

 **Author:joel PCM**

© Chemistry Item Bank – UACE Standard

Item 1 –

Physical & Analytical Chemistry

A sample of impure potassium chloride contains 85% KCl by mass. 20.0 g of the sample is dissolved in water, and the solution is then reacted with 50.0 cm³ of 0.2 M silver nitrate solution.

- Write the ionic equation for the reaction that takes place.
- Calculate the mass of KCl that reacts with the silver nitrate.
- Determine the percentage purity of the KCl sample based on your calculation and compare it with the stated purity.
- Discuss two possible sources of error in this experiment and how they could affect the calculated purity.

Item 2

Organic Chemistry & Reaction Mechanisms

Propan-2-ol is oxidized under controlled laboratory conditions using acidified potassium dichromate(VI).

- Write a balanced chemical equation for the reaction.
- Draw the structural formula of the product.
- Explain the mechanism of oxidation, including the role of the oxidizing agent.
- If 10.0 g of propan-2-ol is used, calculate the theoretical mass of the product formed.
- Discuss how you could confirm the product experimentally using chemical tests.

 **Author: joelPCM**

© Chemistry Item Bank – UACE Standard

Inorganic Chemistry

Item 1

A mining company extracts a sample of impure bauxite, which contains aluminum oxide along with impurities. To obtain pure aluminum, the company first dissolves the bauxite in sodium hydroxide solution to form soluble sodium aluminate. The solution is then filtered to remove insoluble impurities. Aluminum is later obtained by electrolyzing molten aluminum oxide mixed with cryolite.

- a) Write the balanced chemical equation for the reaction of aluminum oxide with sodium hydroxide.
- b) Explain why cryolite is added during the electrolysis of aluminum oxide.
- c) Write the half-equations for the reactions occurring at the anode and cathode during electrolysis.
- d) If 54.0 g of aluminum is produced, calculate the total charge in coulombs required, assuming 100% efficiency. (Al = 27, 1 mol of electrons = 96500 C)
- e) Discuss two possible industrial challenges in producing aluminum by electrolysis and suggest solutions.