ALBERTA CHEMISTRY 20 · UNIT D · 25 QUESTIONS

Quantitative Relationships in Chemical Changes — Practice Test

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

1 **Use the atomic masses Ca = 40.08, O = 16.00, H = 1.01 g/mol. The molar mass of $Ca(OH)_2$ is**

- A 57.09 g/mol
- B 74.10 g/mol
- C 97.15 g/mol
- D 114.18 g/mol

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2 **The mass of 0.250 mol of sodium chloride, NaCl (molar mass 58.44 g/mol), is**

- **A** 14.6 g
- **B** 7.31 g
- **C** 29.2 g
- **D** 234 g

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3 **The number of molecules in 2.00 mol of NH_3 is (use 6.02×10^{23} molecules/mol)**

- **A** 3.01×10^{23}
- **B** 6.02×10^{23}
- **C** 1.20×10^{24}
- **D** 2.41×10^{24}

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4 **At STP, one mole of any ideal gas occupies 22.4 L. The volume occupied by 0.500 mol of $O_2(g)$ at STP is**

- A 5.60 L
- B 11.2 L
- C 22.4 L
- D 44.8 L

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5 **A solution contains 0.200 mol of solute dissolved in 500 mL of solution. The concentration of the solution is**

- A 0.100 mol/L
- B 0.200 mol/L
- C 0.400 mol/L
- D 1.00 mol/L

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6 **Use the atomic masses N = 14.01, H = 1.01, O = 16.00 g/mol. The percent by mass of nitrogen in NH_4NO_3 is**

- A 17.5%
- B 35.0%
- C 52.5%
- D 70.0%

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7 **A compound consists of 40.0% C, 6.7% H, and 53.3% O by mass. Use C = 12.01, H = 1.01, O = 16.00 g/mol. The empirical formula of the compound is**

- A CH_2O
- B CHO
- C $C_2H_4O_2$
- D CH_4O

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8 **The volume of a 6.00 mol/L stock solution required to prepare 250 mL of a 0.500 mol/L solution is**

- **A** 3.00 L
- **B** 125 mL
- **C** 41.7 mL
- **D** 20.8 mL

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9 **$2\ H_2(g) + O_2(g) \rightarrow 2\ H_2O(l)$**
The number of moles of $O_2(g)$ required to react completely with 6.0 mol of $H_2(g)$ is

- **A** 1.5 mol
- **B** 3.0 mol
- **C** 6.0 mol
- **D** 12 mol

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10

$N_2(g) + 3\ H_2(g) \rightarrow 2\ NH_3(g)$

The mass of NH_3 (molar mass 17.04 g/mol) produced when 0.500 mol of $N_2(g)$ reacts completely is

A 34.1 g

B 8.52 g

C 25.6 g

D 17.0 g

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11

At STP the molar volume of a gas is 22.4 L/mol. A sample of $CO_2(g)$ has a volume of 5.60 L at STP and a molar mass of 44.01 g/mol. The mass of the sample, to the nearest tenth of a gram, is ____ g

ANSWER _____

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12 **$2\ Al(s) + 3\ Cl_2(g) \rightarrow 2\ AlCl_3(s)$**
If 4.00 mol of Al(s) and 4.00 mol of $Cl_2(g)$ are mixed and allowed to react as completely as possible, then

A $Cl_2(g)$ is the limiting reactant and 2.67 mol of $AlCl_3(s)$ forms

B Al(s) is the limiting reactant and 4.00 mol of $AlCl_3(s)$ forms

C $Cl_2(g)$ is the limiting reactant and 4.00 mol of $AlCl_3(s)$ forms

D Al(s) is the limiting reactant and 2.67 mol of $AlCl_3(s)$ forms

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13 **A reaction has a theoretical yield of 25.0 g of product, but a student actually collects 21.5 g of product. The percent yield of the reaction is**

A 116%

B 79.6%

C 86.0%

D 92.5%

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14 **$H_2SO_4(aq) + 2\ NaOH(aq) \rightarrow Na_2SO_4(aq) + 2\ H_2O(l)$**
The volume, in millilitres, of 0.150 mol/L NaOH(aq) required to neutralize 20.0 mL of 0.300 mol/L $H_2SO_4(aq)$, to the nearest tenth of a millilitre, is ____ mL

