBr (aq)?

- A) hydrousbromic acid
- B) hydrobromous acid
- C) hydrobromic acid
- D) bromous acid
- E) none of the above

**Question 5**

What is the name of the molecular compound  $\text{SO}_3$ ?

- A) sulfur trioxide
- B) sulfur oxide
- C) sulfur tetraoxide
- D) sulfur(IV) oxide
- E) none of the above

**Question 6**

What is the name of  $\text{Ca}(\text{NO}_3)_2$ ?

- A) calcium nitrite
- B) calcium nitrate
- C) calcium nitride
- D) calcium dinitrite
- E) none of the above

**Question 7**

What is the formula for an ionic compound made of magnesium and sulfur?

- A)  $\text{MgS}$
- B)  $\text{MgS}_2$
- C)  $\text{Mg}_2\text{S}_3$
- D)  $\text{Mg}_2\text{S}$
- E) none of the above

**Question 8**

Which of the following species is a molecular element?

- A) sodium
- B) neon
- C) chlorine
- D) carbon dioxide
- E) none of the above

**Question 9**

Ammonium fluoride is considered which of the following?

- A) molecular compound
- B) atomic element
- C) molecular element
- D) ionic compound
- E) none of the above

**Question 10**

How many oxygen atoms are in the formula  $\text{Al}_2(\text{CO}_3)_3$ ?

- A) 3
- B) 6
- C) 9
- D) 1
- E) none of the above

**Question 11**

What is the oxygen-to-sulfur mass ratio of sulfur dioxide?

- A) 0.5
- B) 1.0
- C) 2.0
- D) 16
- E) none of the above

## End of Chapter Questions

### Question 12

Identify the block in the periodic table containing metals that tend to form more than one type of ion.

### Question 13

What is the basic form for the names of ionic compounds containing a metal that forms only one type of ion?

### Question 14

What is the basic form for the names of ionic compounds containing a metal that forms more than one type of ion?

### Question 15

Why are Roman numerals needed in the names of ionic compounds containing a metal that forms more than one type of ion?

### Question 16

What is the basic form for the names of molecular compounds?

### Question 17

What is the basic form for the names of binary acids?

### Question 18

What is the basic form for the names of oxyacids whose oxyanions end with -ate?

### Question 19

What is the basic form for the names of oxyacids whose oxyanions end with -ite?

### Question 20

Write chemical formulas for compounds containing:

- (a) three iron atoms for every four oxygen atoms
- (b) one phosphorus atom for every three chlorine atoms
- (c) one phosphorus atom for every five chlorine atoms
- (d) two silver atoms for every oxygen atom

**Question 21**

Determine the number of each type of atom in each formula.

- (a)  $\text{MgCl}_2$
- (b)  $\text{NaNO}_3$
- (c)  $\text{Ca}(\text{NO}_2)_2$
- (d)  $\text{Sr}(\text{OH})_2$

**Question 22**

Complete the atom-counting table.

| Formula                                         | Acetate groups | C atoms | H atoms | O atoms | Metal atoms |
|-------------------------------------------------|----------------|---------|---------|---------|-------------|
| $\text{Mg}(\text{C}_2\text{H}_3\text{O}_2)_2$   | _____          | _____   | _____   | _____   | _____       |
| $\text{NaC}_2\text{H}_3\text{O}_2$              | _____          | _____   | _____   | _____   | _____       |
| $\text{Cr}_2(\text{C}_2\text{H}_3\text{O}_2)_4$ | _____          | _____   | _____   | _____   | _____       |

**Question 23**

Give the empirical formula corresponding to each molecular formula.

- (a)  $\text{C}_2\text{H}_6$
- (b)  $\text{N}_2\text{O}_4$
- (c)  $\text{C}_4\text{H}_6\text{O}_2$
- (d)  $\text{NH}_3$

**Question 24**

Classify each element as atomic or molecular.

- (a) chlorine
- (b) argon
- (c) cobalt
- (d) hydrogen

**Question 25**

Classify each compound as ionic or molecular.

