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Appendix

Table 1 Chung EMC equation constants for various grains

S.No	Grain	C	E	F
1	Barley	91.323	0.33363	0.050279
2	Beans, edible	160.629	0.43001	0.062596
3	Corn yellow dent	30.205	0.33872	0.058970
4	Peanut, kernel	33.892	0.18948	0.034196
5	Peanut, pod	12.354	0.16510	0.026383
6	Rice, rough	35.703	0.29394	0.046015
7	Sorghum	102.849	0.35649	0.050907
8	Soybean	100.288	0.41631	0.071853
9	Wheat, durum	112.350	0.37761	0.055318
10	Wheat, hard	50.998	0.35616	0.056788
11	Wheat, soft	35.622	0.27908	0.042360

Source: (Brooker et al., 1992)

Table 2 Equations and constants for calculating Latent Heat of Vaporization for various grains

S.No	Grain	A	B
1	Barley	0.8266	19.901
2	Beans, edible	0.4922	14.965
3	Corn, yellow	1.2925	16.961
4	Canola(rape seed)	1.3577	0.032
4	Rice, rough	2.0692	21.739
5	Sorghum	1.0060	19.650
6	Soybean	0.7000	14.969
7	Wheat		
	i)Durum	0.7405	18.010
	ii) Hard	1.2287	17.612
	iii)Soft	2.5348	23.628

Source: Reprinted with permission from R.C Brook and G.H Foster, 1981, Drying, cleaning, and conditioning. In CRC Handbook of Transportation and Marketing and Agriculture, vol.2 Field crops, Essex E. Finney, Jr., ed. CRC Press.

Table 3 Recommendation for drying grain with heated air [Talbot, 2003]

S. No	Variable	Ear corn	Shelled corn	Wheat	Oats	Barley	Sorghum	Soybeans	Rice	Peanuts
1	Maximum moisture content of crop at harvesting for satisfactory drying: With heated air,%	35	35	25	25	25	25	25	25	45-50
	ii)Maximum moisture content of crop for safe storage in a tight structure,%	13	13	13	13	13	12	11	12	13
2	Maximum relative humidity of air entering crop that will dry crop down to safe storage level when natural air is used for drying,%	60	60	60	60	60	60	65	60	75
3	Maximum safe temperature of heated air entering crop for drying when crop is to be									
	used for : i)Seed (°C)	43	43	43	43	41	43	43	43	32
	ii)Sold for commercial use (°C)	54	54	60	60	41	60	49	43	32
	iii)Animal feed (°C)	82	82	82	82	82	82			

Table 4 Effective Moisture Diffusivity in some materials

S.No	Material	Water content Kg/kg db	Temperature (°C)	Diffusivity (m^2/s)
1	Alfalfa stems	<3.70	26	$2.6*10^{-12} - 2.6*10^{-09}$
2	Apple	0.12 0.15-7	60 30-76	$6.5*10^{-12} - 1.2*10^{-10}$ $1.2*10^{-10} - 2.6*10^{-10}$
3	Biscuit	0.1-0.65	20-100	$9.4*10^{-10} - 9.7*10^{-08}$
4	Bread	0.1-0.7	20-100	$2.5*10^{-9} - 5.5*10^{-07}$
5	Carrot	0.03-11.6	42-80	$9*10^{-10} - 3.3*10^{-09}$
6	Corn	0.05-0.23 0.19-0.27	40 36-62	$1*10^{-12} - 1*10^{-10}$ $7.2*10^{-11} - 3.3*10^{-10}$
7	Fish muscle	0.05-0.3	30	$8.1*10^{-11} - 3.4*10^{-10}$
8	Garlic	0.2-1.6	22-58	$1.1*10^{-11} - 2*10^{-10}$
9	Milk foam Skim	0.2 0.25-0.80	40 30-70	$1.1*10^{-09}$ $1.5*10^{-11} - 2.5*10^{-10}$
10	Muffin	0.1-0.65	20-100	$8.4*10^{-10} - 1.5*10^{-7}$
11	Onion	0.05-18.7	47-81	$7*10^{-10} - 4.9*10^{-9}$
12	Pasta, Semolina Corn based Durum wheat	0.01-0.25 0.1-0.4 0.16-0.35	40-125 40-80 50-90	$3*10^{-13} - 1.5*10^{-10}$ $5*10^{-11} - 1.3*10^{-10}$ $2.5*10^{-12} - 5.6*10^{-11}$
13	Pepper, green	0.04-16.2	47-81	$5*10^{-10} - 9.2*10^{-09}$
14	Pepperoni	0.19	12	$4.7*10^{-11} - 5.7*10^{-11}$
15	Potato	0.6 <4.0 0.15-3.5 0.01-7.2	54 65 65 39-82	$2.6*10^{-10}$ $4*10^{-10}$ $1.7*10^{-09}$ $5*10^{-11} - 2.7*10^{-09}$
16	Rice	0.18-0.36 0.28-0.64	60 40-56	$1.3*10^{-11} - 2.3*10^{-11}$ $1*10^{-11} - 6.9*10^{-11}$
17	Soybeans, defatted	0.05	30	$2*10^{-12} - 5.4*10^{-12}$

18	Starch, gel Granular	0.1-0.3 0.2-3.0 0.75 0.1-0.5	25 30-50 25-140 25-140	$1*10^{-12}-2.3*10^{-11}$ $1*10^{-10}-1.2*10^{-09}$ $1*10^{-10}-1.5*10^{-09}$ $5*10^{-10}-3*10^{-09}$
19	Sugar beet	2.5-3.6	40-80	$4*10^{-10}-1.3*10^{-09}$
20	Tapioca root	0.16-1.95	97	$9*10^{-10}$
21	Turkey	0.04	22	$8*10^{-15}$
22	Wheat	0.12-0.3 0.13-0.2	21-80 20	$6.9*10^{-12}-2.8*10^{-10}$ $3.3*10^{-10}-3.7*10^{-09}$

Source: (Arun S. Mujumdar, 2014)

Table 5. Equations and constants for calculating specific heat for various grains as effected by moisture content

Material	C1	C2
Corn	1.465	0.0356
Yellow corn	1.361	0.0397
Oats	1.277	0.0327
Rapeseed(canola)	1.357	0.0320
Rough rice	1.110	0.0448
Sorghum	1.390	0.0322
Soybean	1.637	0.0193
Hard wheat	1.185	0.0303
Soft wheat	1.394	0.0409
Kaolin	1.100	4.200

Specific heat=C1+C2*X(%,w.b.) [Brooker et al., 1992]