

Final Review - Chem A

1. List, define, and give an example of each step of the **scientific method**. (see pg 12)

2. Convert the following:

$$1.50 \text{ L} = 1500 \text{ mL}$$

$$25 \text{ kg} = 2.5 \times 10^7 \text{ mg}$$

$$75 \text{ cm} = 750 \text{ mm}$$

3. How many **significant figures** in each?

a) 1000 1

b) 1.005 4

c) 408.0 4

d) 0.00100 3

e) 1000. 4

4. Calculate (remember sigfig rules!):

a) 237×5.8 1400

b) $278 / 6.15$ 45.2

c) $6.8 + 12.665$ 19.5

d) $7.55 - 6.55$ 1.00

5. Convert **scientific notation** to **plain decimal** or vice versa:

a) 10062 1.0062×10^4

b) 0.00005650 5.650×10^{-5}

c) 10705.00 1.070500×10^4

d) 4.623×10^{-5} 0.00004623

e) 6.25×10^8 625,000,000

f) 8.00×10^6 8,000,000

f. Write the formula for finding **density**. What is the density of a sample that has a mass of 98.6 g and a volume of 62.1 ml? $D=m/V$ 1.59g/mL

7. Convert the following **temperatures**:

a. 473 K = 200 °C 392°F

b. -272 °C = 1 K 458°F

c. 796 °F = 424 °C 697 K

8. Are the following **physical** or **chemical** properties?

a. Helium is inflammable. Chem

b. Water melts at 0°C. Phys

c. Water's density is 1.0 g/mL. Phys

d. Sodium reacts with water. Chem

9. **Physical** or **chemical** change?

a. ice melts Phys

b. glass breaks Phys

c. wood burns Chem

d. water boils Phys

10. How is the **Periodic Table** arranged? Where are the *metals*, *semimetals* (metalloids), *nonmetals*, *transition metals*, *alkali metals*, *alkaline earth metals*, *halogens*, and *noble gases* located? (see chap 3)

11. Describe Rutherford's experiment (gold foil) and explain its significance.

Shot alpha particles (+ charge) at gold foil. Some particles bounced back indicating a dense positively charged area of atom. Significance: discovered the nucleus

12. Be able to define and use the **terms** atomic number, isotopes, diatomic gases, cation, anion, (s), (l), (g), (aq), protons, neutrons, electrons, nucleus, mass number, molar mass (see glossary)

13. What are the **diatomic** elements. **Br I N Cl H O F**

14. **Cations** (gain/lose) electrons to have a (positive/negative) charge. They are normally (metals/nonmetals). **Anions** (gain/lose) electrons to have a (positive/negative) charge. They are normally (metals/nonmetals).

15. **Name** the following compounds: CO₂ NaNO₃ MgCl₂ Fe₂O₃ HF Pb(SO₄)₂ H₂SO₄
carbon dioxide sodium nitrate magnesium chloride iron(III) oxide
hydrofluoric acid lead(IV) sulfate sulfuric acid

16. **Write** the formula: sulfur trioxide phosphoric acid hydrocyanic acid magnesium nitride
iron(II) oxide iron(III) hydroxide ammonium sulfate
SO₃ H₃PO₄ HCN Mg₃N₂ FeO Fe(OH)₃ (NH₄)₂SO₄

17. Find the **molar mass**:

- a. C₆H₁₂O₆ 180. g/mol
- b. NH₃ 17.0 g/mol
- c. MgO 40.3g/mol
- d. SO₃ 80.1 g/mol

18. **Grams** ⇌ **mols** ⇌ **numbers** conversions:

- a. 80.0 g Ca = 2.0 mol Ca = 1.204x10²⁴ atoms Ca
- b. 80.0 g C₆H₁₂O₆ = 0.44 mol C₆H₁₂O₆ = 2.68x10²³ molecules
- c. 9.03 x 10²³ atoms Na = 1.5 mol Na = 34.5 g Na
- d. 5.7 mol P₂O₅ = 808.8 grams = 3.43x10²⁴ molecules
- e. 855 g MgO = 1.28x10²⁵ atoms MgO
- f. 4.5 x 10²³ atoms Ba = 103 g Ba

19. **Balance** the following equations:

- a. AgNO₃ + NaCl → AgCl + NaNO₃ dd; ppt
- b. NaOH + HCl → H₂O + NaCl dd; acid/base
- c. 2 KClO₃ → 2 KCl + 3 O₂ redox; decomp
- d. C₆H₁₂O₆ + 6 O₂ → 6 CO₂ + 6 H₂O redox; combustion
- e. 2 K + MgBr₂ → 2 KBr + Mg redox; single displacement
- f. CaO + H₂O → Ca(OH)₂ redox; synthesis

20. **Classify the reactions** in question # 19 as *combustion, synthesis, decomp, acid/base*, etc.

21. For this *unbalanced* reaction: 2 Na + Cl₂ → 2 NaCl

- a. Balance the equation.
- b. How many moles of chlorine gas (Cl₂) would react with 5.0 moles of sodium (Na)? 2.5 mol
- c. How many grams of NaCl will be produced from 5.0 moles of Na? 292.5 g
- d. How many grams of Na will react with 71.0 g of Cl₂? 46.0 g
- e. 89.0 grams of Na will produce how many moles of NaCl? 3.87 mol