- (a)  $\text{CS}_2$
- (b)  $\text{CuO}$
- (c)  $\text{KI}$
- (d)  $\text{PCl}_3$

**Question 26**

Match each substance with the basic units that compose it. Substances: helium;  $\text{CCl}_4$ ;  $\text{K}_2\text{SO}_4$ ; bromine. Unit choices: molecules; formula units; diatomic molecules; single atoms.

**Question 27**

What basic units—single atoms, molecules, or formula units—compose each substance?

- (a)  $\text{BaBr}_2$
- (b) Ne
- (c)  $\text{I}_2$
- (d) CO

**Question 28**

Classify each compound as ionic or molecular. If ionic, determine whether the metal forms only one type of ion or more than one type of ion.

- (a) KCl
- (b)  $\text{CBr}_4$
- (c)  $\text{NO}_2$
- (d)  $\text{Sn}(\text{SO}_4)_2$

**Question 29**

Write a formula for the ionic compound that forms from each pair of elements.

- (a) sodium and sulfur
- (b) strontium and oxygen
- (c) aluminum and sulfur
- (d) magnesium and chlorine

**Question 30**

Write a formula for the compound that forms from potassium and:

- (a) acetate
- (b) chromate
- (c) phosphate
- (d) cyanide

**Question 31**

Determine whether the metal in each ionic compound forms only one type of ion or more than one type, and name the compound accordingly.

- (a)  $\text{Cr}_2\text{O}_3$
- (b)  $\text{NaI}$
- (c)  $\text{CaBr}_2$
- (d)  $\text{SnO}$

**Question 32**

Name each ionic compound containing a polyatomic ion.

- (a)  $\text{Ba}(\text{NO}_3)_2$
- (b)  $\text{Pb}(\text{C}_2\text{H}_3\text{O}_2)_2$
- (c)  $\text{NH}_4\text{I}$
- (d)  $\text{KClO}_3$
- (e)  $\text{CoSO}_4$
- (f)  $\text{NaClO}_4$

**Question 33**

Name each polyatomic ion.

- (a)  $\text{BrO}^-$
- (b)  $\text{BrO}_2^-$
- (c)  $\text{BrO}_3^-$
- (d)  $\text{BrO}_4^-$

**Question 34**

Write a formula for each ionic compound.

- (a) copper(II) bromide
- (b) silver nitrate
- (c) potassium hydroxide
- (d) sodium sulfate
- (e) potassium hydrogen sulfate
- (f) sodium hydrogen carbonate

**Question 35**

Name each molecular compound.

- (a)  $\text{SO}_2$
- (b)  $\text{NI}_3$
- (c)  $\text{BrF}_5$
- (d)  $\text{NO}$
- (e)  $\text{N}_4\text{Se}_4$

**Question 36**

Write a formula for each molecular compound.

- (a) carbon monoxide
- (b) disulfur tetrafluoride
- (c) dichlorine monoxide
- (d) phosphorus pentafluoride
- (e) boron tribromide
- (f) diphosphorus pentasulfide

**Question 37**

Determine whether the name shown for each molecular compound is correct. If not, provide the correct name.

- (a)  $\text{PBr}_5$ : phosphorus(V) pentabromide
- (b)  $\text{P}_2\text{O}_3$ : phosphorus trioxide
- (c)  $\text{SF}_4$ : monosulfur hexafluoride
- (d)  $\text{NF}_4$ : nitrogen trifluoride

**Question 38**

Determine whether each acid is binary or an oxyacid and name it. If it is an oxyacid, name the oxyanion.

- (a)  $\text{HNO}_2(\text{aq})$
- (b)  $\text{HI}(\text{aq})$
- (c)  $\text{H}_2\text{SO}_4(\text{aq})$
- (d)  $\text{HNO}_3(\text{aq})$

### Question 39

Name each acid.

- (a)  $\text{HClO}$
- (b)  $\text{HClO}_2$
- (c)  $\text{HClO}_3$
- (d)  $\text{HClO}_4$

### Question 40

Write a formula for each acid.

- (a) phosphoric acid
- (b) hydrobromic acid
- (c) sulfurous acid

### Question 41

Arrange these compounds in order of decreasing formula mass:  $\text{Ag}_2\text{O}$ ,  $\text{PtO}_2$ ,  $\text{Al}(\text{NO}_3)_3$ ,  $\text{PBr}_3$ .