ANSWER _____

Understand It with Pulse | Flag a mistake

15 **$CH_4(g) + 2\ O_2(g) \rightarrow CO_2(g) + 2\ H_2O(g)$**
The volume of $O_2(g)$ at STP required to completely burn 11.2 L of $CH_4(g)$ at STP is

A 5.60 L

B 11.2 L

C 22.4 L

D 44.8 L

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16 **A 0.500 mol sample of an unknown gas has a mass of 32.0 g. The molar mass of the gas, in g/mol, to the nearest whole number, is ____**

ANSWER _____

Understand It with Pulse | Flag a mistake

17 $CaCO_3(s) + 2\ HCl(aq) \rightarrow CaCl_2(aq) + H_2O(l) + CO_2(g)$

The mass of $CO_2(g)$ (44.01 g/mol) produced when 10.0 g of $CaCO_3(s)$ (100.09 g/mol) reacts completely, to the nearest tenth of a gram, is ____ g

ANSWER

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18 $AgNO_3(aq) + NaCl(aq) \rightarrow AgCl(s) + NaNO_3(aq)$

50.0 mL of 0.200 mol/L $AgNO_3(aq)$ is mixed with excess NaCl(aq). The mass of AgCl(s) (molar mass 143.32 g/mol) that precipitates is

A 0.717 g

B 2.87 g

C 14.3 g

D 1.43 g

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19 **A compound has an empirical formula of CH_2O (empirical formula mass 30.03 g/mol) and a molar mass of 180.16 g/mol. Its molecular formula is**

- **A** $C_2H_4O_2$
- **B** $C_3H_6O_3$
- **C** $C_6H_{12}O_6$
- **D** $C_{12}H_{24}O_{12}$

Understand It with Pulse | Flag a mistake

20 **$2\ H_2(g) + O_2(g) \rightarrow 2\ H_2O(l)$**
If 4.00 g of H_2 (2.02 g/mol) and 32.0 g of O_2 (32.00 g/mol) react, the mass of H_2O (18.02 g/mol) formed, to the nearest tenth of a gram, is ____ g

ANSWER _____

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21 **$HCl(aq) + NaOH(aq) \rightarrow NaCl(aq) + H_2O(l)$**
A 20.0 mL sample of HCl(aq) requires 18.5 mL of 0.100 mol/L NaOH(aq) for complete neutralization. The concentration of the HCl(aq) is

A 0.0925 mol/L

B 0.108 mol/L

C 0.185 mol/L

D 0.0500 mol/L

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22 **$Zn(s) + 2\ HCl(aq) \rightarrow ZnCl_2(aq) + H_2(g)$**
A student reacts 13.0 g of Zn(s) (65.38 g/mol) with excess HCl(aq) and collects 0.175 mol of $H_2(g)$. The percent yield, to the nearest whole percent, is ____ %

ANSWER _____

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23 **The total number of moles of ions present in 500 mL of a 0.200 mol/L $CaCl_2(aq)$ solution, assuming complete dissociation, is**

- **A** 0.300 mol
- **B** 0.100 mol
- **C** 0.200 mol
- **D** 0.600 mol

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24 **The mass of NaOH(s) (molar mass 40.00 g/mol) needed to prepare 250 mL of a 0.500 mol/L solution, to the nearest tenth of a gram, is _____ g**

ANSWER _____

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25

Use 6.02×10^{23} particles/mol. The number of oxygen atoms in 0.500 mol of $Ca(OH)_2$ is

A 3.01×10^{23}

B 1.20×10^{24}

C 1.81×10^{24}

D 6.02×10^{23}

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ANSWER KEY

1.	B	**10.**	D	**19.**	C
2.	A	**11.**	11.0	**20.**	35.7
3.	C	**12.**	A	**21.**	A
4.	B	**13.**	C	**22.**	88
5.	C	**14.**	80.0	**23.**	A
6.	B	**15.**	C	**24.**	5.0
7.	A	**16.**	64	**25.**	D
8.	D	**17.**	4.40		
9.	B	**18.**	D		

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