



**ALL SAINTS'
COLLEGE**

Science Department

Year 12 Chemistry
2017

Test 1: Chemical Fundamentals

Name: _____

Teacher: _____

Instructions to Students:

1. 50 minutes permitted
2. Attempt all questions
3. Write in the spaces provided
4. Show all working when required
5. All answers to be in blue or black pen, diagrams in pencil.

TOTAL
/45

Final Percentage

Calculations should be set out neatly with numerical answers given to the appropriate number of significant figures and units provided.

1. Solubility and Colours of substances

(4 marks)

For each of the following equations, decide whether a precipitate is formed. Indicate this by writing the abbreviation 'ppt' behind the reaction arrow. What would be the colour of this precipitate?

	Precipitate formed Yes/No ?	Colour of precipitate
a) $\text{KOH}_{(\text{aq})} + \text{Fe}(\text{NO}_3)_{3(\text{aq})} \rightarrow$		
b) $\text{CH}_3\text{COONa}_{(\text{aq})} + \text{CaS}_{(\text{aq})} \rightarrow$		
c) $\text{K}_2\text{SO}_{4(\text{aq})} + \text{Pb}(\text{NO}_3)_{2(\text{aq})} \rightarrow$		
d) $\text{KNO}_{3(\text{aq})} + \text{MgCl}_{2(\text{aq})} \rightarrow$		

2. Molar Mass Calculations

(5 marks)

Determine the molar masses (M_r) for the following substances:

- a) $\text{Pb}(\text{OH})_2$
- b) $\text{C}_{12}\text{H}_{22}\text{O}_{11}$
- c) $\text{C}_2\text{H}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$
- d) $\text{Mg}(\text{NO}_3)_2$
- e) Carbonic acid

3. Mole to Mass (Mass to mole) Calculations

(6 marks)

a) Given the following, find the number of moles in:

i. 30 g of H_3PO_4

ii. 25 g of HF

iii. 110 g of NaHCO_3

b) Given the following, find the mass of:

i. 4 moles of $\text{Cu}(\text{CN})_2$

ii. 1.26×10^{-4} mol of CH_3COOH

iii. 1.2 moles of $(\text{NH}_4)_3\text{PO}_4$

4. Mole-Volume Conversions

(5 marks)

- a) Determine the volume, in litres, occupied by 0.030 moles of a gas at STP.
- b) How many moles of CO₂ are present in 11.2 L at STP?
- c) What is the volume of 0.05 mol of neon gas at STP?
- d) 100.0 g of an unknown gas took up a volume of 46.6 L at STP. Calculate the molar mass (M_r) of the gas.

5. Solution concentration

(7 marks)

- a) What mass of $\text{KCl}_{(s)}$ is required to prepare 630.0 mL of $1.26 \text{ mol L}^{-1} \text{ KCl}_{(aq)}$?
- b) What mass of $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$ is required to prepare 250.0 mL $\text{Na}_2\text{CO}_3_{(aq)}$ with a concentration of 0.265 mol L^{-1} ?
- c) What is the concentration of a solution when 734 grams of lithium sulfate, Li_2SO_4 are dissolved to make 2500 mL of solution?
- d) Calculate the concentration in ppm of a solution that contains 0.0198 g of calcium carbonate, CaCO_3 in 2000g of solution.

6. Ions in solution

(6 marks)

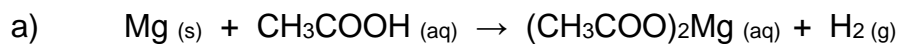
Calculate the number of moles of

- a) Nitrate ions in 2.20 L of a lead nitrate solution with a concentration of $2.02 \times 10^{-3} \text{ mol L}^{-1} \text{ Pb(NO}_3)_2$.
- b) Chloride ions in 25.0 mL of a barium chloride solution with a concentration of $0.200 \text{ mol L}^{-1} \text{ BaCl}_2$ solution.
- c) Sulfate ions in 550.0 mL of a sodium sulfate solution with a concentration of 2.56 mol L^{-1} .

7. Ionic equations

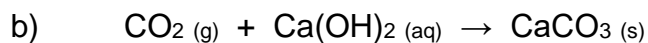
(12 marks)

Write **balanced** ionic equations and observations for the following reactions. (**Include state symbols in the final ionic equation.**) For some of these reactions, you will have to predict the products formed.



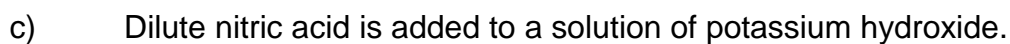
Ionic equation: _____

Observation: _____



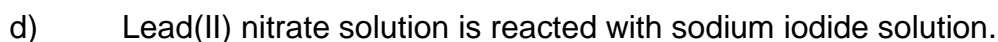
Ionic equation: _____

Observation: _____



Ionic equation: _____

Observation: _____



Ionic equation: _____

Observation: _____

END OF TEST