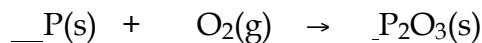


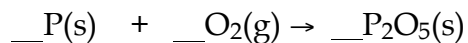
Chemical Reactions *answers follow at end*

Balancing Chemical Equations

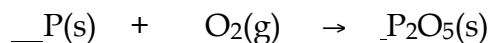
1. What is the coefficient of oxygen gas after balancing the following equation?



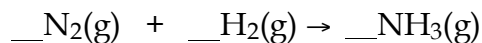
- (a) 1
 - (b) 2
 - (c) 3
 - (d) 5
 - (e) none of the above
2. What is the coefficient of oxygen gas after balancing the following equation?



- (a) 1
 - (b) 2
 - (c) 4
 - (d) 5
 - (e) none of the above
3. What is the coefficient of phosphorus after balancing the following equation?

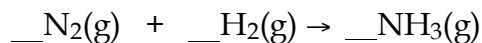


- (a) 1
 - (b) 2
 - (c) 4
 - (d) 5
 - (e) none of the above
4. What is the coefficient of nitrogen gas after balancing the following equation?

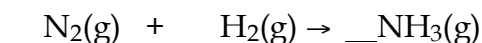


- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) none of the above

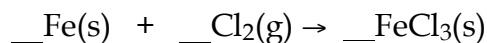
5. What is the coefficient of hydrogen gas after balancing the following equation?



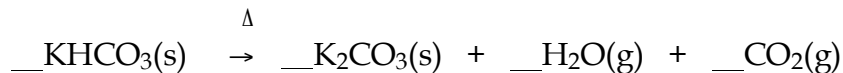
- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
 - (e) none of the above
6. What is the coefficient of ammonia gas after balancing the following equation?



- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
 - (e) none of the above
7. What is the coefficient of chlorine gas after balancing the following equation?

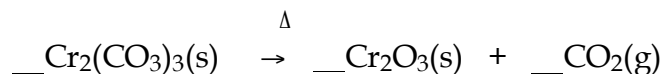


- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
 - (e) none of the above
8. What is the coefficient of carbon dioxide after balancing the following equation?

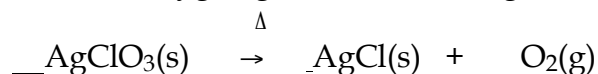


- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) none of the above

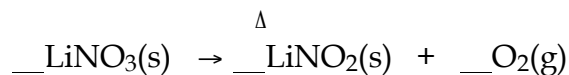
9. What is the coefficient of carbon dioxide after balancing the following equation?



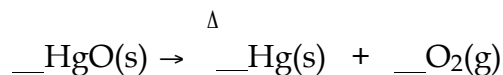
- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
 - (e) none of the above
10. What is the coefficient of oxygen gas after balancing the following equation?



- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
 - (e) none of the above
11. What is the coefficient of oxygen gas after balancing the following equation?

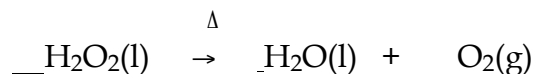


- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
 - (e) none of the above
12. What is the coefficient of oxygen gas after balancing the following equation?



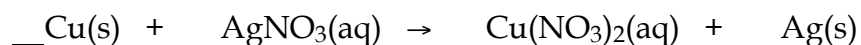
- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) none of the above

13. What is the coefficient of oxygen gas after balancing the following equation?



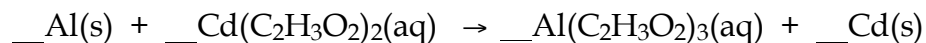
- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) none of the above

14. What is the coefficient of silver metal after balancing the following equation?



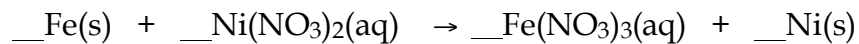
- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) none of the above

15. What is the coefficient of Cd metal after balancing the following equation?



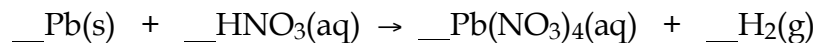
- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) none of the above

