

Rxn: Reaction balancing

Start Rxn and move to the Basis pane. Under “balance reaction for”, select “???” → Aqueous... → H₂S(aq). Set “temperature” to 25 °C

Left side of reaction

The screenshot shows the 'Basis' pane of the Rxn Community Edition software. The window title is 'Rxn Community Edition - C:\Users\maepli'. The menu bar includes 'File', 'Edit', 'Run', 'Config', 'View', and 'Help'. The 'Basis' tab is selected, and the 'balance reaction for' dropdown is set to 'H2S(aq)'. Below this, the 'in terms of' section lists several species with their respective activity coefficients and units:

Species	Activity Coefficient	Unit
H+	[input field]	activity
SO4--	[input field]	activity
O2(aq)	[input field]	activity
temperature	25.0	C
ionic strength	true	molal

At the bottom of the pane, there are buttons for 'add' and 'delete', a 'factor reaction by' dropdown set to '1.0', and a 'reverse' button. The status bar at the bottom left shows 'Ready'.

Rxn: Reaction balancing

- Move to the Results pane and click *Run*. What chemical reaction does the program give? What is its log K?

Rxn: Reaction balancing: Solution

The screenshot shows the Rxn Community Edition software window. The title bar reads "Rxn Community Edition - C:\Users\maeppli". The menu bar includes "File", "Edit", "Run", "Config", "View", and "Help". The main window is divided into three tabs: "Basis", "Command", and "Results". The "Results" tab is active, displaying the following chemical reaction and its equilibrium constant:

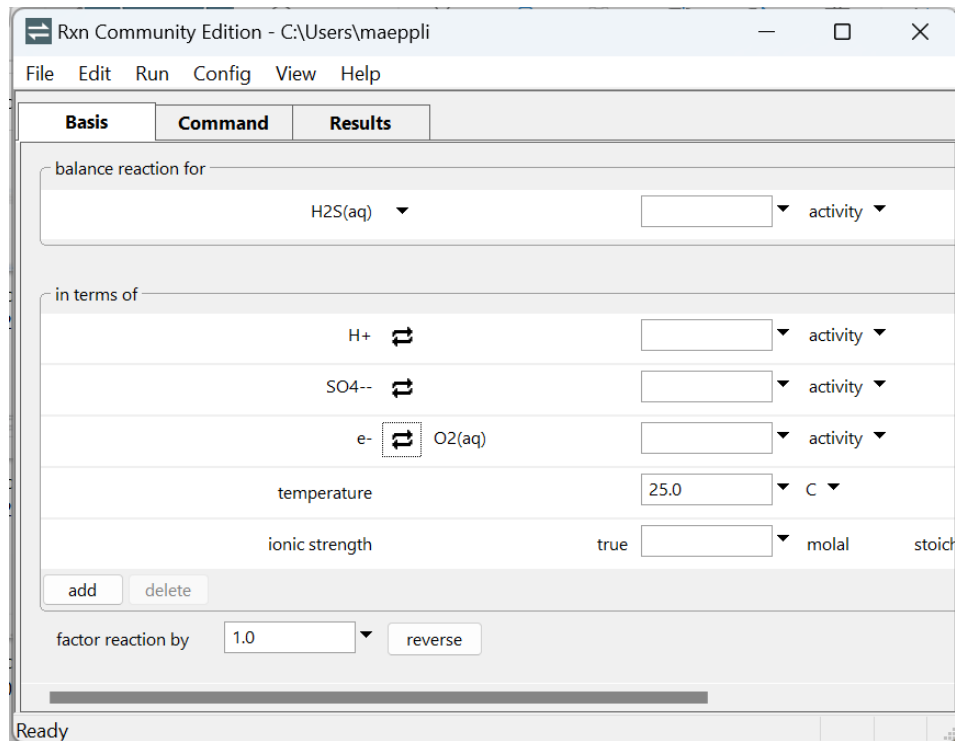
$$\text{H}_2\text{S}(\text{aq}) + 2 \text{O}_2(\text{aq}) = 2 \text{H}^+ + \text{SO}_4^{2-}$$

Log K at 25 C = 131.3943

A "Run" button is visible at the bottom of the window. The status bar at the bottom left shows "Ready".

Rxn: Reaction balancing

Now let's balance the corresponding half-cell reaction. Click on the swap button next to the basis entry for "O2(aq)" and select Aqueous... → e⁻



Rxn: Reaction balancing

- Move to the Results pane and click *Run*. How has the reaction changed?

