

Brett Robbins Academic Consulting

Chemistry 20 Practice Test

Unit D: Quantitative Relationships in Chemical Changes

25 Questions

Original practice questions written to the Alberta curriculum, in the style of past diploma examinations. Work through each question, then check your answers with the key at the end.

This practice test was made by AI and there may be mistakes. If a question or answer looks wrong, contact Brett for clarification.

Question 1

Use the atomic masses Ca = 40.08, O = 16.00, H = 1.01 g/mol.

The molar mass of $\text{Ca}(\text{OH})_2$ is

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

Question 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 |

Question 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} |

Question 4

At STP, one mole of any ideal gas occupies 22.4 L.

The volume occupied by 0.500 mol of $\text{O}_2(\text{g})$ at STP is

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

Question 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 |

Question 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% |

Question 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) $\text{C}_2\text{H}_4\text{O}_2$ | D) CH_4O |

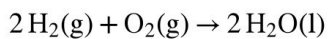
Question 8

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 |

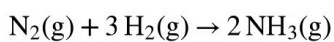
Question 9



The number of moles of $\text{O}_2(\text{g})$ required to react completely with 6.0 mol of $\text{H}_2(\text{g})$ is

- | | |
|------------|------------|
| A) 1.5 mol | B) 3.0 mol |
| C) 6.0 mol | D) 12 mol |

Question 10



The mass of NH_3 (molar mass 17.04 g/mol) produced when 0.500 mol of $\text{N}_2(\text{g})$ reacts completely is

- | | |
|-----------|-----------|
| A) 34.1 g | B) 8.52 g |
| C) 25.6 g | D) 17.0 g |

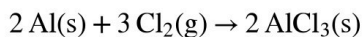
Question 11

At STP the molar volume of a gas is 22.4 L/mol.

A sample of $\text{CO}_2(\text{g})$ 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

Question 12



If 4.00 mol of Al(s) and 4.00 mol of Cl₂(g) are mixed and allowed to react as completely as possible, then

- A) Cl₂(g) is the limiting reactant and 2.67 mol of AlCl₃(s) forms
- B) Al(s) is the limiting reactant and 4.00 mol of AlCl₃(s) forms
- C) Cl₂(g) is the limiting reactant and 4.00 mol of AlCl₃(s) forms
- D) Al(s) is the limiting reactant and 2.67 mol of AlCl₃(s) forms

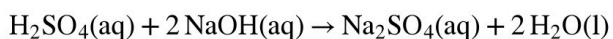
Question 13

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

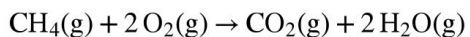
- | | |
|----------|----------|
| A) 116% | B) 79.6% |
| C) 86.0% | D) 92.5% |

Question 14



The volume, in millilitres, of 0.150 mol/L NaOH(aq) required to neutralize 20.0 mL of 0.300 mol/L H₂SO₄(aq), to the nearest tenth of a millilitre, is ____ mL

Question 15



The volume of $\text{O}_2(\text{g})$ at STP required to completely burn

11.2 L of $\text{CH}_4(\text{g})$ at STP is

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

Question 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 ____

Question 17

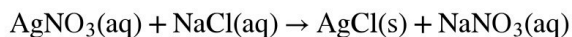


The mass of $\text{CO}_2(\text{g})$ (44.01 g/mol) produced when 10.0 g of

$\text{CaCO}_3(\text{s})$ (100.09 g/mol) reacts completely, to the nearest tenth

of a gram, is ____ g

Question 18



50.0 mL of 0.200 mol/L $\text{AgNO}_3(\text{aq})$ is mixed with excess $\text{NaCl}(\text{aq})$.

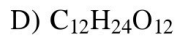
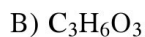
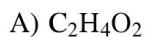
The mass of $\text{AgCl}(\text{s})$ (molar mass 143.32 g/mol) that precipitates is

- | | |
|------------|-----------|
| A) 0.717 g | B) 2.87 g |
| C) 14.3 g | D) 1.43 g |

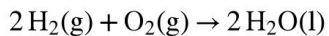
Question 19

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

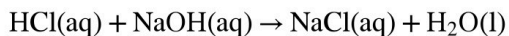


Question 20



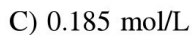
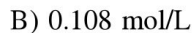
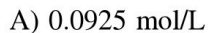
If 4.00 g of H_2 (2.02 g/mol) and 32.0 g of O_2 (32.00 g/mol) react, the mass of H_2O (18.02 g/mol) formed, to the nearest tenth of a gram, is ____ g

Question 21

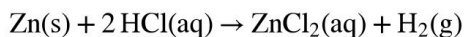


A 20.0 mL sample of $\text{HCl}(\text{aq})$ requires 18.5 mL of 0.100 mol/L $\text{NaOH}(\text{aq})$ for complete neutralization.

The concentration of the $\text{HCl}(\text{aq})$ is



Question 22



A student reacts 13.0 g of Zn(s) (65.38 g/mol) with excess

HCl(aq) and collects 0.175 mol of H₂(g).

The percent yield, to the nearest whole percent, is ____ %

Question 23

The total number of moles of ions present in 500 mL of a

0.200 mol/L CaCl₂(aq) solution, assuming complete dissociation, is

A) 0.300 mol

B) 0.100 mol

C) 0.200 mol

D) 0.600 mol

Question 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

Question 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}

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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