

# Chemistry Study Materials for Class 9 (NCERT Questions –Answers of Chapter -03)

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Date:- 05/07/2021

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## Atoms and Molecules

### **EXERCISE QUESTIONS PAGE NO. 43, 44**

Q 8. Convert into mole.

(a) 12 g of oxygen gas    (b) 20 g of water    (c) 22 g of carbon dioxide.

**Answer:**

(a) 32 g of oxygen gas = 1 mole

Then, 12 g of oxygen gas =  $\frac{12}{32}$  mole = 0.375 mole

(b) 18 g of water = 1 mole

Then, 20 g of water =  $\frac{20}{18}$  mole = 1.11 mole (approx)

(b) 44 g of carbon dioxide = 1 mole

Then, 22 g of carbon dioxide =  $\frac{22}{44}$  mole = 0.5 mole

Q 9. What is the mass of?

(a) 0.2 mole of oxygen atoms

(b) 0.5 mole of water molecules?

**Answer:** (a) Mass of one mole of oxygen atoms = 16 g

Then, mass of 0.2 mole of oxygen atoms =  $0.2 \times 16\text{g} = 3.2\text{ g}$

(b) Mass of one mole of water molecule = 18 g

Then, mass of 0.5 mole of water molecules =  $0.5 \times 18\text{ g} = 9\text{ g}$

**Q 10. Calculate the number of molecules of sulphur (S<sub>8</sub>) present in 16 g of solid sulphur.**

**Answer:** 1 mole of solid sulphur (S<sub>8</sub>) = 8 × 32 g = 256 g

i.e., 256 g of solid sulphur contains = 6.022 × 10<sup>23</sup> molecules

$$\begin{aligned}\text{Then, 16 g of solid sulphur contains} &= \frac{6.022 \times 10^{23}}{256} \times 16 \text{ molecules} \\ &= 3.76 \times 10^{22} \text{ molecules (approx)}\end{aligned}$$

**Q 11. Calculate the number of aluminium ions present in 0.051 g of aluminium oxide. (*Hint:* The mass of an ion is the same as that of an atom of the same element. Atomic mass of Al = 27 u)**

**Answer:**

1 mole of aluminium oxide (Al<sub>2</sub>O<sub>3</sub>) = 2 × 27 + 3 × 16 = 102 g

i.e., 102 g of Al<sub>2</sub>O<sub>3</sub> = 6.022 × 10<sup>23</sup> molecules of Al<sub>2</sub>O<sub>3</sub>

$$\begin{aligned}\text{Then, 0.051 g of Al}_2\text{O}_3\text{ contains} &= \frac{6.022 \times 10^{23}}{102} \times 0.051 \text{ molecules} \\ &= 3.011 \times 10^{20} \text{ molecules of Al}_2\text{O}_3\end{aligned}$$

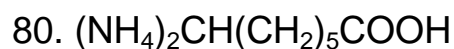
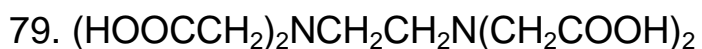
The number of aluminium ions (Al<sup>3+</sup>) present in one molecule of aluminium oxide is 2.

Therefore, the number of aluminium ions (Al<sup>3+</sup>) present in 3.011 × 10<sup>20</sup> molecules (0.051 g) of aluminium oxide (Al<sub>2</sub>O<sub>3</sub>) = 2 × 3.011 × 10<sup>20</sup>

