HW Exercise
(Chemical Stoichiometry)

1. $SO_2 + 2\,H_2S \longrightarrow 3S + 2H_2O$

(a) $1.0\ mol\ H_2S \times \left(\frac{3\ mol\ S}{2\ mol\ H_2S}\right) = \boxed{1.5\ mol\ S}$

(b) $0.500\ mol\ H_2S \times \left(\frac{3\ mol\ S}{2\ mol\ H_2S}\right) = \boxed{0.750\ mol\ S}$

(c) $10.0\ g\ H_2S \times \left(\frac{1\ mol\ H_2S}{34.1\ g}\right) \times \left(\frac{1\ mol\ SO_2}{2\ mol\ H_2S}\right) \times \left(\frac{64.1\ g}{1\ mol\ SO_2}\right) = \boxed{9.40\ g\ SO_2}$

(d) $12.0\ g\ S \times \left(\frac{1\ mol\ S}{32.1\ g}\right) \times \left(\frac{2\ mol\ H_2S}{3\ mol\ S}\right) \times \left(\frac{34.1\ g}{1\ mol\ H_2S}\right) = \boxed{8.50\ g\ H_2S}$

(e) $6.00\ g\ S \times \left(\frac{1\ mol\ S}{32.1\ g}\right) \times \left(\frac{1\ mol\ SO_2}{3\ mol\ S}\right) \times \left(\frac{64.1\ g}{1\ mol\ SO_2}\right) = \boxed{3.99\ g\ SO_2}$

2. $2\,C_4H_{10} + 13\,O_2 \longrightarrow 8\,CO_2 + 10\,H_2O$

(a) $4.26\ mol\ C_4H_{10} \times \left(\frac{13\ mol\ O_2}{2\ mol\ C_4H_{10}}\right) = \boxed{27.7\ mol\ O_2}$

(b) $4.26\ mol\ C_4H_{10} \times \left(\frac{8\ mol\ CO_2}{2\ mol\ C_4H_{10}}\right) = \boxed{17.0\ mol\ CO_2}$

(c) $4.26\ mol\ C_4H_{10} \times \left(\frac{10\ mol\ H_2O}{2\ mol\ C_4H_{10}}\right) = \boxed{21.3\ mol\ H_2O}$

(d) $2.00\ mol\ C_4H_{10} \times \left(\frac{13\ mol\ O_2}{2\ mol\ C_4H_{10}}\right) \times \left(\frac{32.0\ g}{1\ mol\ O_2}\right) = \boxed{416.\ g\ O_2}$

(e) $203\ g\ O_2 \times \left(\frac{1\ mol\ O_2}{32.0\ g}\right) \times \left(\frac{2\ mol\ C_4H_{10}}{13\ mol\ O_2}\right) \times \left(\frac{58.0\ g}{1\ mol\ C_4H_{10}}\right) = \boxed{56.6\ g\ C_4H_{10}}$

(f) $100\ g\ C_4H_{10} \times \left(\frac{1\ mol\ C_4H_{10}}{58.0\ g}\right) \times \left(\frac{8\ mol\ CO_2}{2\ mol\ C_4H_{10}}\right) \times \left(\frac{44.0\ g}{1\ mol\ CO_2}\right) = \boxed{303\ g\ CO_2}$

9.29 (p257),

$$2\,CH_3OH + O_2 \rightarrow 2\,HCHO + 2\,H_2O$$

$$397\ Kg\ CH_3OH \times \left(\frac{1\ Kmol\ CH_3OH}{32.0\ Kg}\right) \times \left(\frac{2\ mol\ HCHO}{2\ mol\ CH_3OH}\right) \times \left(\frac{30.0\ Kg}{1\ Kmol\ HCHO}\right)$$

$$\times \left(\frac{84.9}{100}\right) = \boxed{316\ Kg\ HCHO}$$

9.32 (p257),

$$2\,HNO_3 + Na_2CO_3 \rightarrow 2\,NaNO_3 + H_2O + CO_2$$

$$188\ g\ HNO_3 \times \left(\frac{1\ mol\ HNO_3}{63.0\ g}\right) \times \left(\frac{1\ mol\ Na_2CO_3}{2\ mol\ HNO_3}\right) \times \left(\frac{106\ g}{1\ mol\ Na_2CO_3}\right)$$

$$= 158\ g\ Na_2CO_3$$

No, 135 g Na_2CO_3 is NOT enough to neutralize 135 g of HNO_3

$$188\ g\ HNO_3 \times \left(\frac{1\ mol\ HNO_3}{63.0\ g}\right) \times \left(\frac{1\ mol\ CO_2}{2\ mol\ HNO_3}\right) \times \left(\frac{44.0\ g}{1\ mol\ CO_2}\right)$$

$$= \boxed{65.7\ g\ CO_2}$$