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1.

A sample of chromium (III) oxide, Cr_2O_3, contains 0.599 g of chromium. What mass of oxygen is present?

1. 0.276 g O
2. 0.184 g O
3. 0.599 g O
4. 1.30 g O
5. 0.123 g O

2.

Which one of the following equations is properly balanced?

1. $2Na_2SO_4 + 3Bi(NO_3)_3 \rightarrow Bi_2(SO_4)_3 + 6NaNO_3$
2. $NH_4NO_3 \rightarrow 2H_2O + N_2$
3. $Sn + 4HNO_3 \rightarrow SnO_2 + 4NO_2 + 2H_2O$
4. $CH_3CHO + 3O_2 \rightarrow 2CO_2 + 2H_2O$
5. $Na_2CO_3 + 2H_2SO_4 \rightarrow Na_2SO_4 + 2H_2O + CO_2$

3.

A sample of TNT, $C_7H_5N_3O_6$, has 7.36 10^{21} nitrogen atoms. How many hydrogen atoms are there in this sample of TNT?

1. 1.23×10^{22}
2. 7.36×10^{21}
3. 9.81×10^{21}
4. 1.47×10^{22}
5. 1.72×10^{22}

4.

Which one of the following contains 1.20×10^{24} atoms?

1. 4.00 g He
2. 13.0 g C_2H_2
3. 42.0 g N_2
4. 8.0 g CH_4

5. 24.0 g O_2

5.

How many moles of hydrogen chloride are present in a sample consisting of 5.42×10^{23} molecules of HCl?

1. 1.00 mole
2. 1.98×10^{25} moles
3. 1.49×10^{22} moles
4. 3.26×10^{47} moles
5. 9.00×10^{-1} moles

6.

How many moles of pentane, C_5H_{12}, are in a 33-g sample?

1. 0.46 mol
2. 0.79 mol
3. 0.55 mol
4. 4.1 mol
5. 3.3 mol

7.

How many atoms are present in 583 g of KPF_6 (MW = 184.1 g/mol)?

1. 2.81 10^{25}
2. 3.17 10^{21}
3. 1.53 10^{26}
4. 1.43 10^{25}
5. 1.91 10^{21}

8.

How many moles of carbon are present in 5.19 mL of liquid ethanol (C_2H_5OH, d = 0.789 g/mL)?

1. 0.00660 moles C
2. 0.0444 moles C
3. 0.0714 moles C
4. 0.286 moles C
5. 0.178 moles C

9.

For the reaction $2Mg(s) + O_2(g) \rightarrow 2MgO(s)$, how many moles of O_2 are required to react completely with 0.0232 moles of Mg?

1. 0.0155 moles O_2
2. 0.0116 moles O_2
3. 0.0348 moles O_2
4. 0.0232 moles O_2
5. 0.0464 moles O_2

10.

The amount of calcium in a 15.0-g sample was determined by converting the calcium to calcium oxalate, CaC_2O_4. The CaC_2O_4 weighed 12.4 g. What is the percent of calcium in the original sample?

1. 14.5%
2. 33.1%
3. 25.8%
4. 10.6%
5. 82.7%

11.

What volume of liquid toluene ($C_6H_5CH_3$, d = 0.867 g/mL) contains 4.15×10^{24} molecules?

1. 0.551 L
2. 0.0648 L
3. 1.37 L
4. 0.732 L
5. 11.6 L

12.

A sample of liquid thionyl chloride ($SOCl_2$, d = 1.655 g/mL) contains 6.31 moles of the compound. What volume of thionyl chloride is present?

1. 8.78×10^{-2} mL
2. 7.51×10^{2} mL
3. 3.81×10^{0} mL
4. 4.54×10^{2} mL
5. 1.24×10^{3} mL

13.

An organic compound has a molecular mass of 294.2 and contains 81.58% carbon by mass. How many carbon atoms are in each molecule of this compound?

1. 22
2. 15
3. 27
4. 25
5. 20

14.

If 43.4 g of O_2 are mixed with 43.4 g of H_2 and the mixture is ignited, what mass of water is produced?

1. 48.8 g
2. 77.2 g
3. 391 g
4. 87 g
5. 43.4 g

15.

A 1.1 g sample of washing soda, $Na_2CO_3 \quad 10H_2O$, has 2.3 $\quad 10^{21}$ carbon atoms. How many oxygen atoms are present in 1.1 g of washing soda?

1. 6.9 $\quad 10^{21}$
2. 2.5 $\quad 10^{21}$
3. 2.3 $\quad 10^{22}$
4. 2.3 $\quad 10^{21}$
5. 3.0 $\quad 10^{22}$

16.

The formula weight of aluminum oxalate, $Al_2(C_2O_4)_3$, is

1. 318 g/mol.
2. 272 g/mol.
3. 212 g/mol.
4. 178 g/mol.
5. 152 g/mol.

17.

A sample of acetic acid, CH_3COOH, contains 2.22×10^{20} oxygen atoms. How many moles of hydrogen are present?

1. 1.84×10^{-4} moles H

2. 1.11×10^{-3} moles H
3. 5.53×10^{-4} moles H
4. 7.37×10^{-4} moles H
5. 1.47×10^{-3} moles H

18.

What is the weight in grams of *one* molecule of the compound $C_7H_6O_4$?

1. 1.33×10^{-22} g
2. 154 g
3. 2.56×10^{-22} g
4. 2.82×10^{-22} g
5. 3.91×10^{21} g

19.

The hormone testosterone has a molecular mass of 288.4 and contains 79.12% carbon by mass. How many carbon atoms are in each testosterone molecule?

1. 17
2. 23
3. 21
4. 19
5. 28

20.

What is the molar mass of the solid, $C_6H_{10}N_4O_4$?

1. 192 g/mol
2. 106 g/mol
3. 146 g/mol
4. 202 g/mol
5. 138 g/mol