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Stoichiometry Question Sets

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Stoichiometry Question Sets: Mole, Molar Mass, Balancing Chemical Equation

This is a question pool for general chemistry students. This consists of question sets, each of which contains variations of questions for topics, including the mole, molar mass, balancing chemical equations, and quantitative relationships in chemical reactions. By randomly selecting one question for each topic, instructors can compose a homework/assignment or a quiz unique for each student with the same difficulty level. This could easily be expanded and used in an online class using the selected platform's test options.

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Question Set 1: the Mole

1. Mar learned that the formula for ammonia is NH_3 . Which of the following is correct for ammonia?
 - 1 mol of ammonia contains 1 mol of hydrogen atoms.
 - 2 mol of ammonia contains 1 mol of nitrogen atoms.
 - 1 mol of ammonia contains $2 \times 6.02214076 \times 10^{23}$ nitrogen atoms.
 - 1 mol of ammonia contains $2 \times 6.02214076 \times 10^{23}$ hydrogen atoms.
 - 1 mol of ammonia contains 2 mol of nitrogen atoms.
 - 1 mol of ammonia contain 3 mol of hydrogen atoms.

2. Mar learned that the formula for carbon dioxide is CO_2 . Which of the following is correct for carbon dioxide?
 - 1 mol of carbon dioxide contains 2 mol of carbon atoms.
 - 1 mol of carbon dioxide contains 1 mol of oxygen atoms.
 - 2 mol of carbon dioxide contains 1 mol of carbon atoms.
 - 2 mol of carbon dioxide contain 3 mol of oxygen atoms.
 - 1 mol of carbon dioxide contains $6.02214076 \times 10^{23}$ oxygen atoms.
 - 1 mol of carbon dioxide contains $6.02214076 \times 10^{23}$ carbon atoms.

3. Mar learned that the formula for carbon dioxide is CO_2 . Which of the following is correct for carbon dioxide?
 - 1 mol of carbon dioxide contains $3 \times 6.02214076 \times 10^{23}$ oxygen atoms.
 - 2 mol of carbon dioxide contains $6.02214076 \times 10^{23}$ carbon atoms.
 - 2 mol of carbon dioxide contains 1 mol of carbon atoms.
 - 2 mol of carbon dioxide contain 3 mol of oxygen atoms.
 - 1 mol of carbon dioxide contains 2 mol of carbon atoms.
 - 1 mol of carbon dioxide contains 2 mol of oxygen atoms.

4. Mar learned that the formula for methane is CH_4 . Which of the following is correct for methane?
 - 1 mol of methane contains 2 mol of carbon atoms.
 - 1 mol of methane contains 1 mol of hydrogen atoms.
 - 2 mol of methane contains 1 mol of carbon atoms.
 - 2 mol of methane contain 4 mol of hydrogen atoms.
 - 1 mol of methane contains $4 \times 6.02214076 \times 10^{23}$ hydrogen atoms.
 - 1 mol of methane contains $4 \times 6.02214076 \times 10^{23}$ carbon atoms.

