

Exercise 9.1a

Mole Ratios in Stoichiometry

Name: _____

Date: _____ Per: _____

DIRECTIONS: Answer each set of questions in the space provided.

Balance the following equations

- _____ FeCl₃(aq) + _____ KOH(aq) → _____ Fe(OH)₃(s) + _____ KCl(aq)
- _____ Pb(C₂H₃O₂)₂(aq) + _____ KI(aq) → _____ PbI₂(s) + _____ KC₂H₃O₂(aq)
- _____ P₄O₁₀(s) + _____ H₂O(l) → _____ H₃PO₄(aq)
- _____ Li₂O(s) + _____ H₂O(l) → _____ LiOH(aq)

Find the mole ratio of:

- KO₂ to KOH in $4\text{KO}_2(\text{s}) + 2\text{H}_2\text{O}(\text{l}) \rightarrow 4\text{KOH}(\text{aq}) + 3\text{O}_2(\text{g})$ _____
- BaCl₂ to NaCl in $\text{BaCl}_2(\text{aq}) + \text{Na}_2\text{SO}_4(\text{aq}) \rightarrow \text{BaSO}_4(\text{s}) + 2\text{NaCl}(\text{aq})$ _____
- H₂O₂ to O₂ in $2\text{H}_2\text{O}_2(\text{aq}) \rightarrow 2\text{H}_2\text{O}(\text{l}) + \text{O}_2(\text{g})$ _____

Given the following unbalanced equations:

- _____ MnO₂(s) + _____ C(s) → _____ Mn(s) + _____ CO₂(g)

What is the mole ratio of MnO₂ to CO₂?

- _____ Sb(s) + _____ Cl₂(g) → _____ SbCl₃(s)

What is the mole ratio of Sb to Cl₂?

- _____ CH₄(g) + _____ H₂O(g) → _____ CO(g) + _____ H₂(g)

How many moles of H₂ would be produced from:

- | | |
|---------------------------------------|--|
| a. 2 moles of CH ₄ ? _____ | c. 3 moles of CH ₄ ? _____ |
| b. 4 moles of H ₂ O? _____ | d. 0.50 moles of H ₂ O? _____ |

- _____ Zn(s) + _____ CrCl₃(aq) → _____ CrCl₂(aq) + _____ ZnCl₂(aq)

How many moles of CrCl₂ would be produced from:

- | | |
|-------------------------|---|
| a. 2 moles of Zn? _____ | c. 4 moles of CrCl ₃ ? _____ |
| b. 3 moles of Zn? _____ | d. 2.5 moles of CrCl ₃ ? _____ |

- _____ FeS(s) + _____ HCl(aq) → _____ FeCl₂(aq) + _____ H₂S(g)

- How many moles of HCl are required to react with 1.5 moles of FeS? _____
- How many moles of FeS are required to react with 3.0 moles of HCl? _____
- How many moles of HCl are required to produce 1.5 moles of FeCl₂? _____
- How many moles of HCl are required to produce 0.5 moles of H₂S? _____
- How many moles of FeS are required to produce 3 moles of H₂S? _____

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DIRECTIONS: Write the balanced equation and solve each of the following.

13. Aluminum metal and hydrogen chloride react to form aluminum chloride and hydrogen gas.
- a. How many moles of aluminum metal are needed to produce 3.33 moles of aluminum chloride?

- b. How many moles of hydrogen chloride are needed to react with this number of moles of aluminum metal?

14. Aluminum bromide and sodium hydroxide react to form aluminum hydroxide and sodium bromide.
- a. How many moles of sodium bromide can be formed from 1.55 moles of aluminum bromide?

- b. How many moles of aluminum hydroxide may be formed from 4.65 moles of sodium hydroxide?

15. Methane gas (carbon tetrahydride) reacts with oxygen by combustion.

- a. How many moles of methane are needed to produce 3.5×10^{-4} moles of carbon dioxide?

- b. How many moles of oxygen are needed to react to form the 3.5×10^{-4} moles of carbon dioxide?

- c. How many moles of atoms of oxygen would there be in your answer to question #15b?