### Question 42

Specify the number of hydrogen atoms, shown as the light spheres, in each set of molecular models.



**Figure description:** Three model sets. (a) Four oxygen-centered molecules, each with two light hydrogen spheres. (b) Three carbon-centered molecules, each with four light hydrogen spheres in a tetrahedral arrangement. (c) Two molecules, each with a carbon bearing three light hydrogen spheres and an attached oxygen bearing one light hydrogen sphere.

### Question 43

Is each name correct for the given formula? If not, provide the correct name.

- (a)  $\text{Ca}(\text{NO}_2)_2$ : calcium nitrate
- (b)  $\text{K}_2\text{O}$ : dipotassium monoxide
- (c)  $\text{PCl}_3$ : phosphorus chloride
- (d)  $\text{PbCO}_3$ : lead(II) carbonate
- (e)  $\text{KIO}_2$ : potassium hypoiodite

**Question 44**

For each compound, list the correct formula and calculate its formula mass.

- (a) tin(IV) sulfate
- (b) nitrous acid
- (c) sodium bicarbonate
- (d) phosphorus pentafluoride

**Question 45**

Name each compound and calculate its formula mass.

- (a)  $\text{PtO}_2$
- (b)  $\text{N}_2\text{O}_5$
- (c)  $\text{Al}(\text{ClO}_3)_3$
- (d)  $\text{PBr}_5$

## Solutions

Find the solution with the same question number.

### Question 1 Solution

D. Magnesium forms  $\text{Mg}^{2+}$  and nitride is  $\text{N}^{3-}$ . Three  $\text{Mg}^{2+}$  ions and two  $\text{N}^{3-}$  ions give zero total charge, so the formula is  $\text{Mg}_3\text{N}_2$ .

Formula mass =  $3(24.31) + 2(14.01) = 100.95 \text{ u}$

### Question 2 Solution

C. Each fluoride ion is  $\text{F}^-$ . Two fluoride ions contribute  $-2$ , so M must have charge  $+2$ .

### Question 3 Solution

B.  $\text{IO}_3^-$  is iodate. For an oxyacid, an anion name ending in -ate becomes an acid name ending in -ic: iodic acid.

### Question 4 Solution

C.  $\text{HBr(aq)}$  is a binary acid. Use hydro- + brom- + -ic acid: hydrobromic acid.

### Question 5 Solution

A. This is a molecular compound. Three oxygen atoms give the prefix tri-, so  $\text{SO}_3$  is sulfur trioxide. We omit mono- for the first element.

### Question 6 Solution

B.  $\text{Ca}^{2+}$  is calcium and  $\text{NO}_3^-$  is nitrate. The compound is calcium nitrate. We do not use a molecular prefix such as di- to name this ionic compound.

### Question 7 Solution

A.  $\text{Mg}^{2+}$  and  $\text{S}^{2-}$  balance in a 1:1 ratio, giving  $\text{MgS}$ .

### Question 8 Solution

C. Chlorine exists as  $\text{Cl}_2$  molecules. Sodium and neon are atomic elements; carbon dioxide is a compound.

### Question 9 Solution

D. Ammonium fluoride contains  $\text{NH}_4^+$  and  $\text{F}^-$  ions. It is ionic even though it contains no metal.

### Question 10 Solution

C. The subscript outside the parentheses multiplies every atom inside:  $3 \times 3 = 9$  oxygen atoms per formula unit.

### Question 11 Solution

B.  $\text{SO}_2$  contains two O atoms for every S atom, but this is an atom ratio, not a mass ratio.

O-to-S mass ratio =  $2(16.00)/32.07 \approx 1.0$

### Question 12 Solution

The transition-metal block, the d block, contains many metals that form more than one common positive ion. This is a tendency, not a universal rule: some transition metals have a fixed charge in introductory chemistry, and some metals outside the d block also have variable charges.

### Question 13 Solution

Name the cation first and the anion second. A monatomic anion uses an -ide ending; a polyatomic anion keeps its own name. No Roman numeral is needed for a metal with a fixed charge. Example:  $\text{CaCl}_2$  is calcium chloride.

