**Concrete Gas Permeability Measurements from Different Approaches: Correlation Analysis**

Dongdong Zhang, Kefei Li[[1]](#footnote-1)

Civil Engineering Department, Tsinghua University, Beijing 100084, China

Dataset for CemBureau/Torrent measurement of gas permeability (36 specimens)

Table 1: Gas permeability results of CO specimens from CemBureau and Torrent methods

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Materials | | CO3 | | | CO4 | | | CO5 | | | CO6 | | |
| 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| 70% | Saturation | 70.5% | 70.1% | 70.3% | 70.2% | 69.6% | 70.0% | 70.0% | 69.8% | 68.4% | 69.5% | 69.3% | 68.9% |
| *k*0(\*10-18) | 1.07 | 0.71 | 1.03 | 0.20 | 0.41 | 0.26 | 0.65 | 4.39 | 4.20 | 3.45 | 5.64 | 3.87 |
| *b*(\*105) | 2.14 | 1.75 | 1.50 | 1.73 | 2.01 | 3.66 | 3.86 | 1.40 | 1.25 | 1.90 | 1.99 | 1.86 |
| *R*2 | 0.995 | 0.974 | 0.982 | 0.964 | 0.973 | 0.910 | 0.986 | 0.996 | 0.982 | 0.995 | 0.999 | 0.993 |
| kT(\*10-18) | 4.75 | 3.67 | 3.17 | 2.06 | 1.26 | 1.30 | 12.83 | 22.48 | 23.47 | 24.85 | 38.39 | 22.72 |
| 50% | Saturation | 46.9% | 47.8% | 47.8% | 52.8% | 48.0% | 44.9% | 58.6% | 49.6% | 45.8% | 55.7% | 49.6% | 49.3% |
| *k*0(\*10-18) | 1.19 | 1.19 | 1.51 | 0.63 | 1.23 | 1.14 | 0.79 | 4.83 | 4.50 | 4.06 | 8.63 | 4.40 |
| *b*(\*105) | 2.74 | 1.06 | 1.17 | 7.02 | 3.72 | 4.95 | 4.18 | 2.02 | 2.61 | 2.94 | 1.76 | 2.9 |
| *R*2 | 0.999 | 0.987 | 0.980 | 0.995 | 0.998 | 0.997 | 0.997 | 0.984 | 0.983 | 0.985 | 0.991 | 0.983 |
| kT(\*10-18) | 8.05 | 4.13 | 6.01 | 3.30 | 5.04 | 5.02 | 7.26 | 24.47 | 19.59 | 19.63 | 34.94 | 31.76 |
| 30% | Saturation | 25.2% | 27.0% | 27.7% | 35.0% | 26.8% | 24.5% | 38.3% | 30.2% | 24.5% | 34.6% | 28.0% | 28.9% |
| *k*0(\*10-18) | 2.94 | 2.49 | 3.48 | 2.83 | 6.09 | 8.97 | 2.67 | 6.16 | 8.74 | 12.07 | 15.61 | 14.58 |
| *b*(\*105) | 4.35 | 4.51 | 2.9 | 2.24 | 1.94 | 0.84 | 6.78 | 9.06 | 8.06 | 3.31 | 5.92 | 4.49 |
| *R*2 | 0.995 | 0.993 | 0.992 | 0.998 | 0.997 | 0.991 | 0.995 | 0.998 | 0.999 | 0.996 | 0.982 | 0.993 |
| kT(\*10-17) | 3.08 | 1.59 | 2.41 | 1.49 | 2.18 | 2.10 | 3.51 | 8.97 | 11.46 | 6.22 | 23.02 | 12.73 |
| 0% | Saturation | 1.7% | 2.0% | 2.0% | 0.0% | 0.0% | 1.0% | 0.0% | 0.0% | 2.0% | 0.0% | 0.4% | 0.0% |
| *k*0(\*10-17) | 1.34 | 0.87 | 0.71 | 0.77 | 1.77 | 2.29 | 2.79 | 5.28 | 3.29 | 3.40 | 6.36 | 4.71 |
| *b*(\*105) | 2.25 | 4.61 | 7.38 | 2.59 | 1.43 | 0.67 | 1.17 | 1.09 | 2.31 | 2.86 | 1.96 | 2.73 |
| *R*2 | 0.998 | 0.980 | 0.919 | 0.998 | 1.000 | 0.996 | 0.999 | 0.995 | 0.997 | 0.999 | 1.000 | 0.995 |
| kT(\*10-17) | 6.49 | 4.15 | 6.49 | 5.29 | 6.72 | 6.24 | 12.14 | 28.95 | 20.97 | 17.32 | 39.12 | 37.57 |

