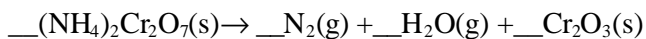
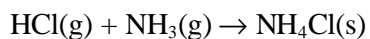


10. Ammonium dichromate, $(\text{NH}_4)_2\text{Cr}_2\text{O}_7$, decomposes when heated to produce N_2 , H_2O , and Cr_2O_3 as represented by this equation.



What is the coefficient for H_2O when this equation is correctly balanced using the smallest set of whole number coefficients?

- (A) 1 (C) 4
(B) 2 (D) 8
11. What volume of 0.15 M HCl can be made from 7.5 mL of concentrated HCl (12M)?
(A) 0.060 L (C) 6.0 L
(B) 0.60 L (D) 6.0×10^2 L
12. Hematite, Fe_2O_3 , is the most common iron ore. How many moles of hematite are in an ore sample that contains 355 g of iron? Assume hematite is the only source of iron in this ore.
(A) 1.11 mol (C) 3.18 mol
(B) 1059 mol (D) 6.36 mol
13. How many moles of $\text{Mg}(\text{OH})_2$ can be precipitated when 15 mL of 0.20 M MgCl_2 solution is mixed with 25 mL of 0.18 M KOH?
(A) 0.0015 mol (C) 0.0030 mol
(B) 0.0022 mol (D) 0.0045 mol
14. A 2.0 mL sample of $\text{HCl}(\text{g})$ is mixed with a 1.5 mL of $\text{NH}_3(\text{g})$. What is the volume if the resulting mixture after the reaction is complete? (Assume all measurements are carried out at the same pressure and temperature and that the volume of the solid is negligible)



- (A) 0.5 mL (C) 2.0 mL
(B) 1.5 mL (D) 3.5 mL

15. A student wants to prepare 250. mL of 0.10 M NaCl solution. Which procedure is most appropriate? (The molar mass of NaCl is 58.4 g mol^{-1})

- (A) Add 5.84 g of NaCl to 250. mL of H_2O
(B) Add 1.46 g of NaCl to 250. mL of H_2O
(C) Dissolve 5.84 g of NaCl in 50 mL of H_2O and dilute to 250. mL.
(D) Dissolve 1.46 g of NaCl in 50 mL of H_2O and dilute to 250. mL.

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6. Calculate the density of a gold coin from the given data.

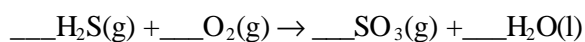
Table of Data	
Mass of the gold coin	13.5243 g
Volume of the coin and water	22.9 mL
volume of the water alone	22.2 mL

- (A) 19.32 g mL^{-1} (C) 19 g mL^{-1}
(B) 19.3 g mL^{-1} (D) $2 \times 10^1 \text{ g mL}^{-1}$

7. A typical silicon chip such as those in electronic calculators weighs 2.3×10^{-4} g. How many silicon atoms are in such a chip?

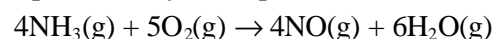
- (A) 4.9×10^{18} (C) 3.9×10^{21}
(B) 1.4×10^{20} (D) 2.6×10^{27}

8. What is the coefficient for oxygen when this equation is balanced?



- (A) 2 (C) 4
(B) 3 (D) 5

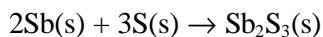
9. The first step in the Ostwald process for producing nitric acid, HNO_3 , from ammonia is represented by this equation.



What volume of oxygen is needed to produce each liter of NO ?

- (A) 0.80 L (C) 5.00 L
(B) 1.20 L (D) 22.4 L

10. Antimony reacts with sulfur according to this equation.



The molar mass of Sb_2S_3 is 339.7 g mol^{-1}

What is the percentage yield for a reaction in which 1.40 g of Sb_2S_3 is obtained from 1.73 g of antimony and a slight excess of sulfur?

- (A) 80.9% (C) 40.5%
(B) 58.0% (D) 29.0%
11. The limiting reagent in a particular reaction can be recognized because it is the reagent.
(A) with the smallest coefficient in the balanced equation.
(B) that has the lowest mass in the reaction mixture.
(C) that is present in the smallest molar quantity.
(D) that would be used up first.
12. What mass of oxygen is present in 50.0 g of copper(II) sulfate pentahydrate, $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$?
The molar mass of $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ is $249.68 \text{ g mol}^{-1}$
(A) 12.8 g (C) 20.0 g
(B) 16.0 g (D) 28.8 g
13. What mass of calcium chloride hexahydrate must be dissolved in sufficient water to prepare 200 mL of a solution with a chloride ion concentration of 0.50M? The molar mass of $\text{CaCl}_2 \cdot 6\text{H}_2\text{O}$ is 219 g mol^{-1}
(A) 5.6 g (C) 22 g
(B) 11 g (D) 44 g
14. The major commercial source for bromine is deep brine wells in Arkansas where the concentration of bromide ion can be as high as 5000 parts per million by mass. What is this concentration when expressed as a mass percentage?
(A) 0.005% (C) 0.5%
(B) 0.05% (D) 5%

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9. How many moles of ozone, O_3 , could be formed from 48.0 g of oxygen gas, O_2 ?
(A) 1.00 mol (C) 1.50 mol
(B) 1.30 mol (D) 2.00 mol

10. How many grams of carbon are present in 0.50 mol of sucrose ($\text{C}_{12}\text{H}_{22}\text{O}_{11}$)?

Substance	Molar Mass
$\text{C}_{12}\text{H}_{22}\text{O}_{11}$	342 g mol^{-1}

- (A) 60 g (C) 90 g
(B) 72 g (D) 120 g
11. If excess Ca(OH)_2 is treated with 0.160 mol of dry HCl gas, what is the maximum number of grams of CaCl_2 that could be formed?

Substance	Molar Mass
Ca(OH)_2	74.1 g mol^{-1}
HCl	36.5 g mol^{-1}
CaCl_2	111.0 g mol^{-1}

- (A) 35.5 g (C) 8.88 g
(B) 17.8 g (D) 4.44 g
12. What volume of 0.500 M CaCl_2 solution is needed to prepare 250 mL of solution that has a chloride concentration of 0.100 M?
(A) 12.5 mL (C) 50.0 mL
(B) 25.0 mL (D) 100 mL