IB Diploma

CHEMISTRY

SL
Paper 1
2017 — 2023

1 - (CHEMI/11_SL_Summer_2017_Q1) - *Stoichiometric Relationship*

Which compound has the greatest percentage by mass of nitrogen atoms?

A. N_2H_4

B. NH_3

C. N_2O_4

D. $NaNO_3$

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2 - (CHEMI/11_SL_Summer_2017_Q2) - *Stoichiometric Relationship*

Which statements about mixtures are correct?

  I. The components may be elements or compounds.
  II. All components must be in the same phase.
  III. The components retain their individual properties.

A. I and II only

B. I and III only

C. II and III only

D. I, II and III

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3 - (CHEMI/11_SL_Summer_2017_Q3) - *Stoichiometric Relationship*

$5.0 \, cm^3$ of $2.00 \, mol \, dm^{-3}$ sodium carbonate solution, $Na_2CO_3(aq)$, was added to a volumetric flask and the volume was made up to $500 \, cm^3$ with water. What is the concentration, in $mol \, dm^{-3}$, of the solution?

A. 0.0050

B. 0.0040

C. 0.020

D. 0.010

4 - (CHEMI/11_SL_Summer_2017_Q4) - *Stoichiometric Relationship*

What is the expression for the volume of hydrogen gas, in dm^3, produced at STP when 0.30 g of magnesium reacts with excess hydrochloric acid solution?

$$Mg(s) + 2HCl(aq) \rightarrow MgCl_2(aq) + H_2(g)$$
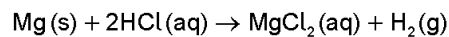
Molar volume of an ideal gas at STP = $22.7\ dm^3\ mol^{-1}$

A. $\dfrac{0.30 \times 2 \times 22.7}{24.31}$

B. $\dfrac{0.30 \times 22.7}{24.31}$

C. $\dfrac{0.30 \times 24.31}{22.7}$
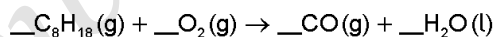
D. $\dfrac{0.30 \times 22.7}{24.31 \times 2}$

5 - (CHEMI/11_SL_Summer_2017_Q29) - *Stoichiometric Relationship*

What is the density, in $g\,cm^{-3}$, of a 34.79 g sample with a volume of $12.5\,cm^3$?

A. 0.359

B. 0.36

C. 2.783

D. 2.78

6 - (CHEMI/12_SL_Summer_2017_Q1) - *Stoichiometric Relationship*

What is the sum of the coefficients when the equation is balanced with whole numbers?

$$\_C_8H_{18}(g) + \_O_2(g) \rightarrow \_CO(g) + \_H_2O(l)$$

A. 26.5

B. 30

C. 53

D. 61

7 - (CHEMI/12_SL_Summer_2017_Q2) - *Stoichiometric Relationship*

How many moles of oxygen atoms are there in 0.500 mol of hydrated iron(II) ammonium sulfate, $(NH_4)_2Fe(SO_4)_2 \cdot 6H_2O\,(s)$?

A.   4.00

B.   7.00

C.   8.00

D.   14.00

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8 - (CHEMI/12_SL_Summer_2017_Q3) - *Stoichiometric Relationship*

What is the maximum volume, in dm^3, of $CO_2\,(g)$ produced when 1.00 g of $CaCO_3\,(s)$ reacts with $20.0\,cm^3$ of $2.00\,mol\,dm^{-3}$ $HCl\,(aq)$?

$$CaCO_3\,(s) + 2HCl\,(aq) \rightarrow CaCl_2\,(aq) + H_2O\,(l) + CO_2\,(g)$$
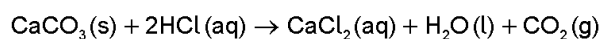
Molar volume of gas = $22.7\,dm^3\,mol^{-1}$; $M_r(CaCO_3) = 100.00$

A. $\dfrac{1}{2} \times \dfrac{20.0 \times 2.00}{1000} \times 22.7$

B. $\dfrac{20.0 \times 2.00}{1000} \times 22.7$

C. $\dfrac{1.00}{100.00} \times 22.7$

D. $\dfrac{1.00}{100.00} \times 2 \times 22.7$

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9 - (CHEMI/12_SL_Summer_2017_Q4) - *Stoichiometric Relationship*

Which factors affect the molar volume of an ideal gas?

     I.   Pressure
     II.   Temperature
     III.   Empirical formula

A.   I and II only

B.   I and III only

C.   II and III only

D.   I, II and III

10 - (CHEMI/10_SL_Winter_2017_Q1) - *Stoichiometric Relationship*

How many atoms of nitrogen are there in 0.50 mol of $(NH_4)_2CO_3$?

A.   1

B.   2

C. 3.01×10^{23}

D. 6.02×10^{23}

11 - (CHEMI/10_SL_Winter_2017_Q2) - *Stoichiometric Relationship*

What is the value of x when 32.2 g of $Na_2SO_4 \cdot xH_2O$ are heated leaving 14.2 g of anhydrous Na_2SO_4? $M_r(H_2O) = 18$; $M_r(Na_2SO_4) = 142$.

$$Na_2SO_4 \cdot xH_2O(s) \rightarrow Na_2SO_4(s) + xH_2O(g)$$
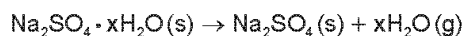
A.   0.1

B.   1

C.   5

D.   10

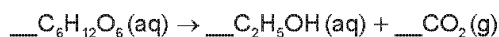**12** - (CHEMI/10_SL_Winter_2017_Q3) - *Stoichiometric Relationship*

How many grams of sodium azide, NaN_3, are needed to produce 68.1 dm^3 of $N_2(g)$ at STP?
Molar volume at STP = 22.7 dm^3 mol^{-1}; $M_r(NaN_3) = 65.0$

$$2NaN_3(s) \rightarrow 3N_2(g) + 2Na(s)$$

A.   32.5

B.   65.0

C.   130.0

D.   195.0

13 - (CHEMI/10_SL_Winter_2017_Q4) - *Stoichiometric Relationship*

What is the sum of the coefficients when the following equation is balanced using the smallest whole numbers?

$$\_\_C_6H_{12}O_6(aq) \rightarrow \_\_C_2H_5OH(aq) + \_\_CO_2(g)$$

A.   4

B.   5

C.   9

D.   10

ANSWERS

1 - (CHEMI/11_SL_Summer_2017_Q1) - *Stoichiometric Relationship*

A

2 - (CHEMI/11_SL_Summer_2017_Q2) - *Stoichiometric Relationship*

B

3 - (CHEMI/11_SL_Summer_2017_Q3) - *Stoichiometric Relationship*

C

4 - (CHEMI/11_SL_Summer_2017_Q4) - *Stoichiometric Relationship*

B

5 - (CHEMI/11_SL_Summer_2017_Q29) - *Stoichiometric Relationship*

D

6 - (CHEMI/12_SL_Summer_2017_Q1) - *Stoichiometric Relationship*

C

7 - (CHEMI/12_SL_Summer_2017_Q2) - *Stoichiometric Relationship*

B

8 - (CHEMI/12_SL_Summer_2017_Q3) - *Stoichiometric Relationship*

C

9 - (CHEMI/12_SL_Summer_2017_Q4) - *Stoichiometric Relationship*

A

10 - (CHEMI/10_SL_Winter_2017_Q1) - *Stoichiometric Relationship*

D