

Chemistry: Stoichiometry – Problem Sheet 2

KEY

$$\text{1) } x \text{ g AgCl} = 45 \text{ g CaCl}_2 \left(\frac{1 \text{ mol CaCl}_2}{111 \text{ g CaCl}_2} \right) \left(\frac{2 \text{ mol AgCl}}{1 \text{ mol CaCl}_2} \right) \left(\frac{143.5 \text{ g AgCl}}{1 \text{ mol AgCl}} \right) = 116 \text{ g AgCl}$$

$$\text{2) } x \text{ L H}_2 = 88 \text{ g CuO} \left(\frac{1 \text{ mol CuO}}{79.5 \text{ g CuO}} \right) \left(\frac{1 \text{ mol H}_2}{1 \text{ mol CuO}} \right) \left(\frac{22.4 \text{ L H}_2}{1 \text{ mol H}_2} \right) = 24.8 \text{ L H}_2$$

$$\text{3) } x \text{ g Na} = 3 \text{ L H}_2 \left(\frac{1 \text{ mol H}_2}{22.4 \text{ L H}_2} \right) \left(\frac{2 \text{ mol Na}}{1 \text{ mol H}_2} \right) \left(\frac{23 \text{ g Na}}{1 \text{ mol Na}} \right) = 6.2 \text{ g Na}$$

$$\text{4) } x \text{ L CH}_4 = 500 \text{ L O}_2 \left(\frac{1 \text{ mol O}_2}{22.4 \text{ L O}_2} \right) \left(\frac{1 \text{ mol CH}_4}{2 \text{ mol O}_2} \right) \left(\frac{22.4 \text{ L CH}_4}{1 \text{ mol CH}_4} \right) = 250 \text{ L CH}_4$$

$$\text{5) } x \text{ molecules C}_2\text{S} = 4.21 \times 10^{19} \text{ molecules O}_2 \left(\frac{1 \text{ mol O}_2}{6.02 \times 10^{23} \text{ molecules O}_2} \right) \left(\frac{1 \text{ mol CS}_2}{3 \text{ mol O}_2} \right) \left(\frac{6.02 \times 10^{23} \text{ molecules CS}_2}{1 \text{ mol CS}_2} \right) = 1.40 \times 10^{19} \text{ molecules CS}_2$$

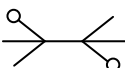
$$\text{6) } x \text{ L H}_2 = 5.76 \times 10^{28} \text{ molecules C}_2\text{H}_6 \left(\frac{1 \text{ mol C}_2\text{H}_6}{6.02 \times 10^{23} \text{ molecules C}_2\text{H}_6} \right) \left(\frac{1 \text{ mol H}_2}{1 \text{ mol C}_2\text{H}_6} \right) \left(\frac{22.4 \text{ L H}_2}{1 \text{ mol H}_2} \right) = 2.14 \times 10^6 \text{ L H}_2$$

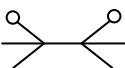
$$\text{7) } x \text{ atoms Fe} = 67.8 \text{ dm}^3 \text{ H}_2 \left(\frac{1 \text{ mol H}_2}{22.4 \text{ dm}^3 \text{ H}_2} \right) \left(\frac{3 \text{ mol Fe}}{4 \text{ mol H}_2} \right) \left(\frac{6.02 \times 10^{23} \text{ atoms Fe}}{1 \text{ mol Fe}} \right) = 1.37 \times 10^{24} \text{ atoms Fe}$$

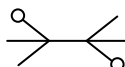
$$\text{8) } x \text{ g O}_2 = 8.65 \times 10^{25} \text{ molecules KCl} \left(\frac{1 \text{ mol KCl}}{6.02 \times 10^{23} \text{ molecules KCl}} \right) \left(\frac{3 \text{ mol O}_2}{2 \text{ mol KCl}} \right) \left(\frac{32 \text{ g O}_2}{1 \text{ mol O}_2} \right) = 6897 \text{ g O}_2$$

