

Avogadro's Number and reacting masses

Avogadro's Number

1. Calculate the number of particles in the following substances:
 - a) 0.025 moles
 - b) 2.5 g of CO₂
 - c) 5.0 g of Pb
 - d) 100 g of N₂
2. Calculate the mass of the following:
 - a) 2.5×10^{23} molecules of N₂
 - b) 1.5×10^{24} molecules of CO₂
 - c) 2×10^{20} atoms of Mg

Reacting Masses

3. Calculate the mass of H₂O required to react completely with 5.0 g of SiCl₄:
$$\text{SiCl}_4 + 2\text{H}_2\text{O} \rightarrow \text{SiO}_2 + 4\text{HCl}$$
4. Calculate the mass of phosphorus required to make 200 g of phosphine, PH₃, by the reaction:
$$\text{P}_4(\text{s}) + 3\text{NaOH}(\text{aq}) + 3\text{H}_2\text{O}(\text{l}) \rightarrow 3\text{NaH}_2\text{PO}_4(\text{aq}) + \text{PH}_3(\text{g})$$
5. Lead (IV) oxide reacts with concentrated hydrochloric acid as follows:
$$\text{PbO}_2(\text{s}) + 4\text{HCl}(\text{aq}) \rightarrow \text{PbCl}_2(\text{s}) + \text{Cl}_2(\text{g}) + 2\text{H}_2\text{O}(\text{l})$$

What mass of lead chloride would be obtained from 37.2g of PbO₂, and what mass of chlorine gas would be produced?
6. When copper (II) nitrate is heated, it decomposes according to the following equation:
$$2\text{Cu}(\text{NO}_3)_2(\text{s}) \rightarrow 2\text{CuO}(\text{s}) + 4\text{NO}_2(\text{g}) + \text{O}_2(\text{g})$$

When 20.0g of copper (II) nitrate is heated, what mass of copper (II) oxide would be produced? What mass of NO₂ would be produced?