$$= 6.022 \times 10^{20}$$

**Calculate the mass of one mole of these substances.**

|                             |                                      |                             |   |  |   |
|-----------------------------|--------------------------------------|-----------------------------|---|--|---|
| 1. $\text{AlCl}_3$          | 14. $\text{Ba}(\text{SCN})_2$        | 27. $\text{LiH}$            | 40. $\text{Ba}(\text{BrO}_3)_2$                   | 53. $\text{AlBr}_3$                    | 66. $\text{HCl}$                                  |
| 2. $\text{TeF}_4$           | 15. $\text{K}_2\text{S}$             | 28. $\text{CO}$             | 41. $\text{Hg}_2\text{Cl}_2$                      | 54. $\text{P}_2\text{O}_5$             | 67. $\text{K}_2\text{SO}_4$                       |
| 3. $\text{PbS}$             | 16. $\text{NH}_4\text{Cl}$           | 29. $\text{SnI}_4$          | 42. $\text{Cr}_2(\text{SO}_3)_3$                  | 55. $\text{NH}_4\text{NO}_3$           | 68. $\text{NaCl}$                                 |
| 4. $\text{Cu}_2\text{O}$    | 17. $\text{KH}_2\text{PO}_4$         | 30. $\text{KOH}$            | 43. $\text{Al}(\text{MnO}_4)_3$                   | 56. $\text{Ba}(\text{OH})_2$           | 69. $\text{LiI}$                                  |
| 5. $\text{AgI}$             | 18. $\text{C}_2\text{H}_5\text{NBr}$ | 31. $\text{K}_2\text{O}$    | 44. $\text{CoSO}_4$                               | 57. $\text{PbSO}_4$                    | 70. $\text{Hg}_2\text{O}$                         |
| 6. $\text{N}_2\text{O}$     | 19. $\text{Ba}(\text{ClO}_3)_2$      | 32. $\text{H}_2\text{SO}_4$ | 45. $\text{Ca}(\text{NO}_3)_3$                    | 58. $\text{Ba}_3(\text{PO}_4)_2$       | 71. $\text{HF}$                                   |
| 7. $\text{MoCl}_5$          | 20. $\text{Fe}(\text{OH})_3$         | 33. $\text{Hg}_3\text{N}_2$ | 46. $\text{NaH}_2\text{PO}_4$                     | 59. $\text{NaC}_2\text{H}_3\text{O}_2$ | 72. $\text{FeCl}_3$                               |
| 8. $\text{Hg}_2\text{Br}_2$ | 21. $(\text{NH}_4)_2\text{S}$        | 34. $\text{SiF}_4$          | 47. $(\text{NH}_4)_3\text{PO}_4$                  | 60. $\text{Ba}(\text{OH})_2$           | 73. $\text{NaHSO}_4$                              |
| 9. $\text{Ta}_2\text{O}_5$  | 22. $\text{CoCl}_2$                  | 35. $\text{NH}_4\text{OH}$  | 48. $\text{KAl}(\text{SO}_4)_2$                   | 61. $\text{NaHCO}_3$                   | 74. $\text{Ag}_2\text{O}$                         |
| 10. $\text{HgF}_2$          | 23. $\text{KMnO}_4$                  | 36. $\text{N}_2\text{O}_5$  | 49. $\text{Hg}_2\text{SO}_4$                      | 62. $\text{Al}(\text{OH})_3$           | 75. $\text{Pb}(\text{ClO}_2)_2$                   |
| 11. $\text{KCl}$            | 24. $\text{CaSO}_4$                  | 37. $\text{SnCrO}_4$        | 50. $\text{Al}_2(\text{SO}_4)_3$                  | 63. $\text{NH}_4\text{MnO}_4$          | 76. $\text{CoF}_3$                                |
| 12. $\text{KF}$             | 25. $\text{H}_2\text{CO}_3$          | 38. $\text{Al}_2\text{O}_3$ | 51. $\text{FePO}_4$                               | 64. $\text{Fe}_2\text{O}_3$            | 77. $\text{Al}(\text{C}_2\text{H}_3\text{O}_2)_3$ |
| 13. $\text{ZnO}$            | 26. $\text{CO}_2$                    | 39. $\text{CuCO}_3$         | 52. $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$ | 65. $\text{CaCO}_3$                    | 78. $\text{Na}_2\text{Al}_2(\text{SO}_4)_4$       |



## Answers (each answer has the units g/mol)

|             |             |             |              |             |             |
|-------------|-------------|-------------|--------------|-------------|-------------|
| 1. 133.34   | 14. 255.26  | 27. 7.95    | 40. 393.1314 | 53. 266.69  | 66. 36.461  |
| 2. 203.59   | 15. 110.26  | 28. 28.01   | 41. 472.09   | 54. 141.944 | 67. 174.25  |
| 3. 239.3    | 16. 53.49   | 29. 626.31  | 42. 344.1666 | 55. 80.04   | 68. 58.443  |
| 4. 143.09   | 17. 136.08  | 30. 56.106  | 43. 383.788  | 56. 171.34  | 69. 133.846 |
| 5. 234.77   | 18. 122.97  | 31. 94.20   | 44. 154.99   | 57. 303.26  | 70. 417.179 |
| 6. 44.01    | 19. 304.23  | 32. 98.07   | 45. 226.09   | 58. 601.93  | 71. 20.006  |
| 7. 273.20   | 20. 106.87  | 33. 629.78  | 46. 119.977  | 59. 82.03   | 72. 162.206 |
| 8. 560.98   | 21. 68.14   | 34. 104.08  | 47. 149.087  | 60. 171.34  | 73. 120.055 |
| 9. 441.89   | 22. 129.84  | 35. 35.046  | 48. 258.195  | 61. 84.007  | 74. 231.74  |
| 10. 238.59  | 23. 158.03  | 36. 108.01  | 49. 497.24   | 62. 78.00   | 75. 342.10  |
| 11. 74.55   | 24. 136.14  | 37. 234.68  | 50. 342.136  | 63. 136.97  | 76. 115.928 |
| 12. 58.10   | 25. 62.02   | 38. 101.96  | 51. 150.82   | 64. 159.69  | 77. 204.12  |
| 13. 81.38   | 26. 44.01   | 39. 123.555 | 52. 158.169  | 65. 100.09  | 78. 484.173 |
| 79. 292.246 | 80. 164.248 |             |              |             |             |

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