Practice Worksheet — Grade 11 Chemistry

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Balancing equations

1. What does a balanced chemical equation tell you? Select all that apply.
   a) the ratio of particles involved
   b) that atoms are conserved in the reaction
   c) the ratio of moles of reactants to products
   d) how fast the reaction will happen

Bond polarity and shape

2. What type of bond forms between a metal and a non-metal, such as in NaCl?
   a) polar covalent
   b) metallic
   c) ionic
   d) non-polar covalent

3. Which molecule is non-polar overall despite containing polar bonds?
   a) HCl
   b) H_2O
   c) CO_2
   d) NH_3

4. Why does water have a much higher boiling point than expected for its size?
   a) water molecules are very heavy
   b) its covalent bonds are unusually strong
   c) hydrogen bonding between molecules
   d) it is an ionic compound

5. Which pair of atoms would form the most polar bond?
   a) Cl and Cl
   b) H and H
   c) C and H
   d) H and F

Concentration and pH

6. 0.50 mol of sodium chloride is dissolved to make 2.0 L of solution. What is the concentration?

   Answer: _____ (mol/L)

7. Why does salt water conduct electricity while sugar water does not?
   a) salt raises the temperature of the water, and warm water conducts well
   b) salt is a metal, and metals conduct electricity wherever they are found
   c) salt dissociates into free ions, sugar dissolves as whole molecules
   d) sugar water is never a true solution, so nothing can move through it

8. 50.0 mL of 2.0 mol/L solution is diluted to a final volume of 250.0 mL. What is the new concentration?

   Answer: _____ (mol/L)

9. A solution has a hydrogen ion concentration of 1.0×10^{-3} mol/L. What is its pH?

   Answer: _____

Gas laws

10. A gas occupies 2.0 L at 100 kPa. At constant temperature, what volume does it occupy at 250 kPa?

    Answer: _____ (L)

11. A gas occupies 2.0 L at 300 K. At constant pressure, what volume does it occupy at 450 K?

    Answer: _____ (L)

12. A gas at 100 kPa fills 4.0 L at 250 K. What pressure does it exert in a 2.0 L container at 300 K?

    Answer: _____ (kPa)

13. A sealed rigid can holds gas at 150 kPa and 300 K. What is the pressure at 400 K?

    Answer: _____ (kPa)

Mole ratios in reactions

14. A reaction should theoretically produce 10.0 g of product, but only 8.5 g is collected. What is the percent yield?

    Answer: _____ (%)

15. What does it mean for a reactant to be the limiting reagent?
    a) it is present in the largest amount at the start
    b) it runs out first and so caps how much product can form
    c) it is the reactant left over once the reaction stops
    d) it has the smallest molar mass of the reactants

16. Why must a chemical equation be balanced before it is used for calculations?
    a) because unbalanced equations are always chemically impossible
    b) because it makes the arithmetic easier
    c) because atoms are neither created nor destroyed in a reaction
    d) because it guarantees a 100% yield

Moles

17. How many moles of gas occupy 5.0 L at 101.3 kPa and 298 K? Use R = 8.314 L·kPa/(mol·K).

    Answer: _____ (mol)

18. How many moles are in 11.2 L of an ideal gas at STP, where molar volume is 22.4 L/mol?

    Answer: _____ (mol)

19. A student is given a sample of the ionic compound formed between calcium and chlorine. Using the charges on the two ions to work out the formula, calculate the molar mass of the compound. Use Ca = 40.08 g/mol and Cl = 35.45 g/mol.

    Answer: _____ (g/mol)

20. How many moles of solute are in 500.0 mL of a 0.25 mol/L solution?

    Answer: _____ (mol)