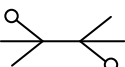
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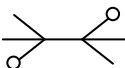
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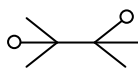
 **9)** $x \text{ molecules I}_2 = 546 \text{ g Cl}_2 \left(\frac{1 \text{ mol Cl}_2}{71 \text{ g Cl}_2} \right) \left(\frac{1 \text{ mol I}_2}{1 \text{ mol Cl}_2} \right) \left(\frac{6.02 \times 10^{23} \text{ molecules I}_2}{1 \text{ mol I}_2} \right) = 4.63 \times 10^{24} \text{ molecules I}_2$

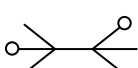
 **10)** $x \text{ g Ag} = 86 \text{ g CuO} \left(\frac{1 \text{ mol Cu}}{63.5 \text{ g Cu}} \right) \left(\frac{1 \text{ mol Ag}}{1 \text{ mol Cu}} \right) \left(\frac{108 \text{ g Ag}}{1 \text{ mol Ag}} \right) = 292 \text{ g Ag}$

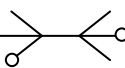
 **11)** $x \text{ L NH}_3 = 26.0 \text{ g Ca(OH)}_2 \left(\frac{1 \text{ mol Ca(OH)}_2}{74 \text{ g Ca(OH)}_2} \right) \left(\frac{2 \text{ mol NH}_3}{1 \text{ mol Ca(OH)}_2} \right) \left(\frac{22.4 \text{ dm}^3 \text{ NH}_3}{1 \text{ mol NH}_3} \right) = 15.7 \text{ dm}^3 \text{ NH}_3$

 **12)** $x \text{ molecules Na}_2\text{SO}_4 = 395 \text{ g NaCl} \left(\frac{1 \text{ mol NaCl}}{58.5 \text{ g NaCl}} \right) \left(\frac{1 \text{ mol Na}_2\text{SO}_4}{2 \text{ mol NaCl}} \right) \left(\frac{6.02 \times 10^{23} \text{ molecules Na}_2\text{SO}_4}{1 \text{ mol Na}_2\text{SO}_4} \right) = 1.85 \times 10^{23} \text{ molecules Na}_2\text{SO}_4$

 **13)**
 $x \text{ g AgCH}_3\text{COO} = 4.77 \times 10^{26} \text{ molecules Na}_3\text{PO}_4 \left(\frac{1 \text{ mol Na}_3\text{PO}_4}{6.02 \times 10^{23} \text{ molecules Na}_3\text{PO}_4} \right) \left(\frac{3 \text{ mol AgCH}_3\text{COO}}{1 \text{ mol Na}_3\text{PO}_4} \right) \left(\frac{167 \text{ g AgCH}_3\text{COO}}{1 \text{ mol AgCH}_3\text{COO}} \right) = 3.97 \times 10^5 \text{ g AgCH}_3\text{COO}$

 **14)** $x \text{ g HgO} = 812 \text{ L O}_2 \left(\frac{1 \text{ mol O}_2}{22.4 \text{ L O}_2} \right) \left(\frac{2 \text{ mol HgO}}{1 \text{ mol O}_2} \right) \left(\frac{216.6 \text{ g HgO}}{1 \text{ mol HgO}} \right) = 1.57 \times 10^4 \text{ g HgO}$

 **15)** $x \text{ molecules Ag}_2\text{O} = 445 \text{ dm}^3 \text{ O}_2 \left(\frac{1 \text{ mol O}_2}{22.4 \text{ dm}^3 \text{ O}_2} \right) \left(\frac{2 \text{ mol Ag}_2\text{O}}{1 \text{ mol O}_2} \right) \left(\frac{6.02 \times 10^{23} \text{ molecules Ag}_2\text{O}}{1 \text{ mol Ag}_2\text{O}} \right) = 2.39 \times 10^{25} \text{ molecules Ag}_2\text{O}$

 **16)** $x \text{ L H}_2 = 3.54 \times 10^{24} \text{ atoms Al} \left(\frac{1 \text{ mol Al}}{6.02 \times 10^{23} \text{ atoms Al}} \right) \left(\frac{3 \text{ mol H}_2}{2 \text{ mol Al}} \right) \left(\frac{22.4 \text{ L H}_2}{1 \text{ mol H}_2} \right) = 198 \text{ L H}_2$