### Question 14 Solution

Name the metal, give its ion charge as a Roman numeral in parentheses, and then name the anion. Example:  $\text{FeCl}_3$  is iron(III) chloride because three  $\text{Cl}^-$  ions require  $\text{Fe}^{3+}$ .

### Question 15 Solution

The Roman numeral specifies which metal ion is present. Iron(II) and iron(III) have different charges and give different compounds. The numeral gives the charge, not the number of metal atoms.

### Question 16 Solution

For a binary molecular compound, name the first element and then the second with an -ide ending. Use numerical prefixes to indicate atom counts, omitting mono- on the first element. Example:  $\text{N}_2\text{O}_4$  is dinitrogen tetroxide.

### Question 17 Solution

Use hydro- + the nonmetal root + -ic acid. Example:  $\text{HCl(aq)}$  is hydrochloric acid.

### Question 18 Solution

Change the oxyanion's -ate ending to -ic acid. Keep any prefix such as per-. Do not add hydro-. Example: nitrate gives nitric acid.

### Question 19 Solution

Change the oxyanion's -ite ending to -ous acid. Keep any prefix such as hypo-. Example: nitrite gives nitrous acid.

### Question 20 Solution

The subscripts record the given atom ratios; a subscript of 1 is omitted.

(a)  $\text{Fe}_3\text{O}_4$ .

- (b)  $\text{PCl}_3$ .
- (c)  $\text{PCl}_5$ .
- (d)  $\text{Ag}_2\text{O}$ .

**Question 21 Solution**

- (a) Mg: 1; Cl: 2.
- (b) Na: 1; N: 1; O: 3.
- (c) Ca: 1; N: 2; O: 4.
- (d) Sr: 1; O: 2; H: 2.

A subscript outside parentheses multiplies every atom inside those parentheses.

**Question 22 Solution**

Count each acetate group as  $\text{C}_2\text{H}_3\text{O}_2^-$ , then multiply the atom counts by the number of groups. The metal count is read separately from its own subscript.

| Formula                                         | Acetate groups | C atoms | H atoms | O atoms | Metal atoms |
|-------------------------------------------------|----------------|---------|---------|---------|-------------|
| $\text{Mg}(\text{C}_2\text{H}_3\text{O}_2)_2$   | 2              | 4       | 6       | 4       | 1           |
| $\text{NaC}_2\text{H}_3\text{O}_2$              | 1              | 2       | 3       | 2       | 1           |
| $\text{Cr}_2(\text{C}_2\text{H}_3\text{O}_2)_4$ | 4              | 8       | 12      | 8       | 2           |

**Question 23 Solution**

Divide all subscripts by their greatest common divisor.

- (a)  $\text{CH}_3$ , dividing by 2.
- (b)  $\text{NO}_2$ , dividing by 2.
- (c)  $\text{C}_2\text{H}_3\text{O}$ , dividing by 2.
- (d)  $\text{NH}_3$ , already in its smallest whole-number ratio.

**Question 24 Solution**

- (a) Molecular:  $\text{Cl}_2$ .
- (b) Atomic: Ar.
- (c) Atomic: Co.
- (d) Molecular:  $\text{H}_2$ .

An element can contain molecules while still consisting of only one kind of atom.

**Question 25 Solution**

- (a)  $\text{CS}_2$ : molecular, nonmetal + nonmetal.

- (b) CuO: ionic, copper cations and oxide anions.
- (c) KI: ionic,  $K^+$  and  $I^-$ .
- (d)  $PCl_3$ : molecular, nonmetal + nonmetal.

#### Question 26 Solution

Helium  $\rightarrow$  single atoms.

$CCl_4$   $\rightarrow$  molecules.

$K_2SO_4$   $\rightarrow$  formula units, describing the ratio of ions in an ionic material.

Bromine  $\rightarrow$  diatomic molecules,  $Br_2$ .

#### Question 27 Solution

- (a)  $BaBr_2$ : formula units; it is ionic.
- (b) Ne: single atoms.
- (c)  $I_2$ : molecules of an element.
- (d) CO: molecules of a compound.