5. Mar learned that the formula for ammonia is NH_3 . Which of the following is correct for ammonia?
- 1 mol of ammonia contains 1 mol of hydrogen atoms.
 - 1 mol of ammonia contains 3 mol of nitrogen atoms.
 - 1 mol of ammonia contains $6.02214076 \times 10^{23}$ nitrogen atoms.
 - 1 mol of ammonia contains $2 \times 6.02214076 \times 10^{23}$ hydrogen atoms.
 - 1 mol of ammonia contains 2 mol of nitrogen atoms.
 - 1 mol of ammonia contain 4 mol of hydrogen atoms.
6. Mar learned that the formula for carbon dioxide is CO_2 . Which of the following is correct for carbon dioxide?
- 1 mol of carbon dioxide contains 3 mol of carbon atoms.
 - 1 mol of carbon dioxide contains 1 mol of oxygen atoms.
 - 2 mol of carbon dioxide contains 2 mol of carbon atoms.
 - 2 mol of carbon dioxide contain 3 mol of oxygen atoms.
 - 1 mol of carbon dioxide contains $6.02214076 \times 10^{23}$ oxygen atoms.
 - 1 mol of carbon dioxide contains $2 \times 6.02214076 \times 10^{23}$ carbon atoms.
7. Mar learned that the formula for methane is CH_4 . Which of the following is correct for methane?
- 1 mol of methane contains 4 mol of carbon atoms.
 - 1 mol of methane contains 1 mol of hydrogen atoms.
 - 2 mol of methane contains 1 mol of carbon atoms.
 - 2 mol of methane contain 4 mol of hydrogen atoms.
 - 1 mol of methane contains $2 \times 6.02214076 \times 10^{23}$ hydrogen atoms.
 - 1 mol of methane contains $6.02214076 \times 10^{23}$ carbon atoms.
8. Mar learned that the formula for ammonia is NH_3 . Which of the following is correct for ammonia?
- 1 mol of ammonia contains 1 mol of hydrogen atoms.
 - 2 mol of ammonia contains 1 mol of nitrogen atoms.
 - 1 mol of ammonia contains $2 \times 6.02214076 \times 10^{23}$ nitrogen atoms.
 - 1 mol of ammonia contains $3 \times 6.02214076 \times 10^{23}$ hydrogen atoms.
 - 1 mol of ammonia contains 3 mol of nitrogen atoms.
 - 1 mol of ammonia contain 2 mol of hydrogen atoms.

Question Set 2: Molar Mass

1. Erica has 152 g of Mg_3N_2 . How many moles of Mg_3N_2 are there in 152 g?
 - 2.61 mol
 - 3.52 mol
 - 2.25 mol
 - 4.55 mol
 - 1.501 mol
 - 0.505 mol

2. Erica has 166.5 g of CaCl_2 . How many moles of CaCl_2 are there in 166.5 g?
 - 2.00 mol
 - 1.50 mol
 - 0.50 mol
 - 3.50 mol
 - 4.50 mol
 - 2.50 mol

3. Erica has 2.613 mol of CO_2 . How many grams of CO_2 are there in 2.613 mol?
 - 115 g
 - 82 g
 - 60 g
 - 96 g
 - 300 g
 - 152 g

4. Erica has 252.4 g of Mn_3N_2 . How many moles of Mn_3N_2 are there in 252.4 g?

3.50 mol

1.31 mol

2.00 mol

0.50 mol

4.50 mol

2.50 mol

5. Erica has 266.7 g of AlCl_3 . How many moles of AlCl_3 are there in 266.7 g?

1.50 mol

0.50 mol

2.00 mol

2.50 mol

4.50 mol

3.50 mol

6. Erica has 3.523 mol of NH_3 . How many grams of NH_3 are there in 3.523 mol?

82 g

152 g

96 g

60 g

115 g

300 g

7. Erica has 300.0 g of AlCl_3 . How many moles of AlCl_3 are there in 300 g?
- 1.501 mol
 - 4.55 mol
 - 0.505 mol
 - 2.25 mol
 - 2.61 mol
 - 3.52 mol
8. Erica has 4.552 mol of H_2O . How many grams of H_2O are there in 4.552 mol?
- 300 g
 - 115 g
 - 152 g
 - 82 g
 - 60 g
 - 96 g
9. Erica has 56.0 g of CaCl_2 . How many moles of CaCl_2 are there in 56.0 g?
- 1.501 mol
 - 2.61 mol
 - 4.55 mol
 - 3.52 mol
 - 2.25 mol
 - 0.505 mol

10. Erica has 63.1 g of H₂O. How many moles of H₂O are there in 63.1 g?

- 4.50 mol
- 3.50 mol
- 2.00 mol
- 0.50 mol
- 2.50 mol
- 1.50 mol

11. Erica has 66.0 g of CO₂. How many moles of CO₂ are there in 66.0 g?

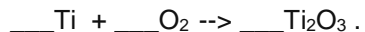
- 3.50 mol
- 2.00 mol
- 1.50 mol
- 2.50 mol
- 3.00 mol
- 0.50 mol

