



Chemistry Form 10



English

1. Biomass consists mainly of carbon, hydrogen and oxygen, but also of small quantities of nitrogen, sulphur and phosphorus. Write a balanced reaction equation for the total combustion of the following compound in air: $\text{CH}_{1.8} \text{O}_{1.1} \text{S}_{0.05} \text{N}_{0.1}$

8 points

2. Acidification of lakes and land and the greenhouse effect are two large global environmental problems. The acidification is caused by certain chemical substances the contents of which in the atmosphere are raised as a result of various human activities. These substances create something called "acid rain" which falls on land and lakes and lowers their pH-value. The greenhouse effect is due to raised contents of other substances in the atmosphere than those which contribute to the acidification.

a. With the help of chemical formulae explain the occurrence of "acid rain".

4 points

b. Which chemical substances create the buffer system in soil and water, and write the chemical reaction for the buffering process?

4 points

c. To which of the following statements is the greenhouse effect related? Justify your answer

- 1) Raised contents of SO_4^{2-} from the incineration of waste
- 2) Raised contents of N_2O from the use of fertilizers
- 3) Raised contents of N_2 from the burning of fossil fuels

2 points

3. In connection with the mining of sulphide ore which is common in the Boliden district in Northern Sweden, the ore is often found to contain several different sulphide minerals. A sample from a mine contains a mixture of galena (a chemical compound of lead and sulphur) and zinc blende (a compound of zinc and sulphur). An analysis of the isolated galena shows that it contains 13.4 % by weight of sulphur. Suggest a probable formula for galena.

6 points



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4. Show with electronic structural formulae which of the following molecules lack a permanent dipole moment.

- a. SO_2
- b. CO_2
- c. BF_3
- d. NH_3
- e. N_2O
- f. NO_2
- g. SO_3
- h. CCl_4

8 points

5. Describe the different types of chemical bonds that exist in crystals of the following elements and compounds.

- a. I_2
- b. Na
- c. NaCl
- d. Kr
- e. CsF
- f. Si
- g. CH_4
- h. NH_4Cl

8 points