Table 2: Gas permeability results of CF specimens from CemBureau and Torrent methods

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Material | | F3 | | | F4 | | | F5 | | | F6 | | |
| 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| 70% | Saturation | 66.7% | 67.8% | 69.6% | 70.5% | 72.3% | 71.5% | 71.3% | 73.1% | 73.5% | 71.6% | 72.5% | 71.9% |
| *k*0(\*10-20) | 6.41 | 19.46 | 3.92 | 1.23 | 9.87 | 12.71 | 5.58 | 3.76 | 1.20 | 1.47 | 4.89 | 3.98 |
| *b*(\*105) | 1.77 | 1.49 | 1.55 | 26.71 | 6.71 | 1.11 | 4.49 | 3.58 | 2.05 | 4.58 | 4.33 | 1.46 |
| R2 | 0.928 | 1.000 | 0.756 | 0.999 | 0.951 | 0.980 | 0.786 | 0.989 | 0.998 | 0.719 | 0.543 | 0.999 |
| *k*T(\*10-19) | 5.69 | 6.69 | 1.86 | 8.86 | 16.85 | 3.69 | 8.57 | 12.00 | 11.64 | 5.18 | 11.88 | 7.38 |
| 50% | Saturation | 46.2% | 46.1% | 45.2% | 47.1% | 54.9% | 54.3% | 47.7% | 55.7% | 59.5% | 46.8% | 54.3% | 53.9% |
| *k*0(\*10-19) | 1.35 | 4.70 | 2.52 | 12.31 | 7.39 | 7.04 | 9.82 | 4.45 | 3.67 | 7.44 | 6.42 | 1.83 |
| *b*(\*105) | 6.49 | 3.87 | 3.46 | 1.90 | 1.50 | 1.25 | 3.03 | 2.54 | 2.32 | 3.10 | 0.24 | 5.08 |
| R2 | 0.992 | 0.997 | 0.999 | 0.997 | 0.994 | 0.995 | 0.993 | 1.000 | 0.904 | 0.999 | 0.998 | 0.990 |
| *k*T(\*10-18) | 5.14 | 2.27 | 2.61 | 6.08 | 3.78 | 2.20 | 5.35 | 4.12 | 1.90 | 5.32 | 3.77 | 4.27 |
| 30% | Saturation | 24.3% | 24.8% | 26.2% | 35.8% | 35.3% | 35.8% | 38.2% | 37.6% | 36.4% | 34.9% | 35.2% | 35.6% |
| *k*0(\*10-18) | 1.12 | 1.15 | 1.09 | 3.28 | 2.54 | 2.88 | 2.16 | 2.51 | 1.43 | 2.27 | 2.78 | 2.50 |
| *b*(\*105) | 3.93 | 2.71 | 4.44 | 1.79 | 2.01 | 1.74 | 2.77 | 2.06 | 2.89 | 2.68 | 2.34 | 1.82 |
| R2 | 0.997 | 0.999 | 0.993 | 0.996 | 0.999 | 0.994 | 0.997 | 0.992 | 0.996 | 0.998 | 0.999 | 0.981 |
| *k*T(\*10-17) | 1.28 | 0.84 | 0.96 | 1.16 | 1.44 | 1.13 | 1.07 | 1.20 | 1.15 | 1.19 | 1.85 | 1.58 |
| 0% | Saturation | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| *k*0(\*10-17) | 0.21 | 0.85 | 0.39 | 2.56 | 1.96 | 1.98 | 2.74 | 2.66 | 2.12 | 2.07 | 3.13 | 2.19 |
| *b*(\*105) | 2.78 | 1.57 | 2.42 | 0.87 | 0.92 | 0.85 | 0.99 | 1.17 | 1.39 | 1.27 | 1.45 | 1.37 |
| R2 | 0.995 | 0.990 | 0.979 | 0.983 | 0.949 | 0.965 | 0.965 | 0.997 | 0.996 | 0.980 | 0.995 | 0.996 |
| *k*T(\*10-17) | 2.51 | 1.22 | 1.88 | 5.84 | 5.89 | 4.76 | 13.32 | 9.65 | 8.91 | 6.86 | 16.82 | 11.65 |

