

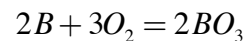
06J: Problems Related to Ellingham Diagrams

1. Descriptions

- (i) What is the architecture of Ellingham Diagrams
- (ii) What is the most useful application of these Diagrams

2. Construction

Construct an Ellingham Diagram for the following equation



Where B and the oxide are solids and oxygen is in the gas phase.

The standard Gibbs Free “formation” Energy of the oxide is given by

$$\Delta G_{B_2O_3}^{\circ} = -1500 + 0.25T \text{ in units of kJ mol}^{-1}, \text{ where T is in Kelvin.}$$

Draw the Ellingham diagram for this reaction and show how it can be used to estimate the oxygen pressure that will hold the reaction in equilibrium at 1000 K.

3. Prediction of Oxidation

Assume two metals held at a specific temperature at a specific oxygen pressure. Describe in words how the Ellingham Diagrams can be used to determine

- (i) which metal will oxidize preferentially at this oxygen pressure and temperature, or
- (ii) neither of the metals would oxidize, or
- (iii) both metals will oxidize.