16. What is the coefficient of nickel metal after balancing the following equation?



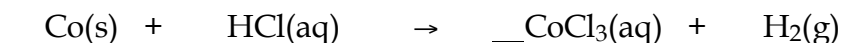
- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) none of the above

17. What is the coefficient of hydrogen gas after balancing the following equation?



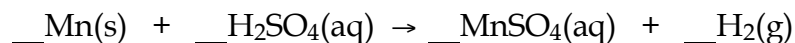
- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) none of the above

18. What is the coefficient of hydrogen gas after balancing the following equation?



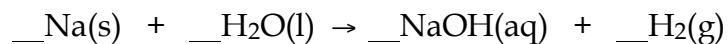
- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) none of the above

19. What is the coefficient of hydrogen gas after balancing the following equation?



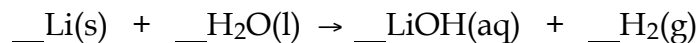
- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) none of the above

20. What is the coefficient of sodium metal after balancing the following equation?



- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) none of the above

21. What is the coefficient of water after balancing the following equation?



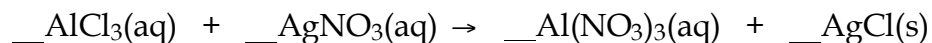
- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) none of the above

22. What is the coefficient of hydrogen gas after balancing the following equation?



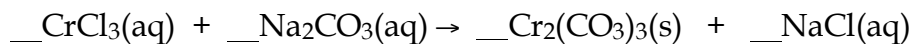
- (a) 1
- (b) 2
- (c) 3
- (d) 4
- (e) none of the above

23. What is the coefficient of AgCl after balancing the following equation?



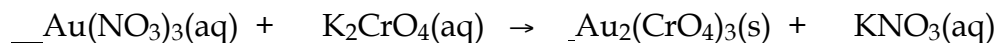
- (a) 1
- (b) 2
- (c) 3
- (d) 6
- (e) none of the above

24. What is the coefficient of NaCl after balancing the following equation?



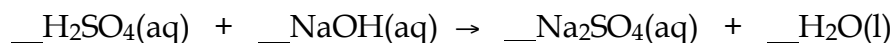
- (a) 1
- (b) 2
- (c) 3
- (d) 6
- (e) none of the above

25. What is the coefficient of KNO_3 after balancing the following equation?



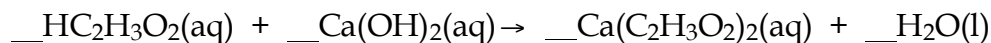
- (a) 1
- (b) 2
- (c) 3
- (d) 6
- (e) none of the above

26. What is the coefficient of water after balancing the following equation?



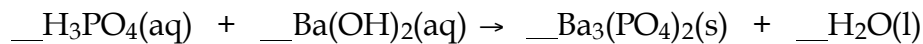
- (a) 1
- (b) 2
- (c) 3
- (d) 6
- (e) none of the above

27. What is the coefficient of water after balancing the following equation?



- (a) 1
- (b) 2
- (c) 3
- (d) 6
- (e) none of the above

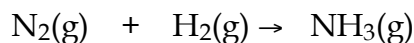
28. What is the coefficient of water after balancing the following equation?



- (a) 1
- (b) 2
- (c) 3
- (d) 6
- (e) none of the above

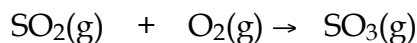
Classifying Chemical Reactions

29. Which of the following types of chemical reactions is illustrated below?



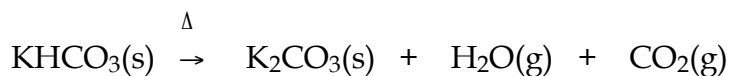
- (a) combination
- (b) decomposition
- (c) single replacement
- (d) double replacement
- (e) neutralization

30. Which of the following types of chemical reactions is illustrated below?



- (a) combination
- (b) decomposition
- (c) single replacement
- (d) double replacement
- (e) neutralization