Table 3: Gas permeability results of CG specimens from CemBureau and Torrent methods

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Materials | | S3 | | | S4 | | | S5 | | | S6 | | |
| 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| 70% | Saturation | 74.3% | 74.0% | 76.0% | 71.1% | 72.0% | 71.8% | 71.1% | 72.6% | 71.4% | 73.6% | 72.9% | 73.1% |
| *k*0(\*10-17) | 2.03 | 5.60 | 4.95 | 4.00 | 3.84 | 2.16 | 5.44 | 4.80 | 5.62 | 4.35 | 5.35 | 5.63 |
| *b*(\*105) | 0.47 | 0.65 | 0.68 | 0.10 | 0.70 | 0.40 | 0.61 | 0.50 | 0.24 | 0.23 | 0.77 | 0.43 |
| R2 | 0.993 | 0.998 | 0.999 | 0.999 | 0.986 | 0.982 | 0.997 | 1.000 | 0.990 | 0.998 | 0.990 | 0.989 |
| *k*T(\*10-17) | 3.38 | 14.08 | 10.52 | 5.13 | 6.70 | 6.11 | 6.36 | 2.69 | 2.88 | 7.38 | 7.48 | 10.44 |
| 50% | Saturation | 54.4% | 57.9% | 58.1% | 47.9% | 52.9% | 53.7% | 44.7% | 53.8% | 52.9% | 51.9% | 55.0% | 56.0% |
| *k*0(\*10-16) | 0.79 | 1.47 | 1.40 | 1.83 | 1.76 | 1.13 | 2.71 | 1.72 | 1.74 | 2.77 | 2.72 | 2.64 |
| *b*(\*105) | 0.32 | 0.40 | 0.47 | 0.34 | 0.26 | 0.38 | 0.37 | 0.42 | 0.38 | 0.19 | 0.23 | 0.19 |
| R2 | 0.991 | 0.999 | 0.997 | 0.991 | 0.995 | 1.000 | 0.996 | 0.999 | 0.997 | 0.978 | 0.981 | 0.957 |
| *k*T(\*10-16) | 2.22 | 4.31 | 3.91 | 4.72 | 4.64 | 4.21 | 5.60 | 2.94 | 3.64 | 6.97 | 6.97 | 6.81 |
| 30% | Saturation | 38.2% | 38.5% | 39.8% | 34.5% | 33.7% | 34.9% | 34.7% | 35.1% | 35.3% | 37.4% | 36.8% | 37.6% |
| *k*0(\*10-16) | 1.16 | 2.21 | 2.08 | 2.47 | 2.79 | 2.02 | 3.92 | 3.30 | 3.44 | 5.18 | 5.94 | 6.27 |
| *b*(\*105) | 0.35 | 0.37 | 0.42 | 0.33 | 0.30 | 0.36 | 0.19 | 0.26 | 0.30 | 0.20 | 0.22 | 0.20 |
| R2 | 0.987 | 0.994 | 0.995 | 0.996 | 0.999 | 0.999 | 0.998 | 0.997 | 0.997 | 0.997 | 0.999 | 0.992 |
| *k*T(\*10-16) | 3.09 | 5.51 | 5.17 | 5.04 | 6.41 | 6.08 | 8.56 | 6.88 | 6.54 | 13.59 | 14.54 | 17.17 |
| 0% | Saturation | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% | 0% |
| *k*0(\*10-16) | 2.28 | 4.10 | 4.08 | 4.45 | 4.83 | 3.61 | 6.79 | 6.13 | 6.85 | 11.60 | 12.57 | 13.80 |
| *b*(\*105) | 0.34 | 0.36 | 0.40 | 0.29 | 0.29 | 0.24 | 0.26 | 0.29 | 0.21 | 0.22 | 0.22 | 0.17 |
| R2 | 0.977 | 0.967 | 0.964 | 0.986 | 0.997 | 0.979 | 0.998 | 0.999 | 0.981 | 0.984 | 0.981 | 0.960 |
| *k*T(\*10-16) | 5.95 | 8.52 | 7.93 | 7.78 | 9.72 | 8.92 | 13.46 | 10.62 | 11.67 | 20.95 | 24.23 | 24.21 |

1. Corresponding author, E-mail: [likefei@tsinghua.edu.cn](mailto:likefei@tsinghua.edu.cn); ORCID:0000-0003-1635-6362 [↑](#footnote-ref-1)