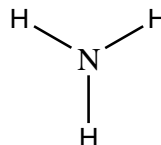
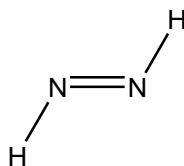
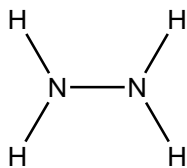


CHAPTER-2 PROBLEM SET

- A chemist finds that 30.82 g of nitrogen will react with 17.60, 35.20, 70.40, or 88.00 g of oxygen to form four different compounds. **(a)** Calculate the mass of oxygen per gram of nitrogen in each compound. **(b)** How do the numbers in part (a) support Dalton's atomic theory? (Answer: a) 1st comp. 0.571 g, 2nd comp. 1.14 g, 3rd comp. 2.28 g, 4th comp. 2.86 g, b) the law of multiple proportions)
- Each of the following isotopes is used in medicine. Indicate the number of protons and neutrons in each isotope: **(a)** phosphorus-32, **(b)** chromium-51, **(c)** cobalt-60, **(d)** technetium-99, **(e)** iodine-131, **(f)** thallium-201. (Answer: a) proton: 15, neutron: 17; b) proton: 24, neutron: 27; c) proton: 27, neutron: 33; d) proton: 43, neutron: 56; e) proton: 53, neutron: 78; f) proton: 81, neutron: 120)
- Rubidium has two naturally occurring isotopes, rubidium-85 (atomic mass = 84.9118 amu; abundance = 72.15%) and rubidium-87 (atomic mass = 86.9092 amu; abundance = 27.85%). Calculate the atomic weight of rubidium. (Answer: 85.468 amu)
- What are the molecular and empirical formulas for each of the following compounds?



- Fill in the gaps in the following table:

Symbol	$^{31}\text{P}^{3-}$			
Protons		34	50	118
Neutrons		45	69	76
Electrons			46	
Net charge		2-		3+

- Predict the chemical formulas of the compounds formed by the following pairs of ions: **(a)** Cr^{3+} and Br^- , **(b)** Fe^{3+} and O^{2-} , **(c)** Hg_2^{2+} and CO_3^{2-} , **(d)** Ca^{2+} and ClO_3^- , **(e)** NH_4^+ and PO_4^{3-} .
- Which of the following are ionic, and which are molecular? **(a)** PF_5 , **(b)** NaI , **(c)** SCl_2 , **(d)** $\text{Ca}(\text{NO}_3)_2$, **(e)** FeCl_3 , **(f)** LaP , **(g)** CoCO_3 , **(h)** N_2O_4 .
- Give the names and charges of the cation and anion in each of the following compounds: **(a)** CuS , **(b)** Ag_2SO_4 , **(c)** $\text{Al}(\text{ClO}_3)_3$, **(d)** $\text{Co}(\text{OH})_2$, **(e)** PbCO_3 .

9. Name the following ionic compounds: (a) KCN, (b) NaBrO₂, (c) Sr(OH)₂, (d) CoTe, (e) Fe₂(CO₃)₃, (f) Cr(NO₃)₃, (g) (NH₄)₂SO₃, (h) NaH₂PO₄, (i) KMnO₄, (j) Ag₂Cr₂O₇.
10. Give the chemical formula for each of the following ionic compounds: (a) sodium phosphate, (b) zinc nitrate, (c) barium bromate, (d) iron(II) perchlorate, (e) cobalt(II) hydrogen carbonate, (f) chromium(III) acetate, (g) potassium dichromate.
11. Draw the structural formulas for three isomers of pentane, C₅H₁₂.
12. The element lead (Pb) consists of four naturally occurring isotopes with atomic masses 203.97302, 205.97444, 206.97587, and 207.97663 amu. The relative abundances of these four isotopes are 1.4, 24.1, 22.1, and 52.4% respectively. From these data, calculate the atomic weight of lead. (Answer: 207.22 amu)