31. Which of the following types of chemical reactions is illustrated below?



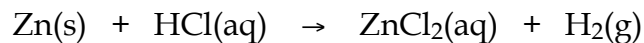
- (a) combination
- (b) decomposition
- (c) single replacement
- (d) double replacement
- (e) neutralization

32. Which of the following types of chemical reactions is illustrated below?



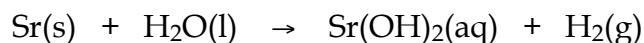
- (a) combination
- (b) decomposition
- (c) single replacement
- (d) double replacement
- (e) neutralization

33. Which of the following types of chemical reactions is illustrated below?



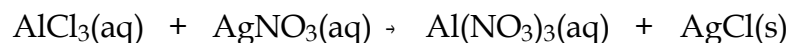
- (a) combination
- (b) decomposition
- (c) single replacement
- (d) double replacement
- (e) neutralization

34. Which of the following types of chemical reactions is illustrated below?



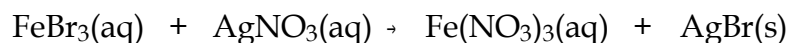
- (a) combination
- (b) decomposition
- (c) single replacement
- (d) double replacement
- (e) neutralization

35. Which of the following types of chemical reactions is illustrated below?



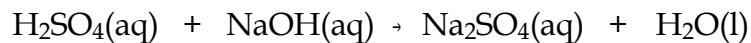
- (a) combination
- (b) decomposition
- (c) single replacement
- (d) double replacement
- (e) neutralization

36. Which of the following types of chemical reactions is illustrated below?



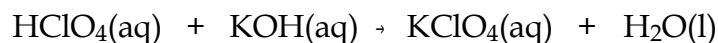
- (a) combination
- (b) decomposition
- (c) single replacement
- (d) double replacement
- (e) neutralization

37. Which of the following types of chemical reactions is illustrated below?



- (a) combination
- (b) decomposition
- (c) single replacement
- (d) double replacement
- (e) neutralization

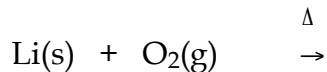
38. Which of the following types of chemical reactions is illustrated below?



- (a) combination
- (b) decomposition
- (c) single replacement
- (d) double replacement
- (e) neutralization

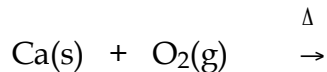
Combination Reactions

39. What is the predicted product from the following combination reaction?



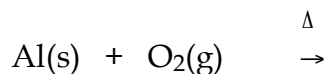
- (a) LiO
- (b) Li₂O
- (c) LiO₂
- (d) Li₂O₃
- (e) Li₃O₂

40. What is the predicted product from the following combination reaction?



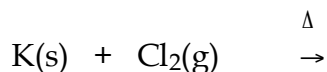
- (a) CaO
- (b) Ca₂O
- (c) CaO₂
- (d) Ca₂O₃
- (e) Ca₃O₂

41. What is the predicted product from the following combination reaction?



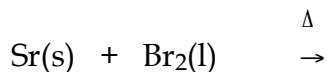
- (a) AlO
- (b) Al₂O
- (c) AlO₂
- (d) Al₂O₃
- (e) Al₃O₂

42. What is the predicted product from the following combination reaction?



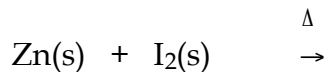
- (a) KCl
- (b) K₂Cl
- (c) KCl₂
- (d) KCl₃
- (e) K₃Cl

43. What is the predicted product from the following combination reaction?



- (a) SrBr
- (b) Sr₂Br
- (c) SrBr₂
- (d) Sr₂Br₃
- (e) Sr₃Br₂

44. What is the predicted product from the following combination reaction?

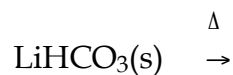


- (a) ZnI
- (b) ZnI₂
- (c) Zn₂I
- (d) Zn₂I₃
- (e) Zn₃I₂

45. What is the formula of the predicted product from heating magnesium metal and nitrogen gas?
- (a) MgN
 - (b) MgN₂
 - (c) Mg₂N
 - (d) Mg₂N₃
 - (e) Mg₃N₂
46. What is the formula of the predicted product from heating potassium metal and powdered phosphorus?
- (a) KP
 - (b) KP₃
 - (c) K₃P
 - (d) K₂P₃
 - (e) K₃P₂
47. What is the formula of the predicted product from heating cadmium metal and powdered sulfur?
- (a) CdS
 - (b) Cd₂S
 - (c) CdS₂
 - (d) Cd₂S₃
 - (e) Cd₃S₂

