

Review of Significant Digits, Scientific Notation and SI Units

State the number of significant digits in each of the following measured values:

- | | | | |
|-------------------------|----------|----------------------------|----------|
| 1. 18.56 g | <u>4</u> | 4. 1.00 W | <u>3</u> |
| 2. 1500°C | <u>4</u> | 5. 0.05730 mol | <u>4</u> |
| 3. 0.0062 L | <u>2</u> | 6. 8.0×10^{-2} mL | <u>2</u> |
| 7. 14.08 cm | <u>4</u> | 9. 0.100 km | <u>3</u> |
| 8. 1.58×10^8 m | <u>3</u> | 10. 62 km/h | <u>2</u> |

Convert the following numbers into scientific notation. The number in brackets indicates the number of significant digits the answer is to be rounded to.

- | | | | | | |
|-----------|--|-----|---------------|---|-----|
| 1. 1000 | <u>1×10^3</u> | (1) | 4. 0.00001098 | <u>1.10×10^{-5}</u> | (3) |
| 2. 492.32 | <u>4.92×10^2</u> | (3) | 5. 6995 000 | <u>7.00×10^7</u> | (3) |
| 3. 0.0573 | <u>5.7×10^{-2}</u> | (2) | 6. 62.49 | <u>6.2×10^1</u> | (2) |

Using the SI Prefixes table on your data sheet, perform the following conversions. Maintain the same number of significant digits in each conversion. (pg 3)

- | | |
|--|--|
| 1. 0.520 km = <u>520</u> m | 6. 200 mL = <u>2.00×10^8</u> L = 200,000,000 |
| 2. 100 mL = <u>0.1</u> L | 7. 45 g = <u>45×10^{-2}</u> kg = 0.045 |
| 3. 152.5 cm = <u>1.525</u> m | 8. 10.8 mol = <u>1.08×10^4</u> mmol = 10800 |
| 4. 3300 mg = <u>3.300</u> g | 9. 0.450 L = <u>450</u> mL |
| 5. 650 kg = <u>6.50×10^5</u> g | 10. 1500 m = <u>1.5</u> km |

Perform the following calculations. Round your answer to the correct number of significant digits, using scientific notation where necessary. Include units.

- 16.56 mL - 6.3 mL = 10.3 mL *
- 21.4 g ÷ 0.825 mol = 25.9 g/mol
- 480 km + 24.07 km = 504 km *
- 0.550 mol × 40.00 g/mol = 22.0 g
- 18.4 g/mL × 5.5 mL = 1.0×10^2 g 2 sig. d.igs 101.2 = 1.0×10^2
- 22.99 g/mol + 35.45 g/mol = 58.44 g/mol
- 18.5°C - 4.5°C = 14.0°C
- 6.0 g ÷ 24.30 g/mol = 0.25 mol
- 19.55 mL - 17.55 mL = 2.000 mL
- 15 600 g ÷ 2000 mol = 7.800 g/mol

Review of Molar Mass and Mole Calculations

Complete the following chart, showing all calculations, formulas, substitutions, units and significant digits.

Name and Formula	Molar Mass	Mass	Moles
1. NaCl(s)	58.44 g/mol	$m = nM$ $m = 0.20 \text{ mol} \times 58.44 \frac{\text{g}}{\text{mol}}$ $m = 11.688 = \boxed{12 \text{ g}}$	0.20 mol
2. sodium hydroxide	$M = \text{NaOH}$ $22.99 + 16 + 1.01$ $= 40 \text{ g/mol}$	$m = 5.48 \text{ g}$	$n = \frac{m}{M}$ $n = \frac{5.48 \text{ g}}{40 \text{ g/mol}}$ $n = 0.137 \text{ mol}$
3. (NH ₄) ₃ PO ₄ (s)	$M = 14.01 \times 3$ 1.01×12 30.97 16×4 $= 149.12 \text{ g/mol}$	$m = nM$ $m = 0.600 \text{ mol} \times 149.12 \frac{\text{g}}{\text{mol}}$ $m = 89.472 \text{ g}$ $m = \boxed{89.5 \text{ g}}$	0.600 mol
4. sodium carbonate octahydrate	$\text{Na}_2\text{CO}_3 \cdot 8\text{H}_2\text{O}$ 22.99×2 12.01 16×3 1.01×16 16×8 $= 250.15 \text{ g/mol}$	50 g	$n = \frac{m}{M}$ $n = \frac{50 \text{ g}}{250.15 \text{ g/mol}}$ $n = 0.1998 \text{ mol}$ $n = \boxed{0.20 \text{ mol}}$

Name and Formula	Molar Mass	Mass	Moles
5. Ca(NO ₃) _{2(s)}	40.08 14.01 × 2 16 × 6 = 164.1 g/mol	8.45 g	$n = \frac{m}{M}$ $n = \frac{8.45g}{164.1g/mol}$ $n = 0.05149 mol$ $n = 0.0515 mol$
6. potassium dichromate	K ₂ Cr ₂ O ₇ 39.10 × 2 52.00 × 2 16 × 7 = 294.2 g/mol	5.65 g	$n = \frac{m}{M}$ $n = \frac{5.65g}{294.2g/mol}$ $n = 0.0192 mol$
7. Na ₂ CO _{3(s)}	22.99 × 2 12.01 16.0 × 3 = 105.99 g/mol	$m = nM$ $m = 0.85 mol \times 105.99 g/mol$ $m = 90.0915 g$ $m = 90.1 g$	0.850 mol
8. sulphur trioxide	SO ₃ 32.07 16 × 3 = 80.07 g/mol	$m = nM$ $m = 1.45 mol \times 80.07 g/mol$ $m = 116.1015 g$ $m = 116 g$	1.45 mol