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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?

Student Response

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?

Student Response

1. $2Na_2SO_4 + 3Bi(NO_3)_3 \longrightarrow Bi_2(SO_4)_3 + 6NaNO_3$

2. $NH_4NO_3 \longrightarrow 2H_2O + N_2$

3. $Sn + 4HNO_3 \longrightarrow SnO_2 + 4NO_2 + 2H_2O$

4. $CH_3CHO + 3O_2 \longrightarrow 2CO_2 + 2H_2O$

5. $Na_2CO_3 + 2H_2SO_4 \longrightarrow Na_2SO_4 + 2H_2O + CO_2$

3.

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

Student Response

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

4.

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

Student Response

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?

Student Response

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?

Student Response

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)?

Student Response

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)?

Student Response

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?

Student Response

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?

Student Response

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?

Student Response

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?

Student Response

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?

Student Response

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?

Student Response

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

Student Response

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

16.

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

Student Response

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?

Student Response

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 $C_7H_6O_4$?

Student Response

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?

Student Response

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

20.

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

Student Response

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