ABE 303 – Applications of Physical Chemistry to Biological Processes

Homework 4– Fall 2017

Deadline Thursday November 9

Problem - 50 marks

Consider the dry instant soup containing the following ingredients rice, cooked chicken, peas and bay leaf with the composition and characteristics indicated in the table below. Calculate the equilibrium water activity of the equilibrium moisture of the sample. Sorption isotherms for each component of the mixture are also given below. You can use a polynomial or the GAB model to fit your moisture sorption data.

Ingredient	Initial Moisture % - wet basis	Weight (grams) – wet basis
Rice	9.8	300
Chicken	8.3	200
Peas	6.1	80
Bay leaf	5.5	1

Rice		Chicken		Peas		Bay leaf	
a_w	m (kg/kg)	a_w	$m^{(1)}$ (kg/kg)	a_w	$m^{(1)}$ (kg/kg)	a_w	$m^{(1)}$ (kg/kg)
0	0	0	0	0	0	0	0
0.1	7.3	0.05	5.6	0.05	5.4	0.05	3.4
0.15	8.3	0.1	6.7	0.1	5.7	0.1	4.2
0.2	9.5	0.15	7.4	0.15	5.9	0.15	4.9
0.25	10.9	0.2	8.2	0.2	6.5	0.2	5.5
0.3	13.2	0.25	9.2	0.25	7.4	0.25	6.2
0.35	15.6	0.3	9.9	0.3	7.6	0.3	6.8
0.4	18.2					0.35	7.2
0.45	18.9						

(1) The moisture in the sorption isotherms are expressed in dry basis, i.e. kg water/kg dry material