INDIAN INSTITUTE OF TECHNOLOGY, BOMBAY

**Department of Metallurgical Engineering and Materials Science**

**MM 209-S2: THERMODYNAMICS : 2019-20: Fall**

**Tutorial No. 10: Date: Oct 18, 2019**

1. (a) 0.05 wt% silicon in iron is in equilibrium with pure silica (solid) and dissolved oxygen at 1950K. What is the dissolved oxygen content ? Assume Henry’s law followed by solutes.

(b) Now the melt is cooled to 1800K without any additional oxygen being available. That is now the oxygen and silicon contents ? ( Equilibrium shifts, but Si and O removed have to be in stoichiometric proportions). Mol. Wt: Si :28, O2 : 32

1. (a) A steel melt contains 1%C, 2%Si, 1%Mn and some small amount of oxygen dissolved. Above it there is a slag in which the aSiO2 w.r.t. solid silca is 0.01, and a gas in which pCO is 1 atm. Calculate the pO2 in equilibrium with (i) carbon (ii) silicon. T = 1873K. Henry’s Law is not followed by the solutes.

(b) If this iron is progressively oxidized by increasing the oxygen potential of the slag slowly which will oxidize first, silicon or carbon? T = 1873.

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