12. Erica has 76.6 g of NH₃. How many moles of NH₃ are there in 76.6 g?

- 2.50 mol
- 0.50 mol
- 4.50 mol
- 1.50 mol
- 3.50 mol
- 2.00 mol

Question Set 3: Balancing Chemical Equations

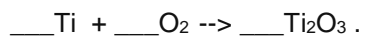
1. Vanessa wants to balance the unbalanced chemical equation:



After balancing this equation, what is the coefficient of Ti?

- 5
- 1
- 2
- 4
- 3
- 0

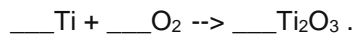
2. Vanessa wants to balance the unbalanced chemical equation:



After balancing this equation, what is the coefficient of O₂?

- 0
- 1
- 2
- 3
- 4
- 5

3. Vanessa wants to balance the unbalanced chemical equation:



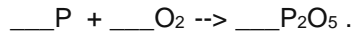
After balancing this equation, what is the coefficient of Ti₂O₃?

- 3
- 2
- 1
- 4

5

0

4. Vanessa wants to balance the unbalanced chemical equation:



After balancing this equation, what is the coefficient of O_2 ?

1

5

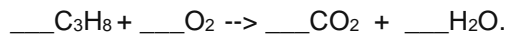
2

0

3

4

5. Vanessa wants to balance the unbalanced chemical equation:



After balancing this equation, what is the coefficient of C_3H_8 ?

1

4

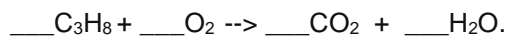
2

0

5

3

6. Vanessa wants to balance the unbalanced chemical equation:



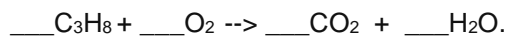
After balancing this equation, what is the coefficient of H_2O ?

3

1

- 5
- 4
- 2
- 0

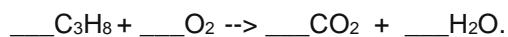
7. Vanessa wants to balance the unbalanced chemical equation:



After balancing this equation, what is the coefficient of CO_2 ?

- 0
- 1
- 3
- 4
- 2
- 5

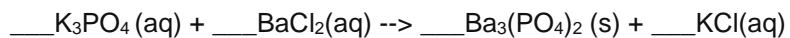
8. Vanessa wants to balance the unbalanced chemical equation:



After balancing this equation, what is the coefficient of O_2 ?

- 0
- 4
- 2
- 5
- 1
- 3

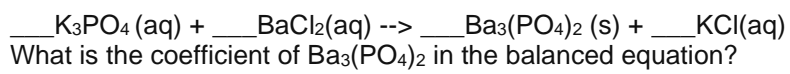
9. Vanessa balances the following chemical equation:



What is the coefficient of KCl in the balanced equation?

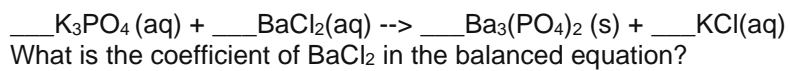
- 1
- 3
- 6
- 2
- 4
- 5

10. Vanessa balances the following chemical equation:



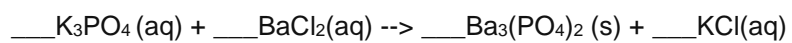
- 6
- 4
- 2
- 5
- 3
- 1

11. Vanessa balances the following chemical equation:



- 6
- 5
- 2
- 1
- 3
- 4

12. Vanessa balances the following chemical equation:



What is the coefficient of K_3PO_4 in the balanced equation?