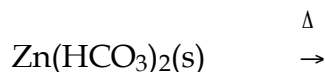
Decomposition Reactions (

48. What are the predicted products from the following decomposition reaction?



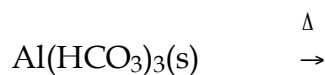
- (a) Li, H₂, and CO₂
- (b) Li, H₂O, and CO₂
- (c) Li₂CO₃, H₂, and CO₂
- (d) Li₂CO₃, H₂O, and CO₂
- (e) Li₂CO₃ and H₂O

49. What are the predicted products from the following decomposition reaction?



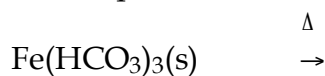
- (a) Zn, H₂, and CO₂
- (b) Zn, H₂O, and CO₂
- (c) ZnCO₃, H₂, and CO₂
- (d) ZnCO₃, H₂O, and CO₂
- (e) ZnCO₃ and H₂O

50. What are the predicted products from the following decomposition reaction?



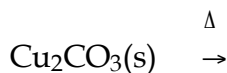
- (a) Al, H₂, and CO₂
- (b) Al, H₂O, and CO₂
- (c) Al₂(CO₃)₃, H₂, and CO₂
- (d) Al₂(CO₃)₃, H₂O, and CO₂
- (e) Al₂(CO₃)₃ and H₂O

51. What are the predicted products from the following decomposition reaction?



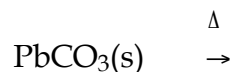
- (a) Fe, H₂O, and CO₂
- (b) FeCO₃, H₂, and CO₂
- (c) FeCO₃, H₂O, and CO₂
- (d) Fe₂(CO₃)₃, H₂O, and CO₂
- (e) Fe₂(CO₃)₃, H₂, and CO₂

52. What are the predicted products from the following decomposition reaction?



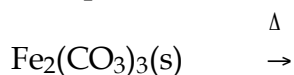
- (a) Cu and CO₂
- (b) Cu₂O and CO
- (c) Cu₂O and CO₂
- (d) CuO and CO
- (e) CuO and CO₂

53. What are the predicted products from the following decomposition reaction?



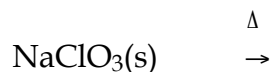
- (a) Pb and CO₂
- (b) PbO and CO
- (c) PbO and CO₂
- (d) PbO₂ and CO
- (e) PbO₂ and CO₂

54. What are the predicted products from the following decomposition reaction?



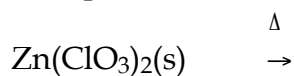
- (a) Fe and CO₂
- (b) FeO and CO
- (c) FeO and CO₂
- (d) Fe₂O₃ and CO
- (e) Fe₂O₃ and CO₂

55. What are the predicted products from the following decomposition reaction?



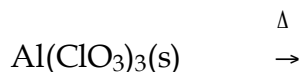
- (a) Na and CO₂
- (b) Na, Cl₂, and O₂
- (c) NaCl and H₂O
- (d) NaCl and O₂
- (e) NaCl and CO₂

56. What are the predicted products from the following decomposition reaction?



- (a) Zn and CO₂
- (b) Zn, Cl₂, and O₂
- (c) ZnCl₂ and H₂O
- (d) ZnCl₂ and O₂
- (e) ZnCl₂ and CO₂

57. What are the predicted products from the following decomposition reaction?



- (a) Al and CO_2
- (b) Al, Cl_2 , and O_2
- (c) AlCl_3 and H_2O
- (d) AlCl_3 and O_2
- (e) AlCl_3 and CO_2