#### Question 28 Solution

- (a) Ionic; potassium has the fixed common charge +1.
- (b) Molecular.
- (c) Molecular.
- (d) Ionic; tin has variable charge. Each sulfate is  $2^-$ , so tin is  $4^+$  in this particular compound.

#### Question 29 Solution

Balance the total positive and negative charge, then use the smallest ion ratio.

- (a)  $Na^+$  and  $S^{2-} \rightarrow Na_2S$ .
- (b)  $Sr^{2+}$  and  $O^{2-} \rightarrow SrO$ .
- (c)  $Al^{3+}$  and  $S^{2-} \rightarrow Al_2S_3$ .
- (d)  $Mg^{2+}$  and  $Cl^- \rightarrow MgCl_2$ .

#### Question 30 Solution

Potassium is  $K^+$ . Use as many potassium ions as are needed to balance the anion charge.

- (a)  $C_2H_3O_2^- \rightarrow KC_2H_3O_2$ .
- (b)  $CrO_4^{2-} \rightarrow K_2CrO_4$ .
- (c)  $PO_4^{3-} \rightarrow K_3PO_4$ .
- (d)  $CN^- \rightarrow KCN$ .

### Question 31 Solution

- (a) Chromium has variable charge. Three  $\text{O}^{2-}$  ions require a total of +6, or +3 per Cr: chromium(III) oxide.
- (b) Sodium has fixed charge +1: sodium iodide.
- (c) Calcium has fixed charge +2: calcium bromide.
- (d) Tin has variable charge. One  $\text{O}^{2-}$  requires  $\text{Sn}^{2+}$ : tin(II) oxide.

### Question 32 Solution

- (a) Barium nitrate.
- (b) Lead(II) acetate: two acetate ions require  $\text{Pb}^{2+}$ .
- (c) Ammonium iodide.
- (d) Potassium chlorate.
- (e) Cobalt(II) sulfate: sulfate is  $2-$ , so cobalt is  $2+$ .
- (f) Sodium perchlorate.

### Question 33 Solution

- (a) Hypobromite.
- (b) Bromite.
- (c) Bromate.
- (d) Perbromate.

Within this series, oxygen count increases from hypo-...-ite through -ite and -ate to per-...-ate. The charge stays  $1-$ .

### Question 34 Solution

- (a)  $\text{CuBr}_2$ :  $\text{Cu}^{2+}$  with two  $\text{Br}^-$ .
- (b)  $\text{AgNO}_3$ :  $\text{Ag}^+$  with  $\text{NO}_3^-$ .
- (c)  $\text{KOH}$ :  $\text{K}^+$  with  $\text{OH}^-$ .
- (d)  $\text{Na}_2\text{SO}_4$ : two  $\text{Na}^+$  with  $\text{SO}_4^{2-}$ .
- (e)  $\text{KHSO}_4$ :  $\text{K}^+$  with  $\text{HSO}_4^-$ .
- (f)  $\text{NaHCO}_3$ :  $\text{Na}^+$  with  $\text{HCO}_3^-$ .

### Question 35 Solution

Use prefixes for the actual atom counts in the formula.

- (a) Sulfur dioxide.
- (b) Nitrogen triiodide.
- (c) Bromine pentafluoride.
- (d) Nitrogen monoxide.

(e) Tetranitrogen tetraselenide.

### Question 36 Solution

Read the prefixes as atom counts; do not reduce a molecular formula.

- (a) CO.
- (b) S<sub>2</sub>F<sub>4</sub>.
- (c) Cl<sub>2</sub>O.
- (d) PF<sub>5</sub>.
- (e) BBr<sub>3</sub>.
- (f) P<sub>2</sub>S<sub>5</sub>.

### Question 37 Solution

All four names are incorrect under the binary molecular naming rules used here.

- (a) Phosphorus pentabromide; remove the Roman numeral.
- (b) Diphosphorus trioxide; the first element needs di-.
- (c) Sulfur tetrafluoride; omit mono- on the first element and use tetra- for four F atoms.
- (d) Nitrogen tetrafluoride; four F atoms require tetra-. These are names for the formulas as printed.