- 3
- 6
- 5
- 4
- 2
- 1

Question Set 4: Reading Chemical Equations

1. Samantha reacts hydrogen with oxygen to produce water: $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{g})$. What is the molar ratio of $\text{H}_2 : \text{O}_2 : \text{H}_2\text{O}$ in this equation?
- 1:2:3
 - 2:1:2
 - 2:2:1
 - 2:1:1
 - 1:1:1
 - 2:1:4
2. Samantha reacts zinc with oxygen gas to produce zinc chloride: $2\text{Zn}(\text{s}) + \text{O}_2(\text{g}) \rightarrow 2\text{ZnO}(\text{s})$. What is the molar ratio of $\text{Zn} : \text{O}_2 : \text{ZnO}$ in this equation?
- 2:1:1
 - 3:1:2
 - 2:3:2
 - 2:1:2
 - 1:1:1
 - 4:3:2
3. Samantha reacts sodium with chlorine gas to produce sodium chloride: $2\text{Na}(\text{s}) + \text{Cl}_2(\text{g}) \rightarrow 2\text{NaCl}(\text{s})$. What is the molar ratio of $\text{Na} : \text{Cl}_2 : \text{NaCl}$ in this equation?
- 1:2:3
 - 2:1:2
 - 2:1:4
 - 1:1:1
 - 3:1:2
 - 2:1:1

4. Samantha reacts hydrogen with nitrogen to produce ammonia: $3\text{H}_2(\text{g}) + \text{N}_2(\text{g}) \rightarrow 2\text{NH}_3(\text{g})$. What is the molar ratio of $\text{H}_2 : \text{N}_2 : \text{NH}_3$ in this equation?
- 2:1:4
 - 3:1:2
 - 2:2:1
 - 2:1:1
 - 1:1:1
 - 1:2:3
5. [Samantha reacts carbon with oxygen to produce carbon dioxide: $\text{C}(\text{s}) + \text{O}_2(\text{g}) \rightarrow \text{CO}_2(\text{g})$. What is the molar ratio of $\text{C} : \text{O}_2 : \text{CO}_2$ in this equation?
- 1:2:3
 - 2:1:1
 - 1:1:1
 - 2:1:4
 - 3:1:2
 - 2:2:1
6. Samantha reacts aluminum with oxygen gas to produce aluminum chloride: $4\text{Al}(\text{s}) + 3\text{O}_2(\text{g}) \rightarrow 2\text{Al}_2\text{O}_3(\text{s})$. What is the molar ratio of $\text{Al} : \text{O}_2 : \text{Al}_2\text{O}_3$ in this equation?
- 3:1:2
 - 2:1:1
 - 2:1:2
 - 4:3:2
 - 2:3:2
 - 1:1:1

7. Samantha reacts aluminum with chlorine gas to produce aluminum chloride: $2\text{Al (s)} + 3\text{Cl}_2\text{(g)} \rightarrow 2\text{AlCl}_3\text{(s)}$. What is the molar ratio of Al : Cl₂ : AlCl₃ in this equation?

3:1:2

1:1:1

2:1:4

2:3:2

2:1:2

2:1:1

Question Set 5: Quantitative Mass Relationship

1. Brenda wants to react hydrogen gas (H_2) with oxygen gas (O_2) to produce water.
 - a) Write a balanced chemical equation for this reaction.
 - b) If she wants to produce 4 moles of water, how many moles of O_2 does she need?
 - c) Calculate the molar masses of H_2 , O_2 and H_2O .
 - d) If she wants to produce 72.060 g of water, how many grams of O_2 does she need?

2. Brenda wants to react hydrogen gas (H_2) with nitrogen gas (N_2) to form ammonia (NH_3).
 - a) Write a balanced chemical equation for this reaction.
 - b) If she wants to produce 4 moles of ammonia, how many moles of N_2 does she need?
 - c) Calculate the molar masses of H_2 , N_2 and NH_3 .
 - d) If she wants to produce 68.12 g of ammonia, how many grams of nitrogen does she need?

3. Brenda wants to react aluminum (Al) with oxygen gas (O_2) to produce aluminum oxide (Al_2O_3).
 - a) Write a balanced chemical equation for this reaction.
 - b) If she wants to produce 6 mole of aluminum oxide, how many moles of Al does she need?
 - c) Calculate the molar masses of Al , O_2 and Al_2O_3 .
 - d) If she wants to produce 611.76 g of aluminum oxide, how many grams of Al does she need?

4. Brenda wants to react hydrogen gas (H_2) with oxygen gas (O_2) to produce water.
 - a) Write a balanced chemical equation for this reaction.
 - b) If she wants to produce 2 moles of water, how many moles of O_2 does she need?
 - c) Calculate the molar masses of H_2 , O_2 and H_2O .
 - d) If she wants to produce 36.030 g of water, how many grams of O_2 does she need?

5. Brenda wants to react hydrogen gas (H_2) with oxygen gas (O_2) to produce water.
 - a) Write a balanced chemical equation for this reaction.
 - b) If she wants to produce 5 moles of water, how many moles of H_2 does she need?
 - c) Calculate the molar masses of H_2 , O_2 and H_2O .
 - d) If she wants to produce 90.075 g of water, how many grams of H_2 does she need?

6. Brenda wants to react hydrogen gas (H_2) with oxygen gas (O_2) to produce water.
 - a) Write a balanced chemical equation for this reaction.
 - b) If she wants to produce 4 moles of water, how many moles of H_2 does she need?
 - c) Calculate the molar masses of H_2 , O_2 and H_2O .
 - d) If she wants to produce 72.060 g of water, how many grams of H_2 does she need?

7. Brenda wants to react hydrogen gas (H_2) with oxygen gas (O_2) to produce water.
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 3 moles of water, how many moles of H_2 does she need?
 - Calculate the molar masses of H_2 , O_2 and H_2O .
 - If she wants to produce 54.045 g of water, how many grams of H_2 does she need?
8. Brenda wants to react hydrogen gas (H_2) with oxygen gas (O_2) to produce water.
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 2 moles of water, how many moles of H_2 does she need?
 - Calculate the molar masses of H_2 , O_2 and H_2O .
 - If she wants to produce 36.030 g of water, how many grams of H_2 does she need?
9. Brenda wants to react hydrogen gas (H_2) with oxygen gas (O_2) to produce water.
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 1 mol of water, how many moles of H_2 does she need?
 - Calculate the molar masses of H_2 , O_2 and H_2O .
 - If she wants to produce 18.015 g of water, how many grams of H_2 does she need?
10. Brenda wants to react hydrogen gas (H_2) with nitrogen gas (N_2) to form ammonia (NH_3).
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 1 mole of ammonia, how many moles of H_2 does she need?
 - Calculate the molar masses of H_2 , N_2 and NH_3 .
 - If she wants to produce 17.03 g of ammonia, how many grams of H_2 does she need?
11. Brenda wants to react hydrogen gas (H_2) with nitrogen gas (N_2) to form ammonia (NH_3).
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 6 moles of ammonia, how many moles of H_2 does she need?
 - Calculate the molar masses of H_2 , N_2 and NH_3 .
 - If she wants to produce 102.18 g of ammonia, how many grams of H_2 does she need?
12. Brenda wants to react hydrogen gas (H_2) with nitrogen gas (N_2) to form ammonia (NH_3).
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 4 moles of ammonia, how many moles of H_2 does she need?
 - Calculate the molar masses of H_2 , N_2 and NH_3 .
 - If she wants to produce 68.12 g of ammonia, how many grams of H_2 does she need?

