(1)

$S + \frac{3}{2} O_2 \rightarrow SO_3$ $\quad \Delta H = -395.2\ kJ$

rev × ½ $\quad SO_3 \rightarrow SO_2 + \frac{1}{2} O_2$ $\quad \Delta H = +99.1\ kJ$

$S + O_2 \rightarrow SO_2$ $\quad \Delta H = \ominus 296.1\ kJ$

$\ominus$ ↓ exo

(2) 35

rev $\quad 2CO_2 + H_2O \rightarrow C_2H_2 + \frac{5}{2} O_2$ $\quad \Delta H = 1300\ kJ$

2x $\quad 2C + 2O_2 \rightarrow 2CO_2$ $\quad \Delta H = -788\ kJ$

$H_2 + \frac{1}{2} O_2 \rightarrow H_2O$ $\quad \Delta H = -286\ kJ$

$2C + H_2 \rightarrow C_2H_2$ $\quad \Delta H = \oplus 226\ kJ$

$\oplus$ ↓ endo

3

34) rev(x½) $\frac{3}{2}O_2 \rightarrow O_3$ $\Delta H = 213.5\ kJ$

rev(x½) $O \rightarrow \frac{1}{2}O_2$ $\Delta H = -247.5\ kJ$

$NO + O_3 \rightarrow NO_2 + O_2$ $\Delta H = -199\ kJ$

$NO + O \rightarrow NO_2$ $\Delta H = -233\ kJ$

↓

exo

4

35) (x3) $3Fe_2O_3 + 9CO \rightarrow 6Fe + 9CO_2$ $\Delta H = -69\ kJ$

rev $2Fe_3O_4 + CO_2 \rightarrow 3Fe_2O_3 + CO$ $\Delta H = +39\ kJ$

rev(2x) $6FeO + 2CO_2 \rightarrow 2Fe_3O_4 + 2CO$ $\Delta H = -36\ kJ$

(x⅙) $6FeO + 6CO \rightarrow 6Fe + 6CO_2$ $\Delta H = -66\ kJ$

$FeO + CO \rightarrow Fe + CO_2 = -11\ kJ$

Enthalpy and Stoich

$$4\ Fe_{(s)} + 3\ O_{2(g)} \rightarrow 2\ Fe_2O_{3(s)} \quad \Delta H = -1652\ kJ$$

a) How much heat is released when 4.00 mol of iron is reacted with excess O_2?

$$4.00\ mol\ Fe \times \frac{-1652\ kJ}{4\ mol\ Fe} = \boxed{-1650\ kJ}$$

b) How much heat is released when 1.00 g of iron is reacted with excess O_2?

$$1.00\ g\ Fe \times \frac{1\ mol\ Fe}{55.85\ g\ Fe} \times \frac{-1652\ kJ}{4\ mol\ Fe} = -7.39\ kJ$$

c) How much heat is released when 10.0 g of Fe and 2.00 g O_2 are reacted?

Just times part b by 10

$$10.0\ g\ Fe = -73.9\ kJ$$

$$2.00\ g\ O_2 \times \frac{1\ mol\ O_2}{32.00\ g\ O_2} \times \frac{-1652\ kJ}{3\ mol\ O_2} = \boxed{-34.4\ kJ}$$