### Question 38 Solution

- (a) Oxyacid: nitrous acid; nitrite, NO<sub>2</sub><sup>-</sup>.
- (b) Binary acid: hydroiodic acid.
- (c) Oxyacid: sulfuric acid; sulfate, SO<sub>4</sub><sup>2-</sup>.
- (d) Oxyacid: nitric acid; nitrate, NO<sub>3</sub><sup>-</sup>.

### Question 39 Solution

- (a) Hypochlorous acid, from hypochlorite.
- (b) Chlorous acid, from chlorite.
- (c) Chloric acid, from chlorate.
- (d) Perchloric acid, from perchlorate.

Retain hypo- and per-, and change -ite to -ous or -ate to -ic.

### Question 40 Solution

- (a) H<sub>3</sub>PO<sub>4</sub>, from three H<sup>+</sup> and PO<sub>4</sub><sup>3-</sup>.
- (b) HBr(aq), from H<sup>+</sup> and Br<sup>-</sup>.
- (c) H<sub>2</sub>SO<sub>3</sub>, from two H<sup>+</sup> and SO<sub>3</sub><sup>2-</sup>.

The number of acidic hydrogen atoms balances the anion charge.

**Question 41 Solution**

Add the atomic masses with the indicated atom counts.

$$\text{Ag}_2\text{O}: 2(107.87) + 16.00 = 231.74 \text{ u}$$

$$\text{PtO}_2: 195.08 + 2(16.00) = 227.08 \text{ u}$$

$$\text{Al}(\text{NO}_3)_3: 26.98 + 3[14.01 + 3(16.00)] = 213.01 \text{ u}$$

$$\text{PBr}_3: 30.97 + 3(79.90) = 270.67 \text{ u}$$

Decreasing order:  $\text{PBr}_3 > \text{Ag}_2\text{O} > \text{PtO}_2 > \text{Al}(\text{NO}_3)_3$ .

**Question 42 Solution**

Count the hydrogen atoms in one molecule, then multiply by the number of molecules.

(a) 4 water molecules  $\times$  2 H atoms per molecule = 8 H atoms.

(b) 3 methane molecules  $\times$  4 H atoms per molecule = 12 H atoms.

(c) 2 methanol molecules  $\times$  4 H atoms per molecule = 8 H atoms.

**Question 43 Solution**

(a) Incorrect: calcium nitrite.  $\text{NO}_2^-$  is nitrite, whereas  $\text{NO}_3^-$  is nitrate.

(b) Incorrect: potassium oxide. Ionic names do not use these prefixes.

(c) Incorrect: phosphorus trichloride. The molecular name must indicate three Cl atoms.

(d) Correct. Carbonate is  $2-$ , requiring  $\text{Pb}^{2+}$ .

(e) Incorrect: potassium iodite.  $\text{IO}_2^-$  is iodite; hypoiodite is  $\text{IO}^-$ .

**Question 44 Solution**

(a)  $\text{Sn}(\text{SO}_4)_2$ .  $\text{Sn}^{4+}$  requires two  $\text{SO}_4^{2-}$  ions.

$$118.71 + 2[32.07 + 4(16.00)] = 310.85 \text{ u}$$

(b)  $\text{HNO}_2$ . Nitrous acid comes from nitrite.

$$1.008 + 14.01 + 2(16.00) = 47.02 \text{ u}$$

(c)  $\text{NaHCO}_3$ . Bicarbonate is hydrogen carbonate,  $\text{HCO}_3^-$ .

$$22.99 + 1.008 + 12.01 + 3(16.00) = 84.01 \text{ u}$$

(d)  $\text{PF}_5$ . Penta- specifies five F atoms.

$$30.97 + 5(19.00) = 125.97 \text{ u}$$

**Question 45 Solution**

(a) Platinum(IV) oxide: two  $\text{O}^{2-}$  ions require  $\text{Pt}^{4+}$ .

$$195.08 + 2(16.00) = 227.08 \text{ u}$$

(b) Dinitrogen pentoxide.

$$2(14.01) + 5(16.00) = 108.02 \text{ u}$$

(c) Aluminum chlorate.

$$26.98 + 3[35.45 + 3(16.00)] = 277.33 \text{ u}$$

(d) Phosphorus pentabromide.

$$30.97 + 5(79.90) = 430.47 \text{ u}$$