Rxn: Reaction balancing: Solution

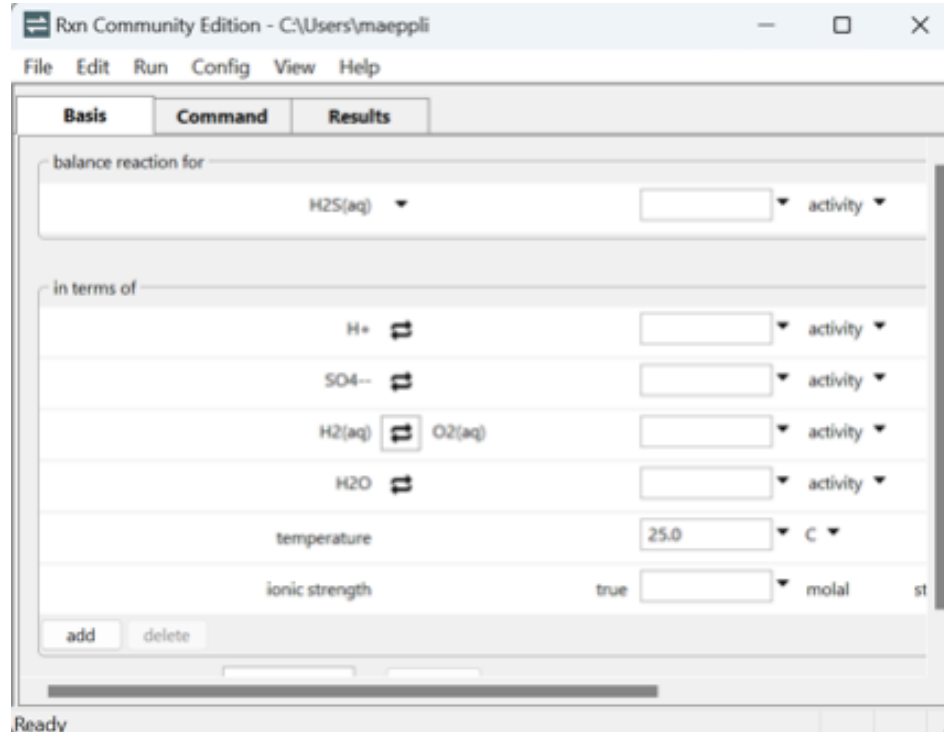
The screenshot shows the Rxn Community Edition software interface. The window title is "Rxn Community Edition - C:\Users\maeppli". The menu bar includes "File", "Edit", "Run", "Config", "View", and "Help". The main area is divided into three columns: "Basis", "Command", and "Results".

Basis	Command	Results
<input type="checkbox"/>	$\text{H}_2\text{S}(\text{aq}) + 4 \text{H}_2\text{O} = 10 \text{H}^+ + \text{SO}_4^{--} + 8 \text{e}^-$	$\text{Log K at 25 C} = -40.6093$

At the bottom of the window, there is a "Run" button and a status bar that says "ready".

Rxn: Reaction balancing

To recast the reaction to liberate dihydrogen, once again click on the swap button next to the basis entry for “O2(aq)” and select Aqueous... → “H2(aq)”



Rxn: Reaction balancing

- Move to the Results pane and click *Run*. How has the reaction changed?

Rxn: Reaction balancing: Solution

The screenshot shows the 'Rxn Community Edition' software window. The title bar indicates the path 'C:\Users\maeppli'. The menu bar includes 'File', 'Edit', 'Run', 'Config', 'View', and 'Help'. The main window is divided into three columns: 'Basis', 'Command', and 'Results'. A single reaction is listed with a '+' icon in the 'Basis' column. The 'Command' column contains the balanced chemical equation: $\text{H}_2\text{S}(\text{aq}) + 4 \text{H}_2\text{O} = 2 \text{H}^+ + \text{SO}_4^{--} + 4 \text{H}_2(\text{aq})$. The 'Results' column shows the calculated equilibrium constant: $\text{Log } K \text{ at } 25 \text{ C} = -53.0573$. A 'Run' button is located at the bottom left of the main area. The status bar at the bottom left displays 'Ready'.

Basis	Command	Results
+	$\text{H}_2\text{S}(\text{aq}) + 4 \text{H}_2\text{O} = 2 \text{H}^+ + \text{SO}_4^{--} + 4 \text{H}_2(\text{aq})$	$\text{Log } K \text{ at } 25 \text{ C} = -53.0573$

Exercise 1: Iron oxidation



Dissolved ionic iron exists in anoxic (i.e., in the absence of oxygen) ground water as the reduced species Fe^{2+} . When such waters are used from drinking water supplies and the water becomes exposed to the atmosphere, the Fe^{2+} is oxidized by O_2 to Fe^{III} (ferric iron), which is insoluble at neutral pH and precipitates as $\text{Fe}(\text{OH})_3(\text{s})$.

Write the balanced equation for the oxidation of Fe^{2+} to $\text{Fe}(\text{OH})_3(\text{s})$ by O_2 with the help of Rxn.

What is the log K value for the reaction?

This is Exercise 2
from the Redox I
class

Exercise 1: Solution



Basis	Command	Results
balance reaction for		
	Fe++	<input type="text"/> activity
in terms of		
	O2(aq)	<input type="text"/> activity
	Fe(OH)3(ppd)	Fe++ <input type="text"/> activity
	H+	<input type="text"/> activity
	H2O	<input type="text"/> activity
	temperature	<input type="text"/> C

File Edit Run Config View Help

Basis	Command	Results
-------	---------	---------

