



Chemistry Form 11



English

1. It is desired to gasify the compound $C_{0.9}H_{1.7}O_{1.1}S_{0.05}N_{0.1}$. Water and oxygen are consumed in the reaction.
 - a. What compounds do we expect to get from S and N if the gasification takes place in a reducing environment? **2 points**
 - b. If oxygen is not limiting, how much oxygen is required in order to oxidise the compounds to CO_2 and H_2O ? **6 point**
 - c. If the oxygen available is less than that required for full combustion, what compounds can be expected to be formed together with CO_2 and H_2O ? **2 points**

2. Lake water should have a pH-value of ca. 6,5 at 25 °C, but in many parts of the world the pH-value is falling as a result of acid rain. This can have serious consequences for life in an acidified lake.
 - a. The pH-value of ca. 6,5 is due to a specific acid. Describe with the help of chemical reactions the formation of the acid which gives rise to a pH-value of 6,5 in lake water. **3 points**
 - b. An acidified lake has pH 4,5, and for that reason the lake should be treated with lime. The plan is to raise the pH to 6,5 by adding calcium hydroxide. The area of the lake is 3,2 km² and its depth is 2,5 m. How many kilograms of calcium hydroxide are required? **5 points**

3. In connection with the mining of sulphide ore in the Boliden region in the north of Sweden, it is often found that the ore contains several sulphide minerals. A sample from a mine contained a mixture of galena (PbS) and zinc blende (ZnS). An analysis of this sample showed that it contained exactly twice as much zinc by weight as lead. What percentage by weight of galena (PbS) was there in the sample? You can assume that the sample contained only the two minerals mentioned. **8 points**

4. 9,36 gram pure salicylic acid (which is a monoprotic acid) is titrated with a solution of sodium hydroxide. The sodium hydroxide solution has previously been prepared by dissolving 10,00 gram NaOH and diluting with distilled water to a volume of 200,0 ml. Of this sodium hydroxide solution, 54,1 ml were required to reach the equivalence point. Calculate the molecular mass of salicylic acid. **6 points**



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5. Silver is attacked by both sulphur and oxygen in the surrounding air and this leads to a black coating on the silver.
- Write a balanced equation for what happens. **2 points**
 - If you mix Na_2CO_3 and aluminium, you can clean the silver. Write a balanced equation for this reaction **2 points**
 - Why is it difficult to dissolve gold and platinum in acids? **1 point**
 - A special mixture called "aqua regia" dissolves gold and platinum. What does it consist of? **1 point**
 - Which of the following acids is the only one which can dissolve glass (SiO_2)?
 HNO_3 , HCl , HF , H_2SO_4 or H_3PO_4 ? **1 point**
 - What other solution could be suitable for dissolving glass? **1 point**