

## Chemistry 1094 Spring 2018 Test 3

Wednesday, March 21, 2018

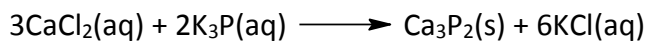
Time: 1 hour 50 minutes

Name: \_\_\_\_\_ Student Number: \_\_\_\_\_

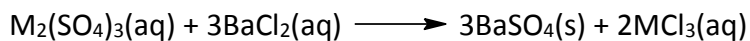
*This test consists of **six** pages of questions and a periodic table. Please ensure that you have a complete paper and, if you do not, obtain one from me **immediately**. There are **36** marks available. Good luck!*

1) **[3 marks]** A compound has been found to have the empirical formula  $C_2HNO_2$ . If the molar mass of the compound is known to be between 170 and 240 grams, what is the molecular formula of the compound?

2) **[3 marks]** If you react 20.0 grams of  $CaCl_2$  (111.0 g/mol) with excess  $K_3P$ , how many grams of  $Ca_3P_2$  (182.2 g/mol) should you collect?

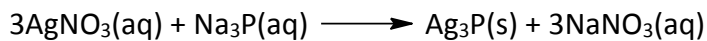


- 3) **[4 marks]** A 701.4-mg sample of a compound of formula  $M_2(SO_4)_3$  was reacted with excess  $BaCl_2$ :



A total of 1435.3 mg of  $BaSO_4$  (233.38 g/mol) was collected. What is the metal, M?

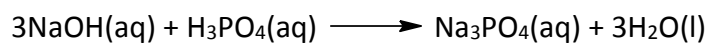
- 4) **[4 marks]** How many grams of 80.0-percent pure  $AgNO_3$  (169.9 g/mol) are necessary to produce 3.546 grams of  $Ag_3P$  (354.6 g/mol)?



5) **[3 marks]** If you made a solution using 30.0 grams of ethanol (molar mass 46.07 grams) and 12.0 grams of water (molar mass 18.02 grams), which compound would be the solute, and which the solvent? (*Note: Show all your work and reasoning to receive any credit for your answer.*)

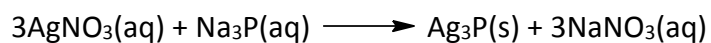
6) **[4 marks]** A 15.00-mL aliquot of 0.500 M NaCl was taken and diluted to 200.0 mL to form solution **A**. A 25.00-mL aliquot of solution **A** was taken and diluted to 250.0 mL to form solution **B**. If you had 1.00 litres of solution **B**, how many **grams** of NaCl (58.44 g/mol) would it contain?

- 7) **[3 marks]** A 25.00-mL aliquot of  $\text{H}_3\text{PO}_4$  was taken and titrated with 45.00 mL of 0.01000 M NaOH:



What was the concentration of the  $\text{H}_3\text{PO}_4$ ?

- 8) **[8 marks total]** A 50.97-gram sample of  $\text{AgNO}_3$  (169.9 g/mol) was reacted with 20.00 grams of  $\text{Na}_3\text{P}$  (100.0 g/mol).

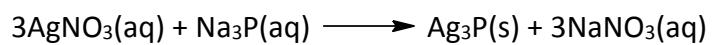


- a) **[3 marks]** Identify the limiting reagent.

- b) **[2 marks]** How many grams of  $\text{Ag}_3\text{P}$  (354.6 g/mol) should be collected?

- c) **[3 marks]** How many grams of which reagent will remain unreacted after the reaction is complete?

- 9) **[4 marks]** How many grams of  $\text{AgNO}_3$  (169.9 g/mol) are necessary to produce 3.1914 grams of  $\text{Ag}_3\text{P}$  (354.6 g/mol) if the reaction



is known to proceed with a 90.00 percent yield?