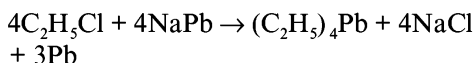
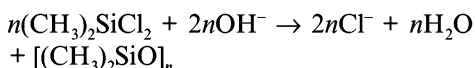


13. Consider the production of tetraethyl lead according to the reaction:



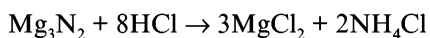
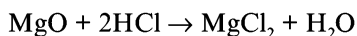
How many kilograms of ethyl chloride is required to produce enough tetraethyl lead (density = 6.48 g/ml) needed per litre of aviation fuel using 2 ml of tetraethyl lead per litre of fuel. (Pb = 208)

14. In one process of water proofing, a fibre is exposed to $(\text{CH}_3)_2\text{SiCl}_2$ vapour. The vapour reacts with hydroxyl groups on the surface of the fabric or with traces of water to form the waterproofing film $[(\text{CH}_3)_2\text{SiO}]_n$, by the reaction:



where n stands for a large integer. The waterproofing film is deposited on the fabric layer upon layer. Each layer is 3.7 Å thick (the thickness of the $(\text{CH}_3)_2\text{SiO}$ group). How much $(\text{CH}_3)_2\text{SiCl}_2$ (in g) is needed to waterproofing one side of a piece of fabric, 5.0 m by 4.0 m, with a film 200 layer thick? The density of film is $\frac{150}{129}$ g/ml. (Si = 28)

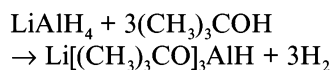
15. A magnesium ribbon, when burnt in air, left an ash containing MgO and Mg_3N_2 . The ash was found to consume 0.6 mole of HCl, when it was taken in solution, according to the reactions:



The solution so obtained was treated with excess of NaOH, when 0.1 mole of NH_3 was evolved. The mass (in g) of magnesium burnt is

16. A sample of $\text{SF}_5\text{OF}(\text{g})$ was contained in a glass vessel at 117°C and a pressure of 380 mm. A quantity of N_2F_4 that was added brought the total pressure to 160 mm. The reaction that occurred produced a variety of products like NF_3 , NO, SiF_4 (by the reaction with glass), SF_6 , SO_2F_2 , SOF_4 , SF_5ONF_2 and NO_2 . The yield of SF_5ONF_2 was 40 mole per cent with respect to the reactant SF_5OF . All of the SF_5OF and N_2F_4 were consumed in the reaction. What was the mass of SF_5ONF_2 produced (in g) if the volume of the vessel was 1.642 L?

17. An amount of 5 millimoles of LiAlH_4 was treated with 20 millimoles of *t*-butylalcohol. A total of 15 millimoles of hydrogen was evolved for the reaction:



The addition of an excess of another alcohol, methanol, to the above reaction mixture caused the fourth H atom of the LiAlH_4 to be replaced according to the equation:



How many millimoles of H_2 was evolved due to the addition of CH_3OH ?

18. To analyse cast iron for its sulphur content, a 6.4 g portion of the iron was weighed out for analysis and treated as follows: it was dissolved in hydrochloric acid, the hydrogen sulphide evolved from iron sulphide was distilled off and made to be absorbed by a solution of a cadmium salt, after which CdS was treated with an excess of a solution of CuSO_4 , and the CuS precipitated formed was ignited. As a result, 0.795 g of an ignited CuO precipitate was obtained. Calculate the percentage content of sulphur in the cast iron. (Cu = 63.5)