Single-Replacement Reactions (

58. What are the products from the following single-replacement reaction?



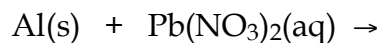
- (a) Cu and ZnSO_4
- (b) Cu and ZnSO_3
- (c) CuO and ZnSO_4
- (d) CuO and ZnSO_3
- (e) no reaction

59. What are the products from the following single-replacement reaction?



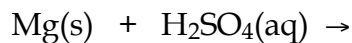
- (a) Ag and $\text{Cd}(\text{NO}_3)_2$
- (b) Ag and $\text{Cd}(\text{NO}_2)_2$
- (c) Ag_2O and $\text{Cd}(\text{NO}_3)_2$
- (d) Ag_2O and $\text{Cd}(\text{NO}_2)_2$
- (e) no reaction

60. What are the products from the following single-replacement reaction?



- (a) Pb and $\text{Al}(\text{NO}_3)_3$
- (b) Pb and $\text{Al}(\text{NO}_2)_3$
- (c) PbO and $\text{Al}(\text{NO}_3)_3$
- (d) PbO and $\text{Al}(\text{NO}_2)_3$
- (e) no reaction

61. What are the products from the following single-replacement reaction?



- (a) MgO and H₂SO₃
- (b) MgO and H₂S
- (c) MgSO₄ and H₂
- (d) MgSO₄ and H₂O
- (e) no reaction

62. What are the products from the following single-replacement reaction?



- (a) ZnO and HNO₂
- (b) Zn(NO₂)₂ and H₂
- (c) Zn(NO₃)₂ and H₂
- (d) Zn(NO₃)₂ and H₂O
- (e) no reaction

63. What are the products from the following single-replacement reaction?



- (a) K₂O and H₂
- (b) K₂O and H₂O
- (c) KOH and H₂
- (d) KOH and H₂O
- (e) no reaction

64. What are the products from the following single-replacement reaction?



- (a) BaO and H₂
- (b) BaO and H₂O
- (c) Ba(OH)₂ and H₂
- (d) Ba(OH)₂ and H₂O
- (e) no reaction

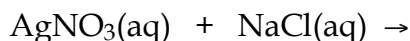
Solubility Rules

65. Which of the following solid compounds is soluble in water?
- (a) Na_2CO_3
 - (b) $\text{CuC}_2\text{H}_3\text{O}_2$
 - (c) AgNO_3
 - (d) all of the above
 - (e) none of the above
66. Which of the following solid compounds is soluble in water?
- (a) CaCO_3
 - (b) PbSO_4
 - (c) AlPO_4
 - (d) all of the above
 - (e) none of the above
67. Which of the following solid compounds is soluble in water?
- (a) NiCO_3
 - (b) PbCrO_4
 - (c) Ag_3PO_4
 - (d) CuS
 - (e) Ba(OH)_2
68. Which of the following solid compounds is insoluble in water?
- (a) PbCl_2
 - (b) Hg_2I_2
 - (c) BaSO_4
 - (d) all of the above
 - (e) none of the above
69. Which of the following solid compounds is insoluble in water?
- (a) Li_2CO_3
 - (b) $\text{AgC}_2\text{H}_3\text{O}_2$
 - (c) $\text{Cu(NO}_3)_2$
 - (d) all of the above
 - (e) none of the above

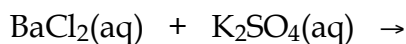
70. Which of the following solid compounds is insoluble in water?
- (a) $(\text{NH}_4)_2\text{CO}_3$
 - (b) K_2CrO_4
 - (c) BaSO_4
 - (d) Na_2S
 - (e) $\text{Sr}(\text{OH})_2$

Double-Replacement Reactions (

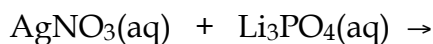
71. What are the products from the following double-replacement reaction?



- (a) Ag_3N and NaClO_3
 - (b) AgCl and NaNO_2
 - (c) AgCl and NaNO_3
 - (d) AgClO_3 and NaNO_2
 - (e) AgClO_3 and NaNO_3
72. What are the products from the following double-replacement reaction?