13. Brenda wants to react hydrogen gas (H_2) with nitrogen gas (N_2) to form ammonia (NH_3).
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 2 moles of ammonia, how many moles of H_2 does she need?
 - Calculate the molar masses of H_2 , N_2 and NH_3 .
 - If she wants to produce 34.06 g of ammonia, how many grams of H_2 does she need?
14. Brenda wants to react hydrogen gas (H_2) with nitrogen gas (N_2) to form ammonia (NH_3).
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 6 moles of ammonia, how many moles of N_2 does she need?
 - Calculate the molar masses of H_2 , N_2 and NH_3 .
 - If she wants to produce 102.18 g of ammonia, how many grams of nitrogen does she need?
15. Brenda wants to react hydrogen gas (H_2) with nitrogen gas (N_2) to form ammonia (NH_3).
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 1 mol of ammonia, how many moles of N_2 does she need?
 - Calculate the molar masses of H_2 , N_2 and NH_3 .
 - If she wants to produce 17.03 g of ammonia, how many grams of nitrogen does she need?
16. Brenda wants to react hydrogen gas (H_2) with nitrogen gas (N_2) to form ammonia (NH_3).
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 2 moles of ammonia, how many moles of N_2 does she need?
 - Calculate the molar masses of H_2 , N_2 and NH_3 .
 - If she wants to produce 34.06 g of ammonia, how many grams of nitrogen does she need?
17. Brenda wants to react aluminum (Al) with oxygen gas (O_2) to produce aluminum oxide (Al_2O_3).
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 1 mole of aluminum oxide, how many moles of Al does she need?
 - Calculate the molar masses of Al , O_2 and Al_2O_3 .
 - If she wants to produce 101.96 g of aluminum oxide, how many grams of Al does she need?
18. Brenda wants to react aluminum (Al) with oxygen gas (O_2) to produce aluminum oxide (Al_2O_3).
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 2 moles of aluminum oxide, how many moles of Al does she need?
 - Calculate the molar masses of Al , O_2 and Al_2O_3 .
 - If she wants to produce 203.92 g of aluminum oxide, how many grams of Al does she need?

19. Brenda wants to react aluminum (Al) with oxygen gas (O₂) to produce aluminum oxide (Al₂O₃).
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 6 moles of aluminum oxide, how many moles of O₂ does she need?
 - Calculate the molar masses of Al, O₂ and Al₂O₃.
 - If she wants to produce 611.76 g of aluminum oxide, how many grams of O₂ does she need?
20. Brenda wants to react aluminum (Al) with oxygen gas (O₂) to produce aluminum oxide (Al₂O₃).
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 4 moles of aluminum oxide, how many moles of O₂ does she need?
 - Calculate the molar masses of Al, O₂ and Al₂O₃.
 - If she wants to produce 407.84 g of aluminum oxide, how many grams of O₂ does she need?
21. Brenda wants to react aluminum (Al) with oxygen gas (O₂) to produce aluminum oxide (Al₂O₃).
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 1 mole of aluminum oxide, how many moles of O₂ does she need?
 - Calculate the molar masses of Al, O₂ and Al₂O₃.
 - If she wants to produce 101.96 g of aluminum oxide, how many grams of O₂ does she need?
22. Brenda wants to react aluminum (Al) with oxygen gas (O₂) to produce aluminum oxide (Al₂O₃).
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 2 moles of aluminum oxide, how many moles of O₂ does she need?
 - Calculate the molar masses of Al, O₂ and Al₂O₃.
 - If she wants to produce 203.92 g of aluminum oxide, how many grams of O₂ does she need?
23. Brenda wants to react hydrogen gas (H₂) with oxygen gas (O₂) to produce water.
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 10 moles of water, how many moles of O₂ does she need?
 - Calculate the molar masses of H₂, O₂ and H₂O.
 - If she wants to produce 180.15 g of water, how many grams of O₂ does she need?
24. Brenda wants to react hydrogen gas (H₂) with oxygen gas (O₂) to produce water.
- Write a balanced chemical equation for this reaction.
 - If she wants to produce 6 moles of water, how many moles of O₂ does she need?
 - Calculate the molar masses of H₂, O₂ and H₂O.
 - If she wants to produce 108.090 g of water, how many grams of O₂ does she need?