- (a) BaS and KClO_4
 - (b) BaSO_3 and KCl
 - (c) BaSO_3 and KClO_4
 - (d) BaSO_4 and KCl
 - (e) BaSO_4 and KClO_4
73. What are the products from the following double-replacement reaction?



- (a) Ag_3P and LiNO_3
- (b) Ag_3PO_3 and LiNO_2
- (c) Ag_3PO_3 and LiNO_3
- (d) Ag_3PO_4 and LiNO_2
- (e) Ag_3PO_4 and LiNO_3

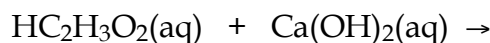
Neutralization Reactions

74. What are the predicted products from the following neutralization reaction?



- (a) NH_3Cl and H_2O
- (b) NH_3Cl and O_2
- (c) NH_4Cl and H_2O
- (d) NH_4Cl and O_2
- (e) no reaction

75. What are the predicted products from the following neutralization reaction?



- (a) CaCO_3 and H_2O
- (b) $\text{Ca(HCO}_3)_2$ and H_2
- (c) $\text{Ca(HCO}_3)_2$ and H_2O
- (d) $\text{Ca(C}_2\text{H}_3\text{O}_2)_2$ and H_2
- (e) $\text{Ca(C}_2\text{H}_3\text{O}_2)_2$ and H_2O

76. What are the predicted products from the following neutralization reaction?



- (a) Ba_3N_2 and H_2O
- (b) $\text{Ba(NO}_2)_2$ and H_2
- (c) $\text{Ba(NO}_2)_2$ and H_2O
- (d) $\text{Ba(NO}_3)_2$ and H_2
- (e) $\text{Ba(NO}_3)_2$ and H_2O

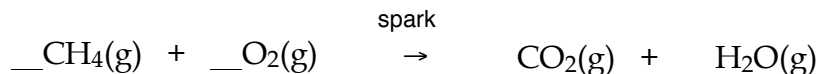
77. What are the products from the complete neutralization of sulfuric acid with aqueous sodium hydroxide?

- (a) $\text{Na}_2\text{S(aq)}$ and $\text{H}_2\text{O(l)}$
- (b) $\text{NaHSO}_3\text{(aq)}$ and $\text{H}_2\text{O(l)}$
- (c) $\text{NaHSO}_4\text{(aq)}$ and $\text{H}_2\text{O(l)}$
- (d) $\text{Na}_2\text{SO}_3\text{(aq)}$ and $\text{H}_2\text{O(l)}$
- (e) $\text{Na}_2\text{SO}_4\text{(aq)}$ and $\text{H}_2\text{O(l)}$

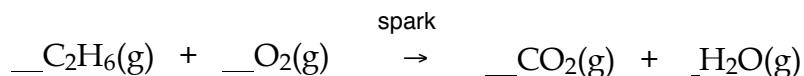
78. What are the products from the complete neutralization of carbonic acid with aqueous potassium hydroxide?
- (a) $\text{K}_2\text{CO}_3(\text{aq})$ and $\text{H}_2\text{O}(\text{l})$
 - (b) $\text{KHCO}_3(\text{aq})$ and $\text{H}_2\text{O}(\text{l})$
 - (c) $\text{KHCO}_4(\text{aq})$ and $\text{H}_2\text{O}(\text{l})$
 - (d) $\text{KC}_2\text{H}_3\text{O}_2(\text{aq})$ and $\text{H}_2\text{O}(\text{l})$
 - (e) $\text{K}_2\text{C}_2\text{H}_3\text{O}_2(\text{aq})$ and $\text{H}_2\text{O}(\text{l})$
79. What are the products from the complete neutralization of phosphoric acid with aqueous lithium hydroxide?
- (a) $\text{LiH}_2\text{PO}_4(\text{aq})$ and $\text{H}_2\text{O}(\text{l})$
 - (b) $\text{Li}_2\text{HPO}_4(\text{aq})$ and $\text{H}_2\text{O}(\text{l})$
 - (c) $\text{Li}_3\text{PO}_4(\text{aq})$ and $\text{H}_2\text{O}(\text{l})$
 - (d) $\text{LiHPO}_4(\text{aq})$ and $\text{H}_2\text{O}(\text{l})$
 - (e) $\text{Li}_2\text{PO}_4(\text{aq})$ and $\text{H}_2\text{O}(\text{l})$

Combustion Reactions

80. Methane, CH_4 , can be used as fuel in an automobile to reduce pollution. What is the coefficient of oxygen in the balanced equation for the reaction?



- (a) 1
 - (b) 2
 - (c) 3
 - (d) 4
 - (e) none of the above
81. Ethane, C_2H_6 , burns to give carbon dioxide and water. What is the coefficient of oxygen in the balanced equation for the reaction?



- (a) 5
- (b) 7
- (c) 10
- (d) 14
- (e) none of the above

82. Propane, C_3H_8 , is flammable and used in rural areas where natural gas is not available. What is the coefficient of oxygen in the balanced equation for the combustion of propane?



- (a) 1
(b) 5
(c) 7
(d) 10
(e) none of the above
83. Butane, C_4H_{10} , is flammable and used in butane lighters. What is the coefficient of oxygen in the balanced equation for the combustion of butane?

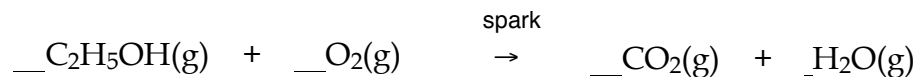


- (a) 9
(b) 13
(c) 18
(d) 26
(e) none of the above
84. Octane, C_8H_{18} , is a major component in gasoline. What is the coefficient of oxygen in the balanced equation for the combustion of octane?

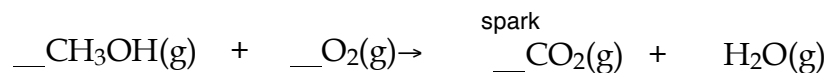


- (a) 17
(b) 25
(c) 34
(d) 50
(e) none of the above

85. Ethanol, $\text{C}_2\text{H}_5\text{OH}$, is made from fermenting grain and can be blended with gasoline to make "gasohol." If the combustion of "gasohol" produces carbon dioxide and water, what is the coefficient of oxygen in the balanced equation?



- (a) 1
(b) 2
(c) 3
(d) 6
(e) none of the above
86. Methanol, CH_3OH , is derived from natural gas and can be blended with gasoline to make "gasohol." If the combustion of "gasohol" produces carbon dioxide and water, what is the coefficient of oxygen in the balanced equation?



- (a) 1
(b) 2
(c) 3
(d) 6
(e) none of the above

Answer Key

- | | | |
|-------|-------|-------|
| 1. C | 38. E | 75. E |
| 2. D | 39. B | 76. E |
| 3. C | 40. A | 77. E |
| 4. A | 41. D | 78. A |
| 5. C | 42. A | 79. C |
| 6. B | 43. C | 80. B |
| 7. C | 44. B | 81. B |
| 8. A | 45. E | 82. B |
| 9. C | 46. C | 83. B |
| 10. C | 47. A | 84. B |
| 11. A | 48. D | 85. C |
| 12. A | 49. D | 86. C |
| 13. A | 50. D | |
| 14. B | 51. D | |
| 15. C | 52. C | |
| 16. C | 53. C | |
| 17. B | 54. E | |
| 18. C | 55. D | |
| 19. A | 56. D | |
| 20. B | 57. D | |
| 21. B | 58. A | |
| 22. A | 59. A | |
| 23. C | 60. A | |
| 24. D | 61. C | |
| 25. D | 62. C | |
| 26. B | 63. C | |
| 27. B | 64. C | |
| 28. D | 65. D | |
| 29. A | 66. E | |
| 30. A | 67. E | |
| 31. B | 68. D | |
| 32. B | 69. E | |
| 33. C | 70. C | |
| 34. C | 71. C | |
| 35. D | 72. D | |
| 36. D | 73. E | |
